1   Introduction

People with severe aphasia, who can no longer rely on verbal communication, often receive therapy focusing on other communication channels, such as gesturing, drawing, or high-tech or low-tech communication aids (Alternative and Augmentative Communication (AAC) training. Hux *et al*. 2008, Van de Sandt-Koenderman 2004). Although widely used, the efficacy of this approach has not been investigated as extensively as treatment aiming at linguistic restoration.

In AAC training, the communicative modes are tailored to the assets and needs of the individual. To evaluate its efficacy, we need to assess whether AAC training improves a person's ability to convey information. The Scenario Test (ST) therefore examines the ability to convey a message verbally and/or non-verbally, in every-day life scenarios. The test was designed for persons with severe to moderate limitations of verbal communication.

In AAC use, communicative independence is a major factor (Lasker & Garrett 2006). Although many people with aphasia learn to use non-verbal strategies, they often do not use these spontaneously (Kraat 1990, Koul and Corwin 2004), needing a prompt from the communicative partner to switch to other channels when verbal communication fails (Yoshihata *et al.* 1998). Others are completely partner-dependent, and the communicative partner has to take the burden of the communication (Lasker & Garrett 2006). Because persons with aphasia communicate better with a supportive communication partner, the ST examines communication in a *dialogue* between the person with aphasia and the examiner, who acts as the supportive communication partner. It assesses the combined effectiveness of verbal and non-verbal communication in daily functioning. In the present study verbal and non-verbal communication is defined as follows: transfer of information through a combination of residual verbal skills, other communication channels (gesturing, writing or drawing) and/or a communication aid.

2   Methods

The ST comprises six daily-life scenarios of three items each (eg. shopping or inviting someone for a drink). All items are read aloud while a black-and-white line drawing depicting the situation is shown (Fig. 1). The picture is then removed, and subjects are asked to respond. The examiner provides support when needed, following a strict protocol that is set up hierarchically and reflects natural strategies of trained communicative partners.

Test sessions are videotaped and scored afterwards on a 4-point scale. For each item, obligatory information elements are defined. The maximum score (3) is given if the person with aphasia conveys all information elements independently. If support is needed, the item scores 2 points. If a person does not provide information, but responds adequately to yes/no questions, the score is 1.

2.1   Participants
122 stroke patients with aphasia and 25 healthy controls (Table 1).

<insert Table 1>

2.2   Procedure
In addition to the ST, the following tests were administered:
- ANELT (Blomert *et al.* 1995, verbal communication in every day life scenarios)
- Spontaneous Speech (Aachen Aphasia Test, AAT; Graetz *et al.* 1991)

- Communicative Effectiveness Index (CETI; Lomas *et al.* 1989), a partner questionnaire of communicative functioning.

2.3   Statistics:

Internal consistency: Cronbach's α .

Test-retest reliability: 20 persons with chronic aphasia (49.9 mpo) were assessed twice, with an interval of two weeks; Intra-class Correlation Coefficient (ICC).

Inter- & intra-judge reliability: five pairs of speech and language therapists (SLTs) scored 79 STs. Five randomly selected videotapes were scored twice by the same SLT with and interval of four weeks; ICC.

Congruent validity: Correlations between the ST and the other measures; Spearman's ρ.

Construct validity: Principal components analysis for categorical data (CATPCA).

Differential validity: Persons with aphasia were compared to the healthy control group. Furthermore, two groups of people with aphasia were compared, differing in their ability to communicate verbally (nonverbal subgroup: ANELT <20 versus verbal subgroup: ANELT >20); Mann-Whitney U analysis.

<insert Table 2>

Sensitivity to change: Reassessment of 22 persons with post-acute aphasia (< 6 weeks po) after 6 months; Paired samples t-test.

All statistical testing took place at the 0.05 level of significance (two-tailed).

3   Results

3.1   Reliability

Internal consistency was high (Cronbach's α 0.96).

Test-retest reliability: < 6 weeks po: 39.8 (SD=15.1), 6months po: 39.9 (SD=14.0), ICC: 0.98, p<0.001.

Interjudge reliability: ICC: 0.86 - 1.00; p<0.001.

Intrajudge reliability: ICC: 0.96 - 1.00; p<0.01.

3.2   Validity

Correlations with the ANELT and spontaneous speech (AAT) were high:

0.85 and 0.79, (p<0.01). The correlation with the CETI was moderate: 0.50 (p<0.01).

The CATPCA revealed two dimensions (total Cronbach's α 0.97; total amount of explained variance: 65.0%). These were interpreted as:

1. a general dimension, indicating general communicative abilities
2. communicative creativity.

Table 3 presents differences between persons with aphasia and non-aphasic controls, as well as between the two subgroups of persons with aphasia differing in their ability to communicate verbally. 87% of the persons with aphasia are correctly classified by the ST, as being either able or unable to communicate verbally (sensitivity 0.77; 0.93).

<insert Table 3>

In Table 4 the data on congruent validity for the non-verbal and verbal subgroups are compared, showing lower correlations for the non-verbal subgroup.

<insert Table 4>

3.3   Sensitivity

In the post-acute stage, the mean ST-score was 38.7 (SD=15.3). Six months later, the mean ST-score was 47.7 (SD=10.4). Paired samples t-test: t=-4.96; p<0.001. Table 5 specifies the individual results.

<center><insert Table 5></center>

4   Conclusions and clinical implications

This study shows that the ST is a reliable and valid instrument. Internal consistency and test-retest reliability were high. Inter- and intrajudge reliability were excellent. Correlations with other instruments measuring communication in aphasia suggest good congruent validity. In addition, the test shows good construct validity and differential validity.

The finding that the correlations with other measures were higher in the verbal subgroup than in the non-verbal subgroup is in line with our expectations. Persons in the verbal subgroup will predominantly give verbal reactions on the ST items. In this case, the ST measures the same construct as the ANELT and the AAT subtest. In contrast, for persons in the nonverbal subgroup, the ST measures a different construct, because the ST allows nonverbal reactions.

The finding that the CETI (overall communication) shows a lower correlation with the ST than the ANELT and AAT (verbal instruments), suggests that both instruments do not cover the same dimensions of communication. Whereas the ST focuses on the ability to convey information in simple scenarios, the CETI has a much broader concept of communication. It rates communicative behaviour eg. by asking the partner to what extent an individual with aphasia is able to participate in a conversation involving a number of people. Furthermore, the CETI is an indirect measure, reflecting the partner's view on the communication of a person with aphasia. In line with our results, Holland *et al.* (1999) also found a moderate correlation between the CADL and a rating of communication by the clinician. More research is needed on the relation between (partner) questionnaires and instruments directly assessing communication in aphasia.

The observation that the ST is sensitive to change allows its use in future studies on the efficacy of AAC therapy. However, it should be noted that the improvement found in this study may either reflect regained verbal communicative skills, improved non-verbal communication strategies or a combination of both. A more detailed analysis is needed to establish the contribution of training nonverbal skills to the communicative improvement.

5   References

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Figure 1

You are visiting your doctor, because you've had a bad cough for weeks.
The doctor asks: How can I help?

Table 1 Characteristics of the study population (N=122)

Characteristic	
Age (years)	58.4 ± 11.9
Years of education	10.3 ± 2.4
Months post stroke	15.2 ± 53.7
Gender	
Male	61.5%
Female	38.5%
Etiology	
LH CVA	91.8%
RH CVA	4.9%
Bilateral CVA	1.6%
Unknown	1.6%
Handedness	
Right	86.9%
Left	8.2%
Ambidextrous	0.8%
Unknown	4.1%
Severity of the aphasia[†]	
Mild	33.1%
Moderate	23.9%
Severe	43.0%

Values are mean ± standard deviation; LH: left hemisphere; RH: right hemisphere; CVA: cerebrovascular accident

[†]*Based on the Token Test of the Aachen Aphasia Test (Graetz et al. 1991).*

Table 2 Characteristics of the non-verbal subgroup (n=43)[*]

Characteristic	
Age (years)	59.7 ± 10.6
Years of education	10.5 ± 2.7
Months post stroke	18.1 ± 30.1
Gender	
Male	76.7%
Female	23.3%
Etiology	
LH CVA	90.7%
RH CVA	4.7%
Bilateral CVA	4.7%
Unknown	0.0%
Handedness	
Right	83.7%
Left	7.0%
Ambidextrous	2.3%
Unknown	7.0%
Severity of the aphasia[†]	
Mild	7.0%
Moderate	18.6%
Severe	74.4%

Values are mean ± standard deviation; LH: left hemisphere; RH: right hemisphere;

CVA: cerebrovascular accident

[*] *Based on the ANELT score (Blomert et al. 1995). The non-verbal subgroup consists of all persons with ANELT scores below 20, indicating severe verbal communication disorders.*

[†]*Based on the Token Test of the Aachen Aphasia Test (Graetz et al. 1991).*

Table 3 Data on differences between the groups.

Group	n	Mean score (0-54)	SD	z (Mann-Whitney U)	p
Non-aphasic	25	53.2	0.9		
Aphasic	122	39.5	13.9	-6.6	<0.01
Aphasic subgroup verbal[*]	72	47.5	7.1	-7.9	<0.01
Aphasic subgroup non-verbal[*]	43	26.5	12.5		

[*] *Based on the ANELT score (Blomert et al. 1995). Verbal: ANELT scores ≥20, indicating moderate to mild verbal communication disorders. Non-verbal: ANELT scores <20, indicating severe verbal communication disorders. Persons in the subgroup 'verbal' communicate mainly through speech, but some do also use non-verbal communication. Persons in the subgroup 'non-verbal' rely on non-verbal communication, although some of them occasionally produce a relevant word.*

Table 4 Congruent validity in two subgroups of persons with aphasia[‡]

Subgroup	ANELT		AAT interview		CETI	
			Communicative Behaviour			
	n	*r*	*n*	*r*	*n*	*r*
Non-verbal subgroup	43	.31[†]	42	.44[*]	27	.21[n.s.]
Verbal subgroup	72	.71[*]	71	.46[*]	38	.36[†]

[*]*p<0.01;* [†]*p<0.05; n.s. non-significant*

‡ Based on the ANELT score (Blomert et al. 1995). Verbal: ANELT scores ≥20, indicating moderate to mild verbal communication disorders. Non-verbal: ANELT scores <20, indicating severe verbal communication disorders.

Table 5

Change in total score on the Scenario Test

Patient	First assessment	Second assessment
1	7	15
2	7	28
3	19	48
4	20	29
5	22	44
6	25	51
7	27	43
8	43	53
9	44	48
10	44	53
11	45	53
12	45	52
13	46	53
14	48	52
15	49	52
16	49	53
17	50	54
18	52	53
19	52	53
20	52	54
21	52	54
22	54	54