Spontaan herstel van afasie in en na de acute fase
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Summary

Spontaneous recovery of aphasia in and beyond the acute phase

This thesis presents research into the spontaneous recovery of aphasia in CVA patients in and beyond the acute phase, with spontaneous language analysis (both objective spontaneous language measures and subjective rating scales for spontaneous language) and tests for language comprehension and naming.

In chapter 1 the need for more knowledge about spontaneous recovery in the language of aphasic patients in the acute phase (defined as the first 3 weeks after a CVA, a period in which the patient is usually still in hospital) was indicated. Surprisingly few studies had looked at this. The research literature and the author’s personal experience show on the one hand that this could be due to the nature of the acute phase: the acute phase is a short and relatively chaotic phase, both for patients and for language researchers, in which collecting enough research data has often proven to be difficult or impossible. On the other hand, there is evidence that the available research materials are not specific enough for the acute phase: even abbreviated standardised tests are too great a burden for a considerable proportion of patients, who, as a result, cannot be tested. The collection and analysis of multiple spontaneous language samples in and shortly after the acute phase could offer more insight into the developments in the language of aphasic patients in the acute phase. The results could be supplemented with and compared to data from some basic language tests. Three research questions, each in two parts, were formulated for this study. The focus in these questions was on the contrast between the acute and the chronic phase, on the different recovery periods and on the correlations between the results of the different measuring instruments:

1a. On which of the spontaneous language measures can a clear disorder be determined in the acute phase and in the chronic phase, and for which of the patients in the study?
1b. On which of the spontaneous language measures can spontaneous recovery be shown to have taken place in the acute phase, between the acute and the chronic phase and in the chronic phase, and for which of the patients in the study?
2a. On which of the language tests can a clear disorder be determined in the acute phase and in the chronic phase, and for which of the patients in the study?
2b. To what extent can spontaneous recovery be shown to have taken place on tests for language comprehension and naming in the acute phase, between the acute and the chronic phase and in the chronic phase, and for which of the patients in the study?
3a. To what extent do the results of the spontaneous language measures correlate with the results on subjective rating scales for spontaneous language?

3b. To what extent do the results of the spontaneous language measures correlate with the test results?

Chapter 2 presented an overview of the literature on spontaneous recovery of aphasia in the acute phase. Methodologically studies on this subject were shown to vary greatly, making a comparison of the results difficult and, for some aspects, even impossible.

On the basis of this literature a review of estimated frequencies of the occurrence and the recovery of aphasia in the CVA population was given. The literature showed that the largest amount of recovery from aphasia occurred in the acute phase. Furthermore, the chances of recovery diminished strongly after this acute phase, especially when no recovery occurred in the first month post onset. Recovery in a later phase was not ruled out, but such a recovery would often be incomplete, although different researchers hold different views on this subject. Late recovery could be an indication of the existence of two separate recovery patterns: an early and fast recovery versus a slower, more gradual recovery. These recovery patterns could account for differences in recovery between patients, but also for the different stages in recovery of an individual patient. Different neurological mechanisms could underlie these two recovery patterns or recovery stages: on the one hand diaschisis might regress, on the other hand different areas of the brain might take over language functions.

At the end of chapter 2, five conclusions were formulated, based on the reviewed research literature. These conclusions were taken into account in the design of the research reported in this thesis and were incorporated in the recommendations of chapter 6.

Chapter 3 dealt with the methodology used in the analysis of the spontaneous language of aphasics and the changes in their spontaneous language in studies to date. The advantages and disadvantages of the methods used were discussed. The aim of this discussion was to determine the suitability of the existing methods for the analysis of spontaneous recovery of the spontaneous language in acute aphasic patients. The question of why spontaneous language analyses are hardly ever carried out, even though progress in the spontaneous language is the most relevant indicator of recovery, was also addressed.

First of all, subjective rating scales were discussed. From among the existing methods, the spontaneous language scales of the Dutch version of the Aachener Aphasie Test (AAT) were selected to use in the acute phase, although even these scales are not completely suitable for the analysis of spontaneous recovery. Objective spontaneous language analyses were then considered and a preselection of spontaneous language measures was made. At least means and standard deviations from an aphasic group and a control group (both Dutch-speaking) had to be available. Finally, the problems and restrictions that generally limit the use of spontaneous language measures were discussed. First of all, most of these language measures lack reliable norms; secondly, there can be considerable variation between
the different language samples; thirdly, the collection of language samples of sufficient size is often problematic in the acute phase; finally, the elaboration and analysis of spontaneous language samples is clearly more time-consuming than for instance scoring (most of the) language tests. Despite these disadvantages, which complicate the systematic use of spontaneous language measures at the present time, a number of spontaneous language measures were used in this thesis to explore the early changes in spontaneous language. Extensive research into the standardization of those measures should nevertheless be conducted in the near future to facilitate future studies in this domain. Such research should ideally include an analysis of the reliability of the various spontaneous language measures.

In chapter 4, the research questions were operationalized. In cooperation with a team of researchers from the Neuropsychology department of the Erasmus Medical Centre (in Rotterdam), it was possible to screen CVA patients in the acute phase for language disorders over a period of one year. Eventually, it was possible to include 11 patients in this research: these patients presented with aphasia in the acute phase after a CVA and could be assessed twice in the first three weeks (sessions 1 and 2). According to their medical history, they had not had an earlier CVA, neither had they shown previous signs of dementia. Their first language was Dutch. Where possible, these 11 patients were also assessed twice in the chronic phase, at 3 to 4 months and at 1 year post onset (sessions 3 and 4). In each of these four sessions two types of data were collected (as far as this was possible): a spontaneous language recording of a conversation between the researcher and the patient about four standard subjects, and test results for three tests (a concrete language comprehension test, the more abstract Token Test and a naming test). The spontaneous language was transcribed and then analysed using the six AAT rating scales and eight spontaneous language measures. For the analysis of the spontaneous language measures, Dutch norms were used based on the means and standard deviations found in the research literature. The significance of the recovery was tested, if possible, using chi-square tests for the spontaneous language measures and McNemar’s tests for the language tests. Furthermore, the correlations between the results of the spontaneous language measures and the rating scales were calculated (Pearson’s product-moment coefficient of correlation). Finally, the results on the spontaneous language measures and on the language tests were compared on the basis of their indication of language disorders and recovery.

In chapter 5 the answers to the research questions were given, firstly based on the data from the individual patients (in separate case studies) and secondly based on the pooled data from the group of patients.

1a. On which of the spontaneous language measures can a clear disorder be determined in the acute phase and in the chronic phase, and for which of the patients in the study?

In the acute phase a clear disorder could be shown for most patients on four out of eight spontaneous language measures, namely: phonological paraphasias, phonological perseverations, semantic errors and lexical perseverations. A
smaller number of patients also showed disorders in minimal responses, neologisms and speaking rate, but no disorders were found in empty words from session 2 onwards. The increase in the number of patients with a disorder in neologisms in this phase was remarkable.

In the chronic phase, a majority of patients continued to have problems with phonological paraphasias, phonological perseverations and lexical perseverations. There was a clear decrease in the number of patients with a disorder on the language measures neologisms and semantic errors. The absence of disorders in speaking rate in the chronic phase was surprising.

The question “for which of the patients can disorders be shown to occur on the spontaneous language measures?” could only be answered in a general sense, since every patient showed one or more disorders in each session. In five patients the number of disorders clearly decreased, particularly between sessions 1 and 2 and between sessions 2 and 3.

On the AAT scale for Communicative ability, all patients showed a disorder, at least during the two sessions in the acute phase. In one third of the patients examined in the chronic phase, the disorder on this rating scale had disappeared.

1b. On which of the spontaneous language measures can spontaneous recovery be shown to have taken place in the acute phase, between the acute and the chronic phase, and for which of the patients in the study?

In the acute phase, spontaneous recovery was found on the spontaneous language measures minimal responses and phonological perseverations (more often an improvement than a deterioration), and to a lesser extent on phonological paraphasias, semantic errors (an equal amount of improvement and deterioration) and lexical perseverations (more often a deterioration than an improvement). On neologisms and empty words no significant recovery was found in the acute phase. In this phase, four patients showed improvement more often than deterioration on the spontaneous language measures.

Between the acute and the chronic phase, a spontaneous recovery was found on lexical perseverations, neologisms, phonological perseverations and minimal responses (more often an improvement than a deterioration). In this interval, six patients showed improvement more often than deterioration on the spontaneous language measures.

In the chronic phase, spontaneous recovery was only found on neologisms (more often an improvement than a deterioration) and lexical perseverations (more often a deterioration than an improvement). In this phase, two patients showed improvement more often than deterioration on the spontaneous language measures.

On the AAT scale for Communicative ability, a majority of the patients (67% between sessions 1 and 2 and 100% between sessions 2 and 3) made progress, but between sessions 3 and 4 there was no evidence of recovery; 33% of the patients even showed a deterioration on this rating scale in the chronic phase. Every patient showed some recovery on the scale for Communicative ability in at least one of the three intervals, specifically in the interval between sessions 2 and 3.
While answering the first research question, some additional conclusions could be formulated, that indicate the importance of the different time intervals:

- The most important decreases in the number of disorders were found in the acute phase and between the acute and the chronic phase. The most important increase in the number of disorders was found in the chronic phase. These data confirm the idea that the acute phase and the period just after the acute phase are the most important periods for spontaneous recovery.
- Most of the recovery on the spontaneous language measures was found in the interval between the acute and the chronic phase (sessions 2 and 3). In the acute phase there was also considerable progress on these measures, but at the same time there was an almost equal amount of deterioration. Because of this, the acute phase was the period in which most of the significant variation was found on the spontaneous language measures.
- In the acute phase a decrease in the number of minimal responses often seemed to coincide with an increase in the number of lexical perseverations. This could be the result of an adaptation strategy.
- In the chronic phase, more patients deteriorated than improved on five out of seven language measures. The only measure that showed only improvement in this interval was neologisms, strangely enough in patients who showed the largest number of disorders on the language measures in this period.
- On three spontaneous language measures (phonological perseverations, semantic errors and empty words), the only significant change that was found in any of the periods was a significant deterioration. On the other spontaneous language measures, a significant recovery was found more often than a significant deterioration considered over the complete period of measurement.

2a. On which of the language tests can a clear disorder be determined in the acute phase and in the chronic phase, and for which of the patients in the study?

On each of the three tests administered, a clear disorder was found during the acute phase in nearly every patient.

Initially, a large number of patients showed a disorder on each of the three tests in the chronic phase as well, but in most patients who could be tested in the chronic phase (five out of nine), an improvement was found on one or more of the tests.

In the chronic phase, five out of eleven patients eventually scored within the norms on at least one of the three tests, and three of those patients even scored within the norms on all of the tests. One patient already scored well within the norms on the Token Test in the acute phase, and showed no disorders on any of the tests from session 3 onwards.

2b. To what extent can spontaneous recovery be shown to have taken place on tests for language comprehension and naming in the acute phase, between the acute and the chronic phase and in the chronic phase, and for which of the examined patients?
In the acute phase and between the acute and the chronic phase, some significant spontaneous recovery was found on the language tests administered. Most of the recovery on the concrete language comprehension test occurred in the acute phase.

On the Token Test and the naming test however, most of the recovery occurred somewhat later, to be precise between sessions 2 and 3 (between the acute and the chronic phase).

In the chronic phase, the only significant recovery was found on the Token Test in one patient who had already experienced an earlier significant recovery between sessions 2 and 3.

The majority of patients (60%) showed a significant recovery across all intervals on at least one of the three tests.

3a. To what extent do the results of the spontaneous language measures correlate with the results on subjective rating scales for spontaneous language?

The majority of expected correlations between the spontaneous language measures and the rating scales proved to be significant, namely the correlations between:

- Articulation and prosody on the one hand and speaking rate, neologisms, phonological paraphasias and phonological perseverations on the other hand.
- Phonology on the one hand and neologisms and phonological paraphasias on the other hand.
- Semantics on the one hand and lexical perseverations and empty words on the other hand.
- Speech automatisms on the one hand and lexical perseverations and empty words on the other hand.
- Syntax and lexical perseverations.
- Communicative ability on the one hand and speaking rate and lexical perseverations on the other hand.

In some cases, the expected relationship was not found, specifically the correlations between:

- Semantics and semantic errors.
- Syntax and speaking rate.
- Communicative ability on the one hand and neologisms, phonological paraphasias, phonological perseverations and semantic errors on the other hand.
- Speaking rate on the one hand and the rating scales for Semantics, Phonology, Syntax and Speech automatisms on the other hand.

For each of these correlations, a possible explanation was suggested to account for the unexpected outcome.
3b. To what extent do the results of the spontaneous language measures correlate with the test results?

The correlations between the results on the spontaneous language measures on the one hand and the language tests on the other hand were limited: Clear parallels were found with respect to the timing of recovery: the most important recovery occurred between sessions 2 and 3 in both cases. The results differed greatly as far as the indication of disorders was concerned. On language comprehension (especially on the comprehension test with simple, concrete items), the patients seemed to start to recover earlier and, eventually, to recover slightly better than in their spontaneous language production and on the naming task.

Chapter 6 discussed the conclusions to be drawn from the answers to the research questions and the consequences they should have for future research with aphasic patients in the acute phase. Contrary to expectations based on research literature, most of the recovery on the spontaneous language measures and the language tests occurred in the interval between 2-3 weeks and 3-4 months post onset and not only in the acute phase. During the first 3 weeks (the acute phase) the spontaneous language measures showed not only considerable improvement, but also considerable deterioration. Apparently, some improvement can still occur in the chronic phase. This seems to indicate the existence of different recovery patterns (an early and fast recovery versus a later, more gradual recovery), a possibility that was also suggested in research literature. Since the slight recovery on some of the spontaneous language measures did not lead to changes on the Communicative ability scale, one should not expect too much of this later, more gradual recovery. A further expectation based on the research literature that seemed to be confirmed here, was that language comprehension would recover better than language production. Contrary to earlier claims in which the recovery of language comprehension was limited to the first 3 or 4 months, this recovery was found to continue even until 1 year post onset. Even as a group, the patients seemed to start somewhat earlier with the recovery of language comprehension and eventually improve slightly more on language comprehension than on spontaneous language production and on the naming task.

A number of aspects of the collection and analysis of spontaneous language samples were considered in order to examine the ways in which the use of spontaneous language analyses had contributed to a growing insight into the course of language disorders in and beyond the acute phase. It appears better to use both spontaneous language and (simple) language tests in the acute phase, wherever possible complementing each other, than to use exclusively spontaneous language or language tests. For future practical use of spontaneous language measures, it is necessary to establish reliable norms for some of the measures, and in particular norms for recovery. This also applies to the rating scales. Some of the spontaneous language measures seem to be slightly more sensitive to the remaining language disorders in the chronic phase than the rating scales and the
language tests. However, the language measure *empty words* in its present form does not seem very useful for future research, since this measure did not indicate a disorder even if a language sample was clinically judged as "empty speech". Finally, it was concluded that the spontaneous language measures in this study have contributed to a growing insight into the course of language disorders in and beyond the acute phase. For instance, the observation that the number of *neologisms* could still decrease significantly in the chronic phase would not have been possible without a detailed analysis of the spontaneous language. Moreover, the importance of the period shortly after the acute phase became clearer, as shown by the results from both the language tests and the spontaneous language measures. More generally, the expectation that spontaneous language interviews would provide a considerable amount of information in a short time about the language of acute aphasic patients proved to be correct.

In some respects, the research design used here could certainly be improved. The following recommendations were made:

1. Extensive normative research should be done for a number of spontaneous language measures, preferably based on fixed amounts of words (50, 100, 150, 200, 250, 300), both on healthy subjects and on chronic and acute aphasic patients with language disorders of different symptomatology and different severity. The reliability and the exact scoring methods for the language measures should be reported. The aim of such normative research would be to facilitate the incorporation of spontaneous language measures into clinical practice.

2. Language research with CVA patients in the acute phase should not take more than half an hour.

3. Language research that continues after the acute phase should repeat in the chronic phase at the least those items administered in the acute phase.

4. It is advisable to have every (possibly aphasic) CVA patient examined in the acute phase by a clinical linguist. At least a standard spontaneous language interview should be conducted and recorded and, if possible, tests for language comprehension and naming should be administered.

5. A classification based on classical aphasia type is not very useful in the acute phase, because of, for example, the rapid changes that often occur in that phase.

6. For each aphasic patient examined, as much information as possible should be collected about the CVA, the lesion, the resulting medical problems and the way in which the CVA and its effects are treated, in order to get a complete picture of the recovery of aphasic patients from the acute phase onwards and to facilitate an adequate interpretation of research data. In this respect, cooperation with a neurologist and (ideally) a neuropsychologist is essential.

7. In group research on language disorders in the acute phase, one should realise that patients with severe language disorders often cannot be examined in the acute phase because of their physical condition. On the other hand, mild aphasic disorders can be overlooked in language research.
that focuses on the acute phase. This has an effect on the composition of the research group and on the generalisability of research results.

8. In prospective research with acute aphasic CVA patients, one should expect a high drop-out rate and often limited possibilities of testing.

This research has shown that the use of spontaneous language measures and language tests in the first weeks after a CVA can produce valuable information about the course of possible language disorders, both in individual patients and in group research. Time will tell if the conditions for further spontaneous language research in the acute phase can be provided in the long term.