CHAPTER VII

PREPOSITIONAL PHRASE INSERTION EXPERIMENT

Research prerequisites

In the analysis of narrative speech reported in chapter V, the non-fluent aphasic speakers were found to produce fewer prepositions and fewer complete correct prepositional phrases in their narrative speech than the group of control speakers, whereas the fluent aphasic speakers did not show any difference in this context. Both groups of aphasic speakers proved able to assign correct case to complements of prepositions and to produce correct case-marking morphemes of the complement nouns of prepositions, when these prepositions were realized in their speech. The sentence completion experiment reported in chapter VI also examined production of prepositions and case-marking morphemes of their complement nouns by aphasic speakers in experimental conditions. Although both groups of aphasic speakers had difficulties producing correct case-assigning prepositions, the overall results of the experiment supported the general hypothesis that presence of correct case-assigning prepositions facilitates case assignment, and results in production of correct case-marking morphemes. In aphasiological cross-linguistic research, and specifically for Russian, it was found that realization of a correct case-assigning verb is necessary for the production of correctly case-marked noun phrases (Ruigendijk, 2002). Hence, the results of the experiments described in chapters V and VI of this thesis supported the proposition with respect to case-assigning prepositions.

Previous cross-linguistic studies have also reported differential impairment of prepositions in aphasia, which can be predicted either by the context in which a particular preposition occurs and/or by the function this preposition performs. Selective deficits of prepositions in different forms of aphasia were found for German (Friederici, 1981, 1982; Friederici, 1985; Friederici et al., 1982), Dutch (Bennis et al., 1983), and English
(Grodzinsky, 1988). The overview of the previous relevant studies is presented in chapter III of this thesis; here, only a brief review of the main findings is presented. In relation to Broca’s aphasic speakers, the reported findings were rather controversial. Dutch and German Broca’s aphasic speakers were found to show no difference in performance on prepositions in the two different functions (Bennis et al, 1983). For English it was claimed that impairment of “governed prepositions” (which perform a grammatical function) appears exclusively in Broca’s aphasic speakers who retained the ability to use some prepositions while others are lost (Grodzinsky, 1988). In later studies, it was found that governed (prepositions with semantic content) and ungoverned prepositions (prepositions with grammatical function) were equally often omitted by agrammatic aphasic speakers (Tesak & Hummer, 1994). Indeed, the authors reported that they had found the opposite trend in the preservation of governed as opposed to ungoverned prepositions. With respect to Wernicke’s aphasic speakers, the findings are less controversial. Wernicke’s aphasic speakers were reported to perform better on prepositions used in the “structural” function than on prepositions with lexical meaning (Friederici, 1982).

**The main goal of the study**

In light of previous findings that reported differential impairment of prepositions in aphasia, the goal of the present study is to investigate whether similar performance patterns could be observed in Russian aphasia. The study examines whether the statement ‘presence of a correct case-assigning preposition facilitates case assignment’ is valid for prepositions performing all functions. In other words, this experiment investigates whether the presence of a correct case-assigning preposition, independent of its function and the context in which it occurs, leads to production of correct case-marking morphemes of its complement noun. To accomplish this aim, and to provide support for the hypothesis, several issues have to be accounted for, as outlined in the next section.
The research questions

To accomplish the goal set for this experiment, the research has to take several steps to provide answers to the main research questions. Initially, it is necessary to investigate the performance of aphasic speakers on the production of prepositions in different functions in experimental tasks, when participants are forced to use particular constructions – namely, phrases with prepositions performing either lexical function or subcategorized function. Henceforth, prepositions in lexical function and prepositions in subcategorized function will be referred to as ‘lexical prepositions’ and ‘subcategorized prepositions’ respectively.

The first question concerns production of lexical and subcategorized prepositions from a quantitative perspective. It will be investigated whether there are differences in the numbers of complete correct prepositional phrases with lexical prepositions and with subcategorized prepositions produced across the aphasic and control populations in restricted tasks.

Further, it will be examined whether aphasic speakers treat all prepositions uniformly irrespective of their function and encirclement. Thus, the second research question looks at whether the patterns of differential loss reported for aphasic speakers of other languages can also be found in Russian aphasia.

Subsequently, the relations between different case-assigning prepositions and case-marking morphemes of nouns have to be studied. Hence, the third question is whether the function of a particular preposition is related to the case assignment of a complement noun and has any influence on the production of correct case-marking morphemes.

A prepositional phrase insertion task with pictures was designed, where participants were required to complete a sentence with a preposition and a noun. The design of the test permits not only the examination of the number of correct prepositional phrases produced by participants, but also a study of the error patterns with respect to the two types of prepositions, namely, whether certain prepositions are omitted and/or produced incorrectly and substituted by other prepositions. The design of the test also allowed the investigation of another issue concerning case marking, and the ability to
explore what happens to case-marking morphemes when obligatory lexical and subcategorized case-assigning prepositions are omitted and/or substituted.

**Hypotheses**

The group of control speakers was expected to perform very well on the task; they were not expected to omit any obligatory prepositions, irrespective of their function, either lexical or subcategorized, or to produce incomplete or ungrammatical responses. No difference in the performance of the control speakers in items with lexical prepositions and subcategorized prepositions was expected, either in quantitative or qualitative terms. Also, no errors were anticipated in case assignment and in production of case-marking morphemes of complement nouns.

For the present experiment, it was assumed that the fluent and non-fluent aphasic speakers would rely more on the component that is comparatively less impaired in each form of aphasia. Thus, it is hypothesized that:

- fluent aphasic speakers perform better on sentences with subcategorized prepositions, which have less semantic load than purely lexical prepositions with semantic meanings, since impairment in fluent aphasia is considered to affect mainly the lexical-semantic domain and cause lexical-retrieval difficulties (cf. Bastiaanse & Edwards, 2004);

- non-fluent aphasic speakers, on the contrary, have fewer difficulties with lexical prepositions, and experience problems with subcategorized prepositions, which perform a grammatical function, as impairment in non-fluent aphasia is a syntactic deficit (cf. Bastiaanse et al., 2003).

Case assignment with respect to different types of prepositions has not yet been investigated; however, on the basis of the previous research, including the results of studies that investigated case assignment by Russian verbs (Ruigendijk, 2002), and the results of the experiments reported in earlier chapters of this thesis, the hypotheses were formulated. In general, aphasic speakers will follow the same patterns in the production
of case-marking morphemes that they showed in the previous experiments. In other words, it was hypothesized that

- when non-fluent aphasic speakers produce case-assigning prepositions, either lexical or subcategorized, they are expected to be able to produce correct case-marking morphemes of the complement nouns of these prepositions. Therefore, presence of a correct case-assigning preposition is expected to assist case assignment and production of correct case-marking morphemes.

Since perfectly accurate performance is not expected in either group of aphasic speakers, omissions and substitutions of case-assigning prepositions are likely. As mentioned before, it is known that the problems fluent aphasic speakers have with free-standing morphemes are expressed in substitution rather than omission errors (Martin & Blossom-Stach, 1986; Friederici, 1981). That is why it is hypothesized that

- when fluent aphasic speakers produce incorrect case-assigning prepositions, either lexical or subcategorized, and substitute them with others, they will produce case-marking morphemes of the complement nouns of these prepositions in accordance with these prepositions.

Previously, no clear pattern in case marking of nouns in the absence of case-assigning prepositions has been observed. By all accounts, both groups of aphasic speakers are not expected to produce nouns deprived of case-marking morphemes, which would result in production of non-words.

**Methods**

In the following work, the methods of the experiment will be described, starting with the description of the participants. The materials of the experiment, its administration procedure, and the scoring techniques used will also be discussed. Statistical tools will be explained at the end of methods section.
Participants

Both experiments were administered to the same group of 24 Russian-native aphasic speakers and to a control group of 22 neurologically intact speakers. In the control group all speakers were volunteers; their age ranged in years from 28 to 54, with a mean age of 41.13 years. The group included 10 males and 12 females. No previous history of neurological disease or any other major illness was registered in the control group. The vision of the fifteen speakers in the control group was normal; the other seven speakers had their vision corrected to normal by glasses or contact lenses. All participants were right-handed native speakers of the Russian language, originating from the central part of the Russian federation; none of them displayed any accent. Their individual data are presented in Appendix III, table I and are summarized in table 7.1, below.

All aphasic speakers were tested in rehabilitation centers in Russia,\(^{29}\) during the course of neurological rehabilitation, which also included a course of speech and language therapy. They were diagnosed in the rehabilitation centers by speech therapists on the basis of Luria’s classification (Luria, 1973). The diagnoses and speech characteristics of the aphasic speakers provided by speech therapists and neurologists were taken into account when they were judged as fluent or non-fluent. Data of several aphasic speakers were excluded from the analysis for various reasons. Fluent aphasic speakers F15, F18 and F112 suffered from severe dysarthria, which could significantly impede scoring and analysis of the obtained data. Non-fluent aphasic speakers Nf6 and Nf23 were unable to complete the experiment. Therefore, data of 19 aphasic speakers were analyzed in the end. In the group of fluent aphasic speakers, the age ranged in years from 17 to 69, with a mean age of 47.45 years. The group comprised three males and five females. In the group of non-fluent aphasic speakers, the age ranged in years from 24 to 58, with a mean age of 36.72 years. There were seven males and four females. Individual data of the control speakers are shown in Appendix III, table I. Individual data of the aphasic speakers who participated in the prepositional phrases insertion experiment are

\(^{29}\) The neurological department of the rehabilitation center “Zelenyj gorod”, Nizhnij Novgorod; Institute of the Human Brain, Russian Academy of Science, Saint-Petersburg; Federal Center of Speech Pathology and Neurorehabilitation, Moscow.
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provided in Appendix VI, table I. Their group data are briefly summarized in table 7.1, below.

Table 7.1 Individual data of all participants in the prepositional phrase insertion experiment summarized

<table>
<thead>
<tr>
<th></th>
<th>Number of participants</th>
<th>Mean age in the group in years</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control speakers</td>
<td>22</td>
<td>41.13</td>
<td>10 males</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12 females</td>
</tr>
<tr>
<td>Fluent aphasic speakers</td>
<td>8</td>
<td>47.45</td>
<td>3 males</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 females</td>
</tr>
<tr>
<td>Non-fluent aphasic speakers</td>
<td>11</td>
<td>36.72</td>
<td>7 males</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 females</td>
</tr>
</tbody>
</table>

All fluent aphasic speakers were aphasic as a result of cerebrovascular accidents in the left hemisphere, except speaker Fl20 whose aphasia etiology was traumatic as the result of a gunshot wound and consequent surgical removal of a subdural hemorrhage in the left hemisphere. Aphasia types, established in accordance with Luria’s classification, differed. Aphasic speaker Fl10 was diagnosed with amnestic aphasia; Fl19 with afferent motor aphasia with elements of acoustic-gnostic aphasia, Fl7, Fl14, Fl17, Fl20, and Fl24 were diagnosed with afferent motor aphasia, which are all known to be fluent aphasias. Neurological data and the linguistic characteristics of the fluent aphasic speakers are shown in Appendix VI, table I.

Aphasia etiology in the group of non-fluent aphasic speakers varied; the aphasic speakers Nf3, Nf11, Nf13, Nf15, and Nf21 were aphasic due to cardiovascular accidents in the left hemisphere; aphasic speakers Nf2, Nf4, Nf9, Nf16, Nf18, and Nf22 suffered from traumatic brain injury as the result of car accidents or other traumas. The non-fluent aphasic speakers were diagnosed with efferent-motor aphasia. All aphasic speakers were at least six months post-onset.
CHAPTER VII

Materials

A prepositional phrase insertion experiment was designed to assess the abilities of the aphasic speakers in the production of lexical and subcategorized prepositions, and in case assignment. Each stimulus included a black-and-white line drawing with an incomplete sentence written underneath it with a gap marked by a suspension point, and also an introductory sentence read by the experimenter. The gap replaced a preposition and a noun. The test included a trial session with 4 trial items and 100 experimental items. Half of the experimental items were designed to be completed with prepositions in a subcategorized function, and the other half were meant to be completed with prepositions in their lexical function. When the test materials were designed, all nouns denoting the objects on the pictures were checked for case-homonymous forms, and these were not used in the test to avoid confusion in scoring. Nouns of feminine and masculine gender of first and second declension classes were used, which are typical and representative of their class. All prepositions used in the experimental sentences were non-derived primary prepositions. As explained in Functions and meanings of Russian prepositions in chapter II of this thesis, Russian prepositions assign five out of six cases, excluding the nominative case. Thus, five cases were tested in combination with prepositions in lexical and subcategorized functions: in genitive, dative, accusative, instrumental, and prepositional cases.

Procedure

Prior to testing, the participants were orally instructed by the experimenter. They were told that they would see a picture and an incomplete sentence underneath with a gap marked by dots. Meanwhile, they would also listen to an introductory sentence read by the experimenter, related to the situation shown in the picture. The participants were asked to listen to the sentence, to look at the picture, and then to read the sentence underneath it aloud and to complete it by filling in the gap. A short explanation of the test
design is necessary here. Patently, a situation in which prepositions are used in their lexical function are easier to visualize than situations that can be described by sentences with prepositions in a subcategorized function. Prepositions used in the lexical function in this experiment denoted location, place and direction. Prepositions used in their subcategorized function are selected by verb and form one lexical unit with it, and, unlike prepositions in the lexical function, they lack a lexical content of their own. The relations or concepts denoted by prepositions in the subcategorized function are difficult to depict or visualize. For example, the sentence *A cat sits on a sofa* calls for immediate visualization of the concept. This, in general, is the same for everybody, and denotes the location of one object (*a cat*) on the surface of another object (*a sofa*). Whereas, for example, a sentence *The trip depends on the weather* does not necessarily evoke a visual image, or at least not the same image for everybody. Therefore, to equalize the perception of the items with prepositions in lexical and subcategorized functions it was decided to include an introductory sentence, read aloud by the experimenter, before the participants had to complete the actual experimental stimuli. This sentence was intended to introduce the participants to the situation denoted by the pictorial stimuli, and to equal the perception of the two types of sentences.

To familiarize the participants with the task a trial session was administered in which feedback was provided. During the actual task, the examiner did not give participants any feedback on their performance. During the testing a participant and the experimenter sat in a quiet room facing the computer screen. The experimental items were shown on the computer screen. The participants were allowed to take as much time as they needed to complete the task. Repetitions of the preceding introductory sentence were provided on request. Due to the large number of items, the task was divided into two sessions, which were administered on two different days with at least one day in between. The order of the items was semi-randomized; in each session experimental items with prepositions in lexical and subcategorized functions were shuffled. The order of the administration of sessions was semi-randomized as well, so that one participant was presented with session 1 on day 1 and session 2 on day 2, while the order of presentation to the next participant was the other way around. The test performance of the
participants was scored on the paper score form and it was audio taped for further transcription and analysis.

Sveta pogladila rubashku Alexeja  Petja ochen zamerz
Sveta has ironed Alexey’s shirt  Peter got very cold

Rubashka visit ...  Petja drozhit ....
The shirt hangs ...  Peter is shivering ...

The answer expected from a participant:

Rubashka visit v shkafu [PREP.case]  Petja drozhit ot kholoda [GEN. case]
The shirt hangs in the wardrobe  Peter is shivering with cold

*Figure 7.1 Examples of test materials (left: a sentence with a preposition in a lexical function; right: a sentence with a preposition in a subcategorized function)*
Scoring

Scoring of data obtained in this experiment went through the general scoring procedure developed throughout the thesis. Thus, three issues were taken into account during data analysis:

1. which case-assigning prepositions participants produced (correct/ incorrect/ omitted);
2. how aphasic speakers dealt with case assignment when
   a. correct case-assigning prepositions are produced,
   b. incorrect case-assigning prepositions are produced and substituted by other prepositions,
   c. case-assigning prepositions are omitted from the responses of the aphasic speakers;
3. whether patterns of performance with case-assigning prepositions in the lexical function were the same as patterns with case-assigning prepositions in the subcategorized function.

Since a complete prepositional phrase includes two elements, a preposition and its complement noun, an error in one of the elements results in an incorrect prepositional phrase. Therefore, scoring included several levels of analysis. At the first level, a simple correct–incorrect scoring was done. At the second level, the participants’ responses were further examined with respect to case assigners, and were grouped into items where case assigners were (1) produced correctly, (2) omitted, and (3) substituted by other members of the same category. At the third level, all responses of the participants were grouped according to the case-marking morphemes produced on the complement nouns into (1) correct case-marking morphemes, hereafter termed correct case marking, and (2) incorrect case-marking morphemes. Finally, at the forth level, incorrect case-marking morphemes were examined and subdivided into (a) nominative case-marking morphemes, which were erroneous, since case-assigning prepositions do not assign nominative case; (b) noun stems, which did not bear a case morpheme and thus resulted in non-words; (c) incorrect case-marking morphemes, which denoted cases that could not be used in combination with particular prepositions; (d) substituted case-marking
morphemes, which were used with possible case-assigning prepositions but denoted cases other than those required by the context of the sentences. The difference between (c) and (d) error types is explained by the capacity of a Russian preposition to assign several cases; that is why there are several possible combinations of a preposition and case morphemes that occur in different contexts. Henceforth, the four possibilities in case marking are referred to as nominative case marking, noun stems, incorrect case marking, and substituted case marking respectively.

Statistical tools

Data obtained from all participants were counted per participant. In order to perform a statistical analysis the raw scores of the correct responses of each participant were converted to proportions from the total number of items. To preclude possible deviations from the normal distribution of the data, an arcsine transformation was applied to the square root of all proportions.

During the provisional data analysis the Shapiro-Wilk normality test was used, which is considered to be more accurate than the Kolmogorov-Smirnov normality test. The Shapiro-Wilk normality test showed that the data of all groups of participants remained non-normally distributed. Moreover, Levene’s test showed that the groups of participants have heterogeneous variances. The results of the Shapiro-Wilk normality test and Levene’s test demonstrated that two main assumptions of parametric tests were violated; namely, normality of data distribution and homogeneity of variances. Therefore, it was decided to apply non-parametric statistical tests.

For comparisons of the three groups of participants, the control speakers, the fluent aphasic speakers and the non-fluent aphasic speakers, a non-parametric equivalent of ANOVA, the Kruskal-Wallis test, was used. For post-hoc single comparisons across the groups a non-parametric alternative to independent samples t-tests, the Mann-Whitney U test, was to be used. However, it was decided to apply the Kolmogorov-Smirnov Z test instead, because it is considered to have more power than the Mann-Whitney U test when sample sizes are less than 25 participants per group (Field, 2005).
For comparisons of the data within one group of participants a non-parametric alternative of the paired t-test, the Wilcoxon signed-rank test, was used. To reduce the possibility of Type I errors, and to avoid the risk of overclaiming, a Holm’s sequential Bonferroni correction was applied, where appropriate. A Holm’s sequential Bonferroni correction tends to be less strict than Bonferroni adjustment, and unlike Bonferroni does not run the risk of underclaiming. To avoid erroneous conclusions over significance, which may occur when significance is computed for small datasets, the Exact significance test was applied throughout the statistical analysis, which is more suitable for smaller sample sizes than the Monte Carlo significance estimate (Field, 2005).

Results

This section starts with the overall results obtained by comparing the numbers of correct responses produced in each group of participants. It is followed by an account of the first analysis of case-assigning prepositions, irrespective of case marking on noun phrases. It is examined whether case assigners are produced correctly, incorrectly, or omitted. Next, an account of the second analysis of case-marking morphemes of the complement nouns and their case marking is presented. Case marking of noun phrases is examined separately for items with correct, incorrect and omitted case-assigning lexical and subcategorized prepositions. The description of the results finishes with a short general summary.

The first research question concerned production of lexical and subcategorized prepositions from a quantitative perspective; therefore, the differences were examined in the numbers of complete correct prepositional phrases with lexical and subcategorized prepositions produced in the aphasic and control populations.

The numbers of complete correct prepositional phrases with lexical prepositions and phrases with subcategorized prepositions were counted in the data corpus acquired from each participant. These raw numbers were converted to percentages from the total number of items in each category of experimental stimuli. This enabled further direct comparisons between the groups of participants. The control group of neurologically
intact speakers performed at ceiling on sentences with lexical and subcategorized prepositions, and their data will not be analyzed further. The results of the groups of aphasic speakers are presented in table 7.2, which shows correct and incorrect responses, as percentages. Individual results of the fluent and non-fluent aphasic speakers from items with lexical prepositions and from items with subcategorized prepositions in the prepositional phrases insertion experiment are shown in Appendix VII, table I and table II.

Table 7.2 Overall results of the fluent and non-fluent aphasic speakers on lexical and subcategorized prepositions

<table>
<thead>
<tr>
<th></th>
<th>Fluent aphasic speakers (N=8)</th>
<th>Non-fluent aphasic speakers (N=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Items with</td>
<td>Items with</td>
</tr>
<tr>
<td></td>
<td>Lex P (N_{items}=392)</td>
<td>Sub P (N_{items}=288)</td>
</tr>
<tr>
<td>Correct responses with prepositions</td>
<td>84.18</td>
<td>78.74</td>
</tr>
<tr>
<td>Incorrect responses with prepositions</td>
<td>10.46</td>
<td>4.52</td>
</tr>
<tr>
<td>Other errors(^{30})</td>
<td>5.36</td>
<td>17.01</td>
</tr>
</tbody>
</table>

A Kruskal-Wallis test revealed significant differences among the groups of participants on sentences with both types of prepositions, lexical (H(2)=33.81, p<.001) and subcategorized (H(2)=35.03, p<.001). Further, paired group comparisons were administered with the Kolmogorov-Smirnov Z test and the Exact significance test. Group comparisons showed that the group of fluent aphasic speakers produced significantly

\(^{30}\)The category of “other errors” comprises non-responses, un-analyzable utterances, and responses in which aphasic speakers produced structures other than those required; these responses will not be analyzed further.
fewer correct responses with lexical prepositions than did the group of control speakers (K-S Z=2.119; p<.001). The fluent aphasic speakers also performed significantly worse on sentences with subcategorized prepositions than the group of control speakers (K-S Z=2.422; p<.001). The group of non-fluent aphasic speakers also performed significantly worse than did the group of control speakers and produced fewer correct responses with lexical prepositions (K-S Z=2.708; p<.001) and subcategorized prepositions (K-S Z=2.708; p<.001).

No difference emerged between the two groups of aphasic speakers on sentences with lexical prepositions (K-S Z=1.076; p=.126). However, the difference between the groups of aphasic speakers on sentences with subcategorized prepositions was just significant at the α-level .025 (K-S Z=1.345; p=.024). As was shown by statistical tests, no quantitative difference was found in the performances of the fluent aphasic speakers and the non-fluent aphasic speakers on sentences with lexical prepositions, while performance of the non-fluent aphasic speakers on sentences with subcategorized repositions was worse than performance of the fluent aphasic speakers on these sentences. However, in order to examine the error patterns of each more closely in a qualitative way, an error analysis will be done.

Referring to the first research question of the experiment, it can be inferred that production of correct lexical and subcategorized prepositions is problematic for both groups of aphasic speakers, since the fluent and non-fluent aphasic speakers produced significantly less sentences with complete correct phrases with lexical and subcategorized prepositions. However, these results also suggest that although both groups of aphasic speakers were impaired in production of complete correct prepositional phrases with lexical prepositions and with subcategorized prepositions, they nevertheless performed above chance; in more than half of responses they were still able to produce a required preposition either in the lexical or subcategorized function and correct case-marking morphemes on its complement noun.

Subsequently, it was questioned whether prepositions are subject to differential loss in Russian aphasia; more specifically, it was investigated whether aphasic speakers treat all prepositions uniformly irrespective of their function and the context in which they occur. Comparisons of correct responses with lexical and subcategorized
prepositions were performed within each group of aphasic speakers by means of the Wilcoxon signed-rank test. A difference was found in the performance of the fluent aphasic speakers on sentences with lexical and subcategorized prepositions; the effect size was found to be moderate ($Z=1.820$; $p=.039$, $r=-.39$). The fluent aphasic speakers produced more correct responses with complete correct prepositional phrases with lexical prepositions than correct responses with complete correct prepositional phrases with subcategorized prepositions. A similar pattern was found in the group of non-fluent aphasic speakers. They performed significantly better on sentences with lexical prepositions as compared to sentences with subcategorized prepositions, the effect size was moderate ($Z=-2.934$; $p<.001$, $r=-.62$). No significant difference between sentences with the two types of prepositions was found in the group of control speakers ($Z=-1.414$, $p=.250$; $r=-.21$). The results of within-group comparisons showed that both groups of aphasic speakers had significantly different results on sentences with lexical prepositions and sentences with subcategorized prepositions. Furthermore, an investigation needs to be done into where these differences came from.

**Error analyses**

For the error analysis the total number of analyzable items was considered. Analyzable items are sentences that were completed by the aphasic speakers in accordance with the sentence structure required by the task, that is, a preposition and a noun. Analyzable items are also sentences which were intended to be completed as required by the task, and their structures are transparent, but one or the other element necessary for the sentence completion is incorrect or is missing but can be deduced from the context. For example, if the aphasic speakers were required to produce a sentence like the one seen in (1), below, but instead produced a sentence as in (2), (3) or (4), these sentences were judged as analyzable and entered into error analyses:

(1)  *Uchitelnitsa [NOM] zhaluetsja na devochku [ACC]*
    “The teacher complains about the girl”
Non-responses, unanalyzable utterances and sentences with structures other than those required were excluded from the error analysis: for instance, production of a sentence *A man goes home* instead of *A man goes towards the house*.

Since the results of within-group comparisons showed that both groups of aphasic speakers performed significantly worse on sentences with lexical prepositions and sentences with subcategorized prepositions than did the control speakers, it was necessary to investigate the origin of these differences. Because a complete prepositional phrase consists of two elements, namely a preposition and its complement noun, there are two possibilities for the origin of the significantly lower performance of the aphasic speakers on sentences with either type of prepositions. The difficulties of the aphasic speakers could be routed either in problems with production of correct prepositions, or in problems with production of the correct case-marking morphemes of complement nouns of these prepositions. Therefore, there are two objectives that need to be fulfilled by the error analyses. The first objective of the error analyses is to investigate error patterns in relation to the production of lexical and subcategorized prepositions in the two groups of aphasic speakers. This will be done by error analysis of lexical and subcategorized prepositions. The second objective is to examine case-marking morphemes of the complement nouns of lexical and subcategorized prepositions, which will be done by error analysis of the case-marking morphemes of complement nouns. The results of these analyses will provide an answer to the third question of the study, namely, whether a function of a particular preposition is related to the case assignment of a complement...
noun and has any influence on the production of correct case-marking morphemes. To address these issues it was necessary to perform two error analyses, the first one regarding the production of case-assigning lexical and subcategorized prepositions, and the second regarding production of case-marking morphemes of the complement nouns in these prepositions.

**Error analysis of lexical and subcategorized prepositions**

After correct–incorrect scoring, the second level of analysis concerned case assigners. All analyzable sentences were examined with respect to the case-assigning lexical and subcategorized prepositions produced irrespective of the case-marking morphemes that appeared on their complement nouns. For the analysis of case assigners, omitted and incorrectly produced prepositions were counted in the groups of aphasic speakers. These numbers were converted into percentages from the total number of errors made in each group of aphasic speakers. Patterns of case-marking morphemes were analyzed thereafter and will be discussed separately in the following sections. It was found that in the group of fluent aphasic speakers three participants, namely Fl10, Fl17, and Fl20, did not make any omission or substitution errors. Therefore, error analysis was carried out on the results of five fluent aphasic speakers, and eleven non-fluent aphasic speakers.

This error analysis aimed to examine error patterns with respect to the production of lexical and subcategorized prepositions in the two groups of aphasic speakers. A significant association was found between the type of preposition and the category of error made in the group of fluent aphasic speakers ($\chi^2 = 11.307; \text{df}=2; p = .0007$). The fluent aphasic speakers omitted 31.67 percent of lexical prepositions, and substituted 68.33 percent of them. With regard to subcategorized prepositions, the fluent aphasic speakers omitted 70 percent of subcategorized prepositions, whereas they substituted 30 percent of subcategorized prepositions.

In the group of non-fluent aphasic speakers, no significant association was found between the type of preposition and the error category ($\chi^2 = 2.292; \text{df}=2; p = .13$). The non-fluent aphasic speakers omitted lexical prepositions in 34.18 percent of all errors made.
with respect to production of lexical prepositions in this group. Substitution errors of lexical prepositions were made in 65.82 percent of all errors made with lexical prepositions. As for subcategorized prepositions, they were omitted by the non-fluent aphasic speakers in 55.92 percent of all errors made with these prepositions, and in 44.08 percent of errors subcategorized prepositions were substituted by other incorrect prepositions. Error patterns of fluent and non-fluent aphasic speakers with respect to lexical and subcategorized prepositions, together with statistical values, are shown in table 7.3. Individual patterns of aphasic speakers in omission and substitution errors made in the production of lexical and subcategorized prepositions are presented in Appendix VIII, table III.

Table 7.3 Performance of fluent and non-fluent aphasic speakers with respect to case assigners

<table>
<thead>
<tr>
<th></th>
<th>Fluent aphasic speakers</th>
<th>Non-fluent aphasic speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Items with</td>
<td>Items with</td>
</tr>
<tr>
<td><strong>Lex P</strong></td>
<td><strong>Sub P</strong></td>
<td><strong>Lex P</strong></td>
</tr>
<tr>
<td>(nitems=41)</td>
<td>(nitems=13)</td>
<td>(nitems=102)</td>
</tr>
<tr>
<td>Case assigner omitted</td>
<td>31.67</td>
<td>70</td>
</tr>
<tr>
<td>Case assigner substituted</td>
<td>68.33</td>
<td>30</td>
</tr>
<tr>
<td>$\chi^2 = 11.307$; df=2 p=.0007</td>
<td>$\chi^2 = 2.292$; df=2 p=.13</td>
<td></td>
</tr>
</tbody>
</table>

An error analysis of the patterns of omissions and substitutions of lexical and subcategorized prepositions revealed an association between the type of preposition (lexical/subcategorized) and the category of error (omission/substitution) made in the group of fluent aphasic speakers: they omitted subcategorized prepositions and substituted lexical prepositions. Although the non-fluent aphasic speakers were more likely to omit subcategorized prepositions and to substitute lexical prepositions, no association was revealed statistically. These results partially provided support for the
proposition concerning differential impairment of prepositions in aphasia. The next error analysis regarded the production of case-marking morphemes of the complement nouns of lexical and subcategorized prepositions.

**Error analysis of case-marking morphemes of complement nouns**

Patterns of case-marking morphemes were regarded separately for responses with case-assigning prepositions (1) produced correctly, (2) omitted, and (3) substituted by members of the same category. All errors made in production of case-marking morphemes within each category (1) ‘case assigner is produced correctly’, (2) ‘case assigner is omitted’, and (3) ‘case assigner is substituted’ were counted and converted to percentages from the all errors within this particular category. The main goal of this error analysis was to examine the case-marking morphemes of the complement nouns of lexical and subcategorized prepositions, and to investigate what happens to a case-marking morpheme of a complement noun when its case-assigning lexical or subcategorized preposition is produced correctly/omitted/substituted by other case assigners. Because the numbers of errors within each category were rather small and, moreover, not all aphasic speakers made errors of all types, no statistical analysis was run on the data; rather, the results will be presented in percentages.

**Case-marking morphemes of complement nouns: correct case-assigning prepositions produced**

When both groups of aphasic speakers produced correct lexical and subcategorized case-assigning prepositions, they virtually always, except once, produced their complement nouns with case-marking morphemes. Moreover, these case-marking morphemes were correct in more than 90 percent of responses. In the group of fluent aphasic speakers, in responses with correct lexical prepositions, correct case-marking morphemes were produced in 92.53 percent of complement nouns and in responses with correct
subcategorized prepositions correct case-marking morphemes were produced 99.63 percent of the time.

Similarly, in the group of non-fluent aphasic speakers, in responses with correct lexical prepositions, case-marking morphemes were produced correctly in 96.69 percent of responses; in responses with correct subcategorized prepositions, correct case-marking morphemes were produced in 94.86 percent of complement nouns. In other words, only a few occasional errors occurred in the case marking of complement nouns in items with lexical prepositions and subcategorized prepositions in both groups of aphasic speakers; however, no clear error pattern emerged in either group. Patterns of case marking of complement nouns in the presence of correct case-assigning lexical and subcategorized prepositions by aphasic speakers are shown in table 7.4.

Table 7.4 Error patterns in case marking when case assigners were produced correctly by aphasic speakers

<table>
<thead>
<tr>
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<th>Fluent aphasic speakers</th>
<th>Non-fluent aphasic speakers</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Items with</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lex P (nitems=357)</td>
<td>Sub P (nitems=226)</td>
</tr>
<tr>
<td>Correct case marking produced</td>
<td>71.43</td>
<td>75</td>
</tr>
<tr>
<td>Incorrect case marking produced</td>
<td>4.76</td>
<td>12.5</td>
</tr>
<tr>
<td>Nominative case marking produced</td>
<td>23.81</td>
<td>12.5</td>
</tr>
<tr>
<td>Noun stem produced</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

195
Case-marking morphemes of complement nouns: case-assigning prepositions omitted

As was shown in the error analysis of lexical and subcategorized prepositions, both types of prepositions required for sentence completion were occasionally omitted in both groups of aphasic speakers, as shown in table 7.4, above.

In the group of fluent aphasic speakers, only three participants omitted lexical prepositions; four participants omitted subcategorized prepositions. When lexical prepositions were omitted by fluent aphasic speakers, correct case-marking morphemes were produced in 71.3 percent of complement nouns; in 23.81 of complement nouns nominative case-marking morphemes were produced. When fluent aphasic speakers omitted subcategorized prepositions, they produced correct case-marking morphemes in 75 percent of complement nouns; nominative case-marking morphemes were produced in 12.5 percent of complement nouns; in another 12.5 percent, other incorrect case-marking morphemes were produced.

In the group of non-fluent aphasic speakers, seven participants omitted lexical prepositions and eight of them omitted subcategorized prepositions. When the non-fluent aphasic speakers omitted lexical prepositions, in 67.38 percent of complement nouns case-marking morphemes were produced correctly, and in 24.05 percent incorrect case-marking morphemes were produced; nominative case-marking morphemes were produced in only 7.62 of complement nouns. When the non-fluent aphasic speakers omitted subcategorized prepositions, correct case-marking morphemes were produced in 73.2 percent of complement nouns; in 22.62 percent, case-marking morphemes were produced incorrectly. These data are summarized in table 7.5, below.
Table 7.5 Error patterns in case marking when case assigners were omitted by aphasic speakers.

Patterns of produced case-marking morphemes of complement nouns in phrases with omitted case-assigning prepositions are rather scattered; however, a few general observations can still be made. First, it is obvious that when case-assigning lexical and subcategorized prepositions were omitted aphasic speakers never deprived nouns of case morphemes, which would result in production of bare noun stems. And second, when the fluent and non-fluent aphasic speakers omitted case-assigning lexical and subcategorized prepositions, in more than half of the responses they nevertheless produced case-marking morphemes of the complement nouns correctly and appropriately for the omitted prepositions.

Case-marking morphemes of complement nouns: case-assigning prepositions substituted

The last error category concerns items in which case-assigning lexical and subcategorized prepositions were produced incorrectly by aphasic speakers; these prepositions were

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<th>Fluent aphasic speakers</th>
<th>Non-fluent aphasic speakers</th>
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<tr>
<td></td>
<td>Items with</td>
<td>Items with</td>
</tr>
<tr>
<td></td>
<td>Lex P (n_items=13)</td>
<td>Sub P (n_items=9)</td>
</tr>
<tr>
<td>Correct case marking produced</td>
<td>71.43</td>
<td>75</td>
</tr>
<tr>
<td>Incorrect case marking produced</td>
<td>4.76</td>
<td>12.5</td>
</tr>
<tr>
<td>Nominative case marking produced</td>
<td>23.81</td>
<td>12.5</td>
</tr>
<tr>
<td>Noun stem produced</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
substituted by other members of the same word class. Here, all items with substituted lexical prepositions or substituted subcategorized prepositions in each group of aphasic speakers are considered as a total. Errors in case marking in sentences with substituted case-assigning prepositions are computed in percentages from this total.

In the group of fluent aphasic speakers, substitution errors of lexical prepositions were made by five participants; lexical prepositions were substituted by only two participants. When the fluent aphasic speakers substituted lexical prepositions, they produced case-marking morphemes matching the substituted prepositions in 95.71 percent of these responses. When subcategorized prepositions were substituted, the fluent aphasic speakers showed a similar performance and in 87.5 percent of the responses produced substituted case-marking morphemes matching the prepositions.

In the group of non-fluent aphasic speakers, lexical prepositions were substituted by ten participants, and subcategorized prepositions were substituted by eight non-fluent aphasic speakers. When lexical prepositions were substituted, the non-fluent aphasic speakers in 90 percent of the responses also substituted case-marking morphemes, and produced case-marking morphemes matching the substituted prepositions. The same pattern was seen in their responses with omitted subcategorized prepositions. In 93.74 percent of complement nouns, case-marking morphemes were also substituted and matched the newly produced prepositions. Patterns of case marking on noun phrases in the sentences with substituted case-assigning prepositions are shown in table 7.6.
Table 7.6 Error patterns in case marking when case assigners were produced incorrectly by aphasic speakers and substituted by other elements of the same category

The main goal of the error analysis of the case-marking morphemes of complement nouns was to examine the case-marking morphemes of complement nouns of the lexical and subcategorized prepositions when these prepositions were produced correctly/omitted/substituted by other case assigners. Several tendencies in the behavior of the aphasic speakers could be distinguished. First, both groups of aphasic speakers always produced nouns with case-marking morphemes and did not deprive nouns of case-marking morphology, which would have resulted in the production of non-words. Second, when the fluent and non-fluent aphasic speakers managed to produce correct lexical and subcategorized prepositions, they were most likely to be able to produce correct case-marking morphemes of their complement nouns. Third, when both groups of aphasic speakers substituted lexical and subcategorized prepositions, at the same time they also produced case-marking morphemes corresponding to the cases assigned by the substituted prepositions.
Merging errors

The comparisons within each group of aphasic speakers, made in relation to sentences with two different types of prepositions, showed that the fluent as well as the non-fluent aphasic speakers produced more correct responses with complete correct prepositional phrases with lexical prepositions than prepositional phrases with subcategorized prepositions. These results provided some support for the claim concerning differential impairment of prepositions in aphasia; however, it was necessary to locate where these differences were rooted.

A complete prepositional phrase consists of two elements – a preposition and its competent noun. Hence, when a prepositional phrase is incorrect, the error can affect either a preposition, which can be produced incorrectly or omitted, or it can affect case-marking morphemes of the complement noun of this preposition. It was decided to merge the errors made by aphasic speakers. Therefore, responses with omitted and substituted prepositions were taken together and regarded as one error category. Errors in case-marking morphemes of complement nouns were collapsed as well, and constituted another error category. This permitted a comparison of two general error categories, namely, errors in production of prepositions were compared to errors in the production of case-marking morphemes of complement nouns when prepositions were produced correctly. The two categories of errors are subsequently referred to as ‘preposition errors’ and ‘case errors’.

All incorrect responses produced by each group of aphasic speakers with each type of preposition were regarded as 100 percent; preposition errors and case errors were computed from this total number of errors. In the group of fluent aphasic speakers ($\chi^2 = .933; \text{df}=2; p=.319$) and in the group of non-fluent aphasic speakers ($\chi^2 = .097; \text{df}=2; p=.755$) no significant associations were found between the error category (preposition errors and case errors) and the type of preposition (lexical and subcategorized). However, it was noted that both groups of aphasic speakers made case errors in responses with subcategorized prepositions twice as often as they did in responses with lexical prepositions. Table 7.7 shows preposition errors and case errors made by the aphasic speakers.
Patterns observed in the performance of both groups of aphasic speakers were similar. When required to complete a sentence with a prepositional phrase both groups of aphasic speakers erred more often in production of correct prepositions, both lexical and subcategorized, than in production of correct case-marking morphemes of the complement nouns of these prepositions. This pattern was found in both groups of aphasic speakers across both types of prepositions.

### Summary

Taking into consideration the results of the experiment and the error analyses performed on the acquired data, it can be concluded that neurologically intact Russian speakers do not experience any difficulties in the production of any type of prepositions, irrespective of their functions; nor do they have any problems in production of correct case-marking morphemes of these prepositions. For aphasic speakers, however, production of all prepositions, and especially production of complete correct prepositional phrases, is difficult. Fluent aphasic speakers experienced more difficulties when required to produce a sentence with a prepositional phrase where a preposition performs a subcategorized function. For the most part, errors that the fluent aphasic speakers made in the production of complete prepositional phrases with lexical prepositions concerned errors in the production of case-marking morphemes of complement nouns, rather than errors in the production of prepositions. When fluent aphasic speakers made errors in the production...
of prepositions, in relation to lexical prepositions, these were most often substitutions, and with respect to subcategorized prepositions these errors were omissions.

For the non-fluent aphasic speakers production of sentences required to be completed with a prepositional phrase, in which a prepositions performs subcategorized function, is more difficult when compared to sentences with prepositions performing lexical function. Most errors made by the non-fluent aphasic speakers, in sentences with both types of preposition, were errors in the production of case-marking morphemes rather than errors in the production of prepositions. However, when errors in prepositions occurred, there were no preferences, and lexical and subcategorized prepositions were substituted equally as often as they were omitted. In the presence of both types of prepositions the non-fluent aphasic speakers were most often able to produce correct case-marking morphemes on the complement nouns of these prepositions.

**Discussion**

The study reported in this chapter was performed subsequent to the examination of prepositions and of the production of case-marking morphemes of complement nouns of these prepositions by Russian aphasic speakers. Previous studies and experiments reported in this thesis have found that the production of complete correct prepositional phrases is defective in aphasia. In narrative speech, non-fluent aphasic speakers produced fewer prepositions than did the control speakers, whereas fluent aphasic speakers performed similarly to the control group. When both groups of aphasic speakers produced a preposition in their narrative speech, they were able to produce the correct case-marking morphemes of the complement nouns of these prepositions. This finding was also supported by the results of the sentence completion experiment. Fluent and non-fluent aphasic speakers were found to be able to produce (although not faultlessly) correct case-marking morphemes of complement nouns of prepositions, both when they managed to produce these prepositions correctly, and when these prepositions were already provided in the sentences. The fluent aphasic speakers, as expected, were also observed to substitute case-assigning prepositions, and to produce their complement
nouns with case-marking morphemes appropriate for the produced prepositions. In addition, it was found that the presence of correct case-assigning prepositions in experimental sentences had a positive influence on the production of correct case-marking morphemes of the complement nouns of these prepositions; therefore, the presence of correct case-assigning prepositions facilitated case assignment and led to the production of correct case-marking morphemes. These results supported the general hypothesis. The main goal of the study discussed in this chapter was to investigate whether the hypothesis could be further extended and, therefore, claim that the presence of a correct case-assigning preposition, independent of the function it performs and the context in which it occurs, facilitates case assignment and leads to the production of correct case-marking morphemes of its complement noun. The results of the experiment were expected to provide an answer to several questions, and to provide data to support the main hypotheses of the study.

The first question concerned production of lexical and subcategorized prepositions in a quantitative perspective. It was examined whether there were differences in the numbers of complete correct prepositional phrases with lexical and subcategorized prepositions produced by fluent and non-fluent aphasic speakers, and the neurologically intact control speakers in experimental tasks. In a number of studies, prepositions, being free-standing grammatical morphemes, have been reported to be vulnerable in aphasia. The results of the experiment show that both groups of aphasic speakers performed significantly worse than the group of control speakers. Fluent and non-fluent aphasic speakers produced fewer correct responses with complete correct prepositional phrases, either with lexical prepositions or with subcategorized prepositions. In other words, the production of complete correct prepositional phrases was found to be impaired in both groups of aphasic speakers. These results are also in line with the results of an earlier study on Russian (Beyn, Vizel, & Hatfield, 1979), which showed that production of prepositional phrases was difficult for Russian fluent and non-fluent aphasic speakers. These results conformed to the general proposition over the difficulties aphasic speakers experience with prepositions.

Prepositions are not only known to be difficult in aphasia, but are also claimed to be subject to differential impairment in aphasia. In earlier studies, patterns of loss and
preservation of prepositions were claimed to be predictable either by the context in which a particular preposition occurs and/or by the function this preposition performs. Differential impairments of prepositions were found in different forms of aphasia in German (Friederici, 1981; 1982; Friederici, 1985; Tesak & Hummer, 1994), Dutch (Bennis et al., 1983), and English (Grodzinsky, 1988). Thus, the second question of the study was whether the patterns of differential loss of prepositions reported for other languages could also be observed in Russian aphasia. Although, in general, prepositions are known to be problematic for aphasic speakers, different performance patterns were reported to be found in fluent as well as in non-fluent aphasia. Since prepositions performing different functions have not yet been investigated in Russian, the results of the experiment described in this chapter will be collated here with the results of similar studies carried out on other languages.

Functionally different prepositions were examined in the speech of German Broca’s and Wernicke’s aphasic speakers (Friederici, 1982). German Wernicke’s aphasic speakers were reported to perform better on prepositions used in verb combinations than on locative prepositions. With Broca’s aphasic speakers, omissions of prepositions performing a “syntactic role” were numerous; they diminished when prepositions carried semantic information (Friederici, 1982). However, this study was later criticized by Bennis and colleagues (Bennis et al., 1983), since the functions of the prepositions, according to them, were not properly determined and specified. Bennis and colleagues investigated the processing of prepositions by Dutch Broca’s and Wernicke’s aphasic speakers in the framework of Extended Standard Theory (Chomsky 1975; 1977), which was outlined here, in chapter II. It was reported that Broca’s aphasic speakers performed better on subcategorized and lexical prepositions, and had more difficulties with syntactic prepositions, while Wernicke’s aphasic speakers showed the opposite pattern (Bennis et al., 1983). Similar to Friederici (1982), the authors concluded that in aphasia prepositions do not behave uniformly, and the difficulties that Broca’s and Wernicke’s aphasic speakers experience with prepositions indicate the different nature of their impairments (Bennis et al., 1983). However, neither the results of German (Friederici, 1982) nor Dutch (Bennis et al., 1983) studies can be adequately tested for Russian. the very rich morphological system of Russian with an extensive case marking, where the primary
function is to express relations among sentence components, eliminates the syntactic function of prepositions. Therefore, with respect to Russian prepositions, only two functions could be specified – lexical and subcategorized – and these were tested in the present study. Both groups of Russian aphasic speakers were found to perform significantly better on sentences with lexical prepositions when compared to sentences with subcategorized prepositions. Taking into account that purely syntactic prepositions do not exist in Russian, these results partially resemble the German and Dutch findings with respect to non-fluent aphasic speakers, who indeed performed better on lexical prepositions (which bear more semantic load) than on subcategorized prepositions. Russian fluent aphasic speakers showed the opposite performance to that reported for German and Dutch. English Broca’s aphasic speakers were reported to retain the ability “to use some prepositions, yet some others are lost” (Grodzinsky, 1988: 129). Only “governed prepositions” (which perform a grammatical function) were claimed to be impaired in non-fluent aphasia while all others were preserved (Grodzinsky, 1988). This was reported to be unique for Broca’s aphasic speakers and not characteristic of the aphasic syndrome in general. However, this statement cannot be fully supported by the findings of the experiment reported here. Indeed, a difference was found in the performance of the non-fluent aphasic speakers in the sentences with lexical prepositions and in sentences with subcategorized prepositions. The group of non-fluent aphasic speakers produced more correct responses with complete correct prepositional phrases with lexical prepositions than correct responses with complete correct prepositional phrases with subcategorized prepositions. However, this performance was not unique for this group, and a similar pattern was found in the performance of the fluent aphasic speakers. When patterns of omissions and substitutions of lexical and subcategorized prepositions were examined, the group of fluent aphasic speakers was found to omit subcategorized prepositions and to substitute lexical prepositions, whereas the group of non-fluent aphasics did not show any preference. In this respect, these results are similar to the results of the German agrammatic aphasic speakers in Tesak and Hummer’s work (1994); they reported that governed prepositions were found to be deleted as often as ungoverned prepositions, and even showed a slight tendency to be better preserved, which is contrary to Grodzinsky’s study (1988).
The third question of the present experiment was whether the function of a particular preposition is related to the case assignment of its complement noun, and whether it influences the production of correct case-marking morphemes of this noun. Case assignment with respect to prepositions performing different functions in Russian has not yet been the focus of investigation; however, some observations concerning the case-marking morphemes of complement nouns of prepositions were mentioned in the aphasiological studies. In the study of Beyn and colleagues, the fluent aphasic speakers were reported to tend to substitute prepositions and to produce case morphemes appropriate for the produced prepositions (1979). Similar to this finding, in the present study, Russian fluent aphasic speakers also substituted prepositions and produced case-marking morphemes appropriate for the produced prepositions. However, contrary to Beyn and colleagues, the same pattern was also observed in the performance of the non-fluent aphasic speakers. Substitutions of prepositions were also reported previously for Russian fluent aphasia (Tsvetkova & Glozman, 1975), and substitutions of case-marking morphemes of the complement nouns of prepositions were described for Polish agrammatic aphasia (Ulatowska et al., 2001). The non-fluent aphasic speakers in the study by Beyn and colleagues were reported to omit prepositions and use nominative case marking of their complement nouns (Beyn et al, 1979). Similar results were reported in the study of the case assignment of Russian verbs (Ruigendijk, 2002). When, in the present study, the non-fluent aphasic speakers omitted case-assigning prepositions, they made errors in the production of case-marking morphemes, but they nevertheless did not show any tendency to overuse nominative case marking, nor was it observed among the fluent aphasic speakers. Both groups of aphasic speakers tended to produce correct case-marking morphemes of more than half of the complement nouns of omitted prepositions.

To recapitulate, the results of the present experiment provided answers to the research questions put forward, and the data to confirm the hypotheses of the study. The results of the experiment and error analyses performed on the acquired data led to the conclusion that, as expected, neurologically intact Russian speakers did not experience any difficulties in production of any type of prepositions, irrespective of their function; nor did they have any problems in production of correct case-marking morphemes of these prepositions. With respect to the performance of the aphasic speakers, it was
assumed that they would rely more on the component that is supposed to be comparatively less impaired in each form of aphasia. Therefore, it was hypothesized that the fluent aphasic speakers would perform better in sentences with subcategorized prepositions that have less semantic load than in purely lexical prepositions with semantic meanings, since impairment in fluent aphasia is considered to affect mainly the lexical-semantic domain and cause lexical-retrieval difficulties (Bastiaanse & Edwards, 2004). It was also hypothesized that the non-fluent aphasic speakers would have fewer difficulties with lexical prepositions, and would instead experience problems with subcategorized prepositions, which perform a grammatical function, as impairment in non-fluent aphasia is a syntactic deficit (Bastiaanse et al., 2003). As discussed before, the results of the study supported the hypothesis proposed for the group of non-fluent aphasic speakers. As for the fluent aphasic speakers, they showed performance patterns similar to the non-fluent aphasic speakers, and performed better on sentences with lexical prepositions. As also mentioned previously, similarities in the performance patterns of fluent and non-fluent aphasic speakers have been observed before (Bastiaanse & Edwards, 2004; Edwards, 2002; Edwards & Bastiaanse, 1998).

Other hypotheses were formulated with respect to the production of case-marking morphemes of complement nouns of lexical and subcategorized prepositions. In general, both groups of aphasic speakers were expected to follow the same patterns in production of case-marking morphemes as they showed in the previous experiments. Therefore, it was hypothesized that when non-fluent aphasic speakers produce case-assigning prepositions, either lexical or subcategorized, they will be able to produce correct case-marking morphemes of the complement nouns of these prepositions. This hypothesis was supported by the results of the study. It was found that when the fluent and non-fluent aphasic speakers produced lexical and subcategorized prepositions, they always produced their complement nouns with case-marking morphemes, and most often these morphemes were correct. As for the fluent aphasic speakers, it was hypothesized that if they substituted either lexical or subcategorized prepositions, they would produce their complement nouns with case-marking morphemes matching these prepositions. The fluent aphasic speakers performed similarly to the non-fluent aphasic speakers, and they also produced correct case-marking morphemes of complement nouns of lexical and
subcategorized prepositions when they were able to produce these prepositions. When they substituted lexical and subcategorized prepositions, they performed in accordance with the hypothesis; however, the non-fluent aphasic speakers showed a similar performance. These results show that neither of the hypotheses was proven to be group specific, since both groups of aphasic speakers showed similar behavior. This finding is similar to the observation made in the previous chapter, which discussed the sentence completion experiment, and such similarities in the performances of fluent and non-fluent aphasic speakers have been mentioned in a number of precedent studies. These similarities were explained by the difficulties that aphasic speakers experience in the “integration of lexical-semantic and grammatical processes at sentence level”, irrespective of the aphasia type (Bastiaanse & Edwards, 2004: 101). With respect to the prepositional phrase insertion task of the present experiment, the production of a preposition, lexical or subcategorized, can be regarded as a lexical-semantic process, whereas insertion of this preposition in the sentence, and production of its complement noun with a correct case-marking morpheme, can be viewed as a grammatical process. Both these operations are performed at sentence level.

This was the final experiment of this thesis, which has investigated the linguistic abilities of Russian speakers with aphasia in the production of case-assigning prepositions and case-marking morphemes of their complement nouns. The next chapter deals with the conclusions reached, and reviews the results of the all experiments in the light of the hypothesis and the research questions.