

The Relationships Among Two Measures of Auditory
Comprehension and Daily Living Communicative Skills

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Slightly more than 110 years ago Wernicke (1874) undertook the first systematic description of comprehension deficits in aphasia. Since that time, and particularly in the last twenty years, clinical researchers have continued to evaluate the critical aspects of spoken language that influence the aphasic individual's comprehension. In 1962, the introduction of the Token Test (DeRenzi and Vignolo, 1962) provided the impetus for renewed research.

While studies generally have found that the Token Test is an accurate and sensitive indicator of the presence of aphasia, an important concern has been the degree to which the test can be considered a relatively pure measure of verbal comprehension. Although the test has been used in clinics and laboratories throughout the world for over twenty years, the precise reasons for differential performance by aphasic subjects are not clear. As Boller *et al.* (1977) suggested, performance variations within and among groups might be accounted for by a variety of reasons and further research into stimulus and subject variables related to auditory comprehension processes is warranted.

A criticism of the Token Test that has persisted is the relative difficulty patients have in dealing with abstract shapes compared to more familiar objects, or to the comprehension required in daily living.

Houses and flowers of various sizes and colors, replaced circles and squares in a Romanian version (Kreindler *et al.*, 1971) and resulted in more accurate performance. Martino, Pizzamiglio, and Razzano (1976) designed a "token test" that used a cup, comb, brush, pencil, and envelope which were either black or white and either large or small. They also found more accurate performance with objects than on the original Token Test.

Modification of commands and test stimulus items were proposed by Berry (1976) who suggested a series of 10 supplementary tests of auditory comprehension in a format he described as "A clinical alternative to the Token Test." Subsequently, aphasic performance using Berry's suggested tasks was studied by Tompkins *et al.* (1980), who found that some of the tasks from Berry's Advanced Auditory Battery could be administered to mildly aphasic subjects to expand upon information obtained from auditory subtests of the PICA.

On the other hand, others who have modified items on the test have reported that concrete objects did not result in improved performance (Lesser, 1979; Lohman and Prescott, 1978).

Others (McNeil, 1973; McNeil and Prescott, 1977) have pointed out that the Token Test may be an inaccurate index of "functional" comprehension because stimulus items are abstract and neutral. In a discussion of future directions of auditory comprehension research, Brookshire (1980) reported "There seems to be a general consensus that investigators need to move toward 'real-life' tasks and situations as soon as possible" (p. 364).

The Functional Auditory Comprehension Task (FACT). The Functional Auditory Comprehension TAsk (FACT) was developed by LaPointe and Horner (1978) in an attempt to circumvent some of the alleged shortcomings of the Token Test. It was conceived as a tool that would retain the principles underlying the

Token Test, but would emphasize greater concreteness, a systematic increase in command difficulty, balance in action-object (verb-noun) frequency, as well as the potential for auditory deficit pattern analysis at the level of three-stage commands.

A primary consideration in the development of the FACT was to carefully arrange a hierarchy of difficulty in terms of length. Therefore, the test is composed of one-part commands (20 items), two-part commands (15 items), and three-part commands (20 items). The test requires twelve readily available objects, six of which comprise a "closed set" of stimulus items (coin, key, pencil, paper, cup, spoon) and six of which comprise an "open set" (ceiling, floor, table [or desk], door, chair, pajamas [or shirt/blouse]). Appendix A contains the entire FACT.

Statement of the Problem. Our understanding of the precise nature and the situational and contextual variables that affect auditory comprehension is still incomplete. While the topic has been a popular focus for research in aphasia, only a few measures of aphasic auditory performance have emerged. One widely used measure, the Token Test, has received a good deal of criticism because of its apparent dependence on visual-spatial, memory, and other skills only tangentially related to auditory comprehension. Though the use of geometric shapes was crucial to the rationale for its development, clinicians have expressed concern over the test's inordinate difficulty, particularly for some patients who seem to have reasonably intact contextual auditory behavior.

Purposes. This study was designed to explore the relationships among levels of performance on two measures of auditory comprehension impairment (Token Test and Functional Auditory Comprehension Test) with a measure devised to sample communication under more naturalistic circumstances (Communicative Abilities of Daily Living).

Specific purposes of the study include determining answers to the following questions:

- 1) What is the correlation of performance on the Token Test and on the FACT?
- 2) What is the relationship of FACT and Token Test scores to performance on the CADL?

Methods and Procedures. Ten male aphasic subjects who ranged in age from 31 to 65 years ($\bar{X} = 55.7$) and ranged in months post-onset from 2 to 230 ($\bar{X} = 44.9$) were selected from the current and recent clinical caseload of a metropolitan Veterans Administration Medical Center in the Southwestern United States. All subjects suffered left-hemisphere cerebrovascular accidents and ranged in severity on the Porch Index of Communicative Ability from the 31st to the 89th over-all percentile ($\bar{X} = 59$ OA percentile).

All subjects were administered a 40-item modified version of the Token Test (LaPointe *et al.*, 1971), the Functional Auditory Comprehension Task (LaPointe and Horner, 1978), the Communicative Abilities in Daily Living (Holland, 1980), and the Porch Index of Communicative Ability (Porch, 1981). Presentation order of the two auditory measures and the CADL was counter-balanced. All testing was carried out in a sound-treated room and subjects were screened to determine if they were able to match color, shape, and size of tokens. No subject presented inordinate hearing acuity deficiencies which would prevent their participation in the study. Subject responses were recorded on suitable forms and submitted to a number of univariate descriptive statistics as well as appropriate nonparametric correlational analyses (Spearman's rho).

Results. Table 1 presents group data for all subjects on the primary auditory measures in this study, as well as their scores on the PICA and CADL.

Table 1. Group scores on Token, FACT, CADL, and PICA for 10 subjects.

Measure	Range	Mean	SD
PICA	31-89%ile	59 (%ile)	21
Token	8-38	22.8 (57%)	10.5
FACT	24-55	43.3 (78%)	10.3
CADL	86-131	112.6 (83%)	13

As can be seen in Table 1, our sample of aphasic subjects ranged in performance from 8-38 on the Token Test with a mean of 22.8 (56%). On the FACT, performance ranged from 24-55 with a mean of 43.3 (78%). Overall severity on the PICA nearly reached the 60th percentile and functional communication as measured by the CADL ranged from 86-131 with a mean of 112.6 (83%).

All variables, including PICA auditory subtests VI and X were submitted to correlational coefficient analyses. Nonparametric Spearman's rho correlation coefficients are presented in Table 2.

Table 2. Correlational analysis of performance on primary variables for 10 subjects.

Comparison	Spearman's Rho Correlation Coefficient	Significance
Token and FACT	.64	.02
FACT and CADL	.82	.009
Token and CADL	.36	n.s.

Table 2 illustrates that the Token Test and FACT are moderately and significantly correlated (.64). The FACT and CADL are strongly positively correlated (.82) and the Token Test and CADL are not significantly correlated (.36).

Conclusions. The results of this study confirm the clinical impression that performance on the FACT may be more directly related to those communicative skills associated with daily living than the Token Test, which appears from these data to be unrelated to performance on the CADL and hence may not reflect auditory comprehension skills necessary to daily living. The suggestion that traditional measures may not capture the essence of auditory comprehension requirements of daily living is suggested by others as well. Recently Brookshire and Nicholas (1984) looked at auditory comprehension of main ideas derived from short narrative paragraphs. The results of their experiment suggested that aphasic subjects' performance on traditional tests of spoken language comprehension is not a good predictor of their comprehension of either main ideas or details in multiple-sentence spoken messages. In their study neither the Token Test nor the auditory comprehension subtests of the Boston Diagnostic Aphasia Examination (BDAE) predicted aphasic subjects' performance on the spoken paragraphs presented. The results of this experiment caused Brookshire and Nicholas (1984) to become married..to the following ideas:

First, they suggested that both aphasic and right-hemisphere damaged listeners go about making sense of spoken discourse in much the same way that non-brain-damaged listeners do. That is, they give preference to main ideas over details, and they are not greatly inconvenienced when information is given indirectly, rather than directly.

Second, their results also suggested that context plays an important role in comprehension of spoken discourse for aphasic subjects. As a consequence, predictions about aphasic listeners' comprehension of discourse in daily-life situations should be based upon samples of performance on discourse, and not upon performance on traditional tests of comprehension. .

Waller and Darley (1978) also asserted the benefit of using nontraditional measures of comprehension and suggested that paragraphs may be a more accurate reflection of the exigencies of everyday listening.

At the same time, while the Token Test may not relate well to the communicative skills tapped by the CADL, there can be little doubt that it measures some fundamental auditory processing skills. The moderate correlation between the FACT and the Token Test lends assurance to the conclusion that these measures are tapping related skills. At least some of the common components of auditory comprehension are being measured by both, and this lends a degree of concurrent validity to interpretation of FACT scores.

The contributions of this study are essentially twofold. First, it documents the frequent clinical observation that other measures of auditory comprehension may be more related to functional or contextual communication than the Token Test is. Second, it provides assurance that the clinician-researcher can use the FACT either in a supplementary role in auditory evaluation or as a replacement for the Token Test.

Advantages to be gained by this decision may include a more detailed evaluation of the relative impairment of actions and objects; a more clinically-interpretable measure of level of breakdown relative to length (one-stage, two-stage, three stage commands), and perhaps wider patient applicability, compliance, and satisfaction, since the measure generates clinical comments on its ease and relevance.

Continued research on theoretic and applied levels will no doubt clarify whether or not auditory processing skills form the central core of aphasic disorders. In the meantime, refinement and modification of our assessment devices can aid us greatly in evaluating the nature of our patients' inability to understand what is said to them.

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APPENDIX

FUNCTIONAL AUDITORY COMPREHENSION TASK
Action and Object Manipulation

Patient Name _____

Date _____

Examiner _____

Materials:

Movable Objects: coin, key, pencil, paper, cup, spoon

Objects in Room: ceiling, floor, table (desk), door, chair, pajamas (shirt)

Actions: point to, tap, shake, pick up, give me, turn over, lift, move, hand me, touch

Instructions:

This is a test of understanding spoken directions. It involves objects on the table (gesture) and objects in the room. Listen very carefully, as I cannot repeat any item. Are you ready?

I. ONE-PART COMMANDS

(a) One Action—One Object: Object Changes

- | | P | F |
|-------------------------------|--------------------------|--------------------------|
| 1. Point to the chair | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Point to the floor | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Point to the pencil | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Point to the paper | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Point to the ceiling | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Point to the money | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Point to the cup | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Point to the door | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Point to the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Point to the table | <input type="checkbox"/> | <input type="checkbox"/> |

(b) One Action—One Object: Action Changes

- | | P | F |
|-------------------------------|--------------------------|--------------------------|
| 11. Tap the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Shake the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Point to the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Pick up the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Give me the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Turn over the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Lift the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Move the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Hand me the spoon | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Touch the spoon | <input type="checkbox"/> | <input type="checkbox"/> |

II. TWO-PART COMMANDS

(a) One Action—Two Objects

- | | P | F |
|--|--------------------------|--------------------------|
| 21. Point to the ceiling and point to the floor | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Point to the key and point to the money | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Point to the paper and point to your pajamas | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Point to the door and point to the table | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Point to the chair and point to the pencil | <input type="checkbox"/> | <input type="checkbox"/> |

LaPointe, L.L., & Horner, J. (1978, Spring). The functional auditory comprehension task (FACT): Protocol and test format. FLASHA Journal, 27-33.

- (b) Two Actions—One Object
- | | | |
|---|--------------------------|--------------------------|
| 26. Point to the cup and tap the cup. | P | F |
| 27. Turn over the cup and give me the cup. | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Pick up the cup and shake the cup. | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Shake the cup and give me the cup. | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Turn over the cup and tap the cup. | <input type="checkbox"/> | <input type="checkbox"/> |

- (c) Two Actions—Two Objects
- | | | |
|---|--------------------------|--------------------------|
| 31. Point to the floor and give me the paper | P | F |
| 32. Point to the chair and pick up the pencil | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Pick up the key and touch your pajamas | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Give me the money and point to the table | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Point to the ceiling and give me the key | <input type="checkbox"/> | <input type="checkbox"/> |

III. THREE-PART COMMANDS

- (a) One Action—Three Objects
- | | | |
|--|--------------------------|--------------------------|
| 36. Point to the table, point to your pajamas, and point to the pencil | P | F |
| 37. Point to the key, point to the money, and point to the paper | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. Point to the ceiling, point to the chair, and point to the door | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Point to the floor, point to the key, and point to the chair | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Point to the pencil, point to the paper, and point to the money | <input type="checkbox"/> | <input type="checkbox"/> |

- (b) Three Actions—One Object
- | | | |
|--|--------------------------|--------------------------|
| 41. Point to the cup, turn over the cup, and give me the cup | P | F |
| 42. Turn over the cup, pick up the cup, and shake the cup | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Tap the cup, shake the cup, and give me the cup | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. Pick up the cup, tap the cup, and give me the cup | <input type="checkbox"/> | <input type="checkbox"/> |
| 45. Turn over the cup, point to the cup, and pick up the cup | <input type="checkbox"/> | <input type="checkbox"/> |

- (c) Two Actions—Three Objects
- | | | |
|---|--------------------------|--------------------------|
| 46. Point to the floor and point to the chair, and give me the key | P | F |
| 47. Point to the table and point to your pajamas, and pick up the money | <input type="checkbox"/> | <input type="checkbox"/> |
| 48. Pick up the paper and pick up the key, and point to the ceiling | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. Give me the money and give me the pencil, and point to the table | <input type="checkbox"/> | <input type="checkbox"/> |
| 50. Point to your pajamas and point to the floor, and give me the key | <input type="checkbox"/> | <input type="checkbox"/> |

- (d) Three Actions—Three Objects
- | | | |
|---|--------------------------|--------------------------|
| 51. Point to the door, pick up the pencil, and touch the table | P | F |
| 52. Give me the money, point to the chair, and pick up the paper | <input type="checkbox"/> | <input type="checkbox"/> |
| 53. Point to the table, give me the money, and pick up the key | <input type="checkbox"/> | <input type="checkbox"/> |
| 54. Pick up the paper, point to the ceiling, and give me the pencil | <input type="checkbox"/> | <input type="checkbox"/> |
| 55. Give me the key, point to your pajamas, and pick up the paper | <input type="checkbox"/> | <input type="checkbox"/> |

	Score	Subtotals		Score	Subtotals
Part I. (a)	_____		Part III. (a)	_____	
(b)	_____	_____	(b)	_____	
Part II. (a)	_____		(c)	_____	
(b)	_____		(d)	_____	_____
(c)	_____	_____	TOTAL:	_____	_____

DISCUSSION

- Q: Can you tell me what kind of Token Test you used and how you scored it?
- A: Yes; it's a 40-item version of the Token Test that we modified at the VA Medical Center in Gainesville several years ago, scored on a pass/fail scoring system; and I guess it retains just about all of the elements of the original 62-item test with the exception of a couple of items that are dropped from each sub-test. Most of Subtest V is retained, in fact 20 items. We normed it on the VA Medical Center population several years ago, and just got in the habit of using that test since the VA was our environment for using it. We had non-brain-damaged norms for comparison. It's quite close to the original Token Test.
- Q: Do you have any reliability data for your FACT Test?
- A: Yes, as a matter of fact. These are some data that were run by Dr. Horner and some of her colleagues, and I've got the raw data here, and was going to run the IBM number cruncher statistics package and do the correlations on that but wasn't able to complete it. But I'll give you the raw data on it and you can make your own judgments. Six subjects were tested on test/retest on the FACT, and they received group scores of 28 on the first testing and 30.0 on the second testing. Raw data for intertester reliability (two different testers)--the mean was 29.3 for one tester for the six subjects and 29.0 for the second tester. I guess those raw data give us a little solace if we're willing to make the inferential leap that perhaps there's a comforting correlation there.
- Q: Why did you choose to not have a subtest with syntactically complex items as in Part V in the original token test? Was that a conscious decision on your part?
- A: Probably because we didn't feel it was necessary at the time.
- Q: Because they're rank ordered correlations, they could have been quite discrepant in terms of the real values, and still have the same ranks. Was that true, and what were those differences?
- A: I don't really recall what the rank ordered differences were.
- Q: Do you have any sense of whether the order of the three-part commands that's on the form is the order of difficulty of those commands? I wonder if three actions to one object is easier than two actions to three objects, and so on.
- A: My sense is that performance follows pretty closely to the order of the outline of three-part commands, though there may be a little twisting of some of the items in B and C, three action/one object and two action/three objects.
- Q: In terms of the value clinically of using the test--you may or may not agree with this from your recent experience--that first of all, we seem to see various patterns in certain patients, that is, the open versus closed set distinction was really very obvious in some patients; they could do the closed set but not the open set or they could do it when it was a single part command, but once the command got more complex there was a drop-out of certain comprehension abilities. It was in Part II and III as things got more complex that we saw the difference in the response to verbs versus nouns which was very helpful in terms of establishing treatment

decisions. I do recall that things did get more complex as we went through Part III A, B, C, and D, but at this point, because the commands are so complex we did see some primacy/recency effects and that sort of thing in addition to the noun versus verb problems.

A: As a matter of fact, we developed a little analysis sheet for breaking down performance on Part III so that we could take a look at patterns of performance, and I think it lends itself to that kind of analysis. I might add relative to the original rationale on the development of the test is relate to a couple of issues that came up yesterday, and that's the functionality and counseling about functionality. We were looking for an easier way to counsel family members on how they could more adequately communicate with folks with aphasia, and one-stage, two-stage, and three-stage commands seemed to be a good way of communicating to them on how to control length; and so that was part of the original justification for trying to break the test up in that kind of length divisions.

Q: I wondered if you did any correlations among different parts of the FACT and the Token Test to see whether you were getting the same consistent effect all the way through or whether different variables might be affecting the overall low correlation--I'm not surprised at your overall low correlation since the ACTS correlated very poorly with the Token Test also, but some of the correlations were higher than others--for example, the variable length in syntax items, and I just wondered whether you had done a similar kind of analysis.

A: Yes, we did an analysis of several correlations among the subtests, and just as you suggested, that's what we found. Some sections--I can't recall exactly which ones right now--were more highly correlated than others.