Part III: Cognitive rehabilitation in schizophrenia

Chapter 6
Cognitive rehabilitation in schizophrenia: an overview

6.1 Introduction

Cognitive impairments in schizophrenia severely hamper daily functioning and are considered a rate limiting factor with regard to social functioning and the ability to work (for example Mueser, 2000). Cognitive impairments affect learning and recovery potential and are related to activity limitations and participation restrictions in daily life (eg. Green et al., 2000). In relation to work, for example, it has been shown that cognitive impairments affect the rate of improvement on work performance measures in a work program (Bell & Lysaker, 1995; Lysaker et al., 1995). Patients with severe cognitive impairments have more difficulties on a job, work fewer hours and fewer weeks (Bell et al., 2003), whereas clinical symptoms of schizophrenia do not predict performance in supported employment (McGurk & Mueser, 2006). Furthermore, cognitive and social-cognition impairments are thought to play a role in the impaired social functioning in schizophrenia (Bellack et al., 1999; Couture et al. (2006) and affect acquisition and performance of skills in a skill training group, aspects of daily ward functioning and ability to be discharged from hospital (Silverstein et al., 1998). Utilisation of outpatient service is predicted by a measure of executive functioning (McGurk et al., 2004). Learning potential has been suggested as a mediator between cognitive functioning and activity limitations/participation restrictions in daily life, as work skills are predicted by whether a patient benefits from training on a cognitive task (Sergi et al., 2006). Moreover, cognitive impairment is linked with negative symptoms (Greenwood et al., 2005), which are known to significantly affect functioning in daily life.

It has been clearly demonstrated that cognitive functioning and social cognition are not the only factors that contribute to activity limitations and participation restrictions in daily life (see for example Chapter 5 of this thesis), since the strength
of the relationships that have been found in most studies is usually, at best, moderate. However, this moderate effect of cognitive impairments at a group level can be of enormous significance to individual patients. Cognitive impairments are, therefore, important targets for intervention.

Today, antipsychotic agents (often in combination with cognitive behavioural therapy) are frequently effective in the treatment of positive symptoms of schizophrenia. Although some atypical anti-psychotic agents may also produce a mild improvement of cognitive functioning, significant cognitive impairments exist even after year-long treatment with these pharmacological agents (Purdon, 2000; Woodward et al., 2005). Given the limited effect of pharmacological treatment on cognition, alternative ways of treating cognitive dysfunction in schizophrenia have been sought. This search has stimulated the development of behavioural interventions aiming to enhance cognitive functioning in schizophrenia or to help patients cope with their cognitive impairments.

It is important to note that consensus about terminology in the field of behavioural interventions for cognitive impairments is lacking. The most commonly used terms are “cognitive remediation”, “cognitive rehabilitation” and “cognitive training” (Twamley et al., 2003). Cognitive remediation suggests that cognitive impairments are cured, which is not the case in schizophrenia. According to Twamley et al., the term ‘rehabilitation’ is also associated with restoring a function to normal or pre-morbid level. He suggests that “cognitive training” is the best option, since this is a general term that is easily understood by professionals. In this thesis, however, the term “cognitive rehabilitation” is preferred because it is compatible with the terminology of landmark publications on this topic (e.g. Goldstein, 1942; Wilson, 1997). Furthermore, it is the most commonly used term in the neuropsychological literature. The exact definition of cognitive rehabilitation varies between authors. For the purpose of this thesis, Wilsons’ (1989, p. 117) broad and pragmatic definition is preferred: “cognitive rehabilitation is any strategy or technique that is intended to help patients with cognitive problems caused by brain injury, and their families, to cope with these problems, to learn to live with them, to overcome and/or to reduce them”. This definition is not restricted to behavioural interventions, but also encompasses other strategies, such as for example the use of a cognitive prosthesis, to help patients cope with their deficits. Although the definition is aimed at the rehabilitation of cognitive impairments due to brain injury, it can be easily applied to patients with schizophrenia.

Although research interest in cognitive rehabilitation has increased enormously during the past two decades, the first attempts at cognitive rehabilitation stem from the first half of the 20th century. Kurt Goldstein’s work is seen as providing
the foundation for contemporary cognitive rehabilitation (Newcombe, 2002). Goldstein’s ideas were derived from his experience of working with patients with war-time brain injuries (Goldstein, 1942). In his approach, patients were enrolled in a combination of vocational training and occupational therapy. The focus of his intervention was on the preferences and strategies of the patient himself. Moreover, he stressed the relevance of family and other social factors. Other influential figures included Zangwill (1950) and Luria (1973). After World War II the rehabilitation of war veterans continued (e.g. Teuber, 1975), together with the cognitive rehabilitation of civilians with closed head injuries (Newcombe, 2002). More recent examples of cognitive rehabilitation in patients with traumatic brain injury are Time Pressure Management, a compensatory strategy for individuals with slow information processing (Fasotti et al., 2000) and Goal Management Training, strategy training aimed at setting goals and sub-goals, maintaining intentions, and reaching goals (Levine et al., 2000). The cognitive impairments of patients with traumatic brain injury often resemble impairments that are found in schizophrenia. For example, mental slowing and impaired memory functioning have been documented in both patient groups. Therefore, it is not surprising that current cognitive rehabilitation in schizophrenia was influenced to a large extent by the early interventions with patients with traumatic brain injury. More recently both fields seem to have developed in parallel without much evidence of interaction, and joint efforts to enhance cognitive rehabilitation by clinicians and researchers in psychiatry on the one hand and neurology on the other are scarce.

Another important development that gave rise to current cognitive rehabilitation in schizophrenia are the many experimental laboratory studies on the effect of manipulation of experimental stimuli (e.g. additional instructions or incentives) on performance in test situations (e.g. Spaulding et al., 1986; Kurtz et al., 2001; Twamley et al., 2003). The earliest documented attempts at cognitive rehabilitation in schizophrenia were made in the 1960’s. In 1968, Wagner established the efficacy of contingent reinforcement and repeated practice on attention and abstraction. Five years later, Meichenbaum and Cameron (1973) reported a positive effect of self-instruction training on a digit symbol task and a digit recall task with and without distraction. Their intervention was based on Luria’s (1973) idea that speech is very powerful in enhancing voluntary attention. These promising findings were followed by other studies of cognitive rehabilitation in schizophrenia. Two recent comprehensive quantitative reviews provide an overview of this area. The first review is a meta-analysis of cognitive rehabilitation in schizophrenia (Twamley et al., 2003). The paper encompasses all randomised, controlled trials of training interventions to improve cognition published up to 2003. Reports of non-intervention
or laboratory studies, and psychosocial skill training were excluded, and the authors also excluded investigations that relied on only the cognitive test used in training as outcome measures. Another quantitative review of controlled studies of cognitive rehabilitation in schizophrenia was carried out by Krabbendam and Aleman (2003). This meta-analysis was conducted on a series of studies that overlapped to a large extent, though not entirely, with those included in Twamley’s review. Results of both of these meta-analyses will be discussed in the following sections, in addition to several more recent or otherwise relevant interventions.

Traditionally, for neurological patients, three approaches to cognitive rehabilitation are distinguished: restorative, compensatory and environmental interventions (e.g. Bellack et al. 1999). Another categorisation system (Code, 2001) for approaches to cognitive rehabilitation encompasses two orthogonal axes. The first axis represents the dimension ‘restoration versus compensation’. The second axis represents the level at which interventions are targeted: neural, cognitive or behavioural. Interventions aimed at the neural level aim for restoration by utilising spared local tissue or compensation by using neural structures that were not originally involved in a lost function. Interventions at the cognitive level might aim for restoration through cognitive training exercises or aim for compensation through mental strategies that compensate for impaired processes. At the behavioural level, interventions may seek to restore normal functioning through training a specific task or enable a person to perform a particular task or activity through task-specific compensation (e.g. allowing more time for job-tasks in the work environment for the person with speed of information deficits). Although this orthogonal classification system is helpful in conceptualising forms of rehabilitation intervention, it is perhaps less suitable as a taxonomy for cognitive rehabilitation in schizophrenia, since categorisation of investigations in schizophrenia as restorative or compensatory, is impeded by the fact that investigations of cognitive rehabilitation in schizophrenia tend not to use these labels and the distinction between restoration and compensation is often quite unclear (Twamley et al., 2003). Therefore, in this thesis interventions will be described in terms of the ICF classification of functioning, disability and health (see Chapter 1): interventions are divided into those that focus on impairments (body structures and functions), and those that focus directly on specific functional activities. Also relevant to this classification is the distinction between expected and observed effects of an intervention. This distinction is relevant because the expected outcome may differ from actual outcome. For example, an intervention may be developed to enhance a specific cognitive function. If this cognitive function really improves after training, the effects of cognitive rehabilitation would be expected to generalise to other situations in which the trained functioning is required. Often,
however, such spontaneous generalisation is not observed. In that case it should be
concluded that a specific activity has been trained but not the underlying function.
In the following paragraphs, interventions are categorised on the basis of the level of
expected outcome and not on the basis on the level of observed outcome.

6.1.1 Interventions at the level of the Body/ Functional Limitations
Interventions in this category are focussed on impairments and aim either to improve
underlying cognitive functions or to train compensatory cognitive strategies that can
be applied across multiple functional situations.

The first group of interventions at the body level, is the use of psychopharma-
cological agents, and in particular antipsychotic medication. Although antipsychotic
agents primarily aim to relieve clinical symptoms of schizophrenia, some second-
generation antipsychotics have a mild positive effect on cognitive functioning. Cloza-
pine has been the most widely studied in this regard. Its effect on cognitive func-
tioning has been demonstrated, but gains are small and performance typically still
falls within the impaired range (Weiss et al., 2002). Positive effects of Risperidone,
Quetiapine, and Olanzapine on cognitive functioning have also been demonstrated
(Weiss et al., 2002).

Interventions that also claim to be at the level of the body functions are repetition
of cognitive tasks or ‘drill and practice’. Drill and practice is the frequent repetition of
a cognitive task in order to improve functioning within the trained cognitive domain.
Traditionally, frequent repetition of a cognitive measure was thought to stimulate
the brain system that is involved and thus enhance performance within the trained
cognitive domain (Berg & Schmidt, 2002). An analogy that is often used in this
regard is the comparison of the brain with a muscle, which will be strengthened by
‘cognitive exercises’. Based on this assumption, many attempts have been made to
enhance performance in schizophrenia. The most frequently studied cognitive task
is the Wisconsin Card Sorting Test, using repeated practice and providing incentives
or additional instructions (see Kurtz et al., 2001 for a review). Most studies reviewed
by Kurtz et al. demonstrated improved performance on the Wisconsin Card Sorting
Test. However, if no outcome measures other than the trained task are used to
evaluate the efficacy of the intervention, this kind of study only shows that learning
(i.e. learning a specific task) is possible in schizophrenia (Twamley et al. 2003).
For this reason, studies that only use the trained measure to evaluate outcome are
not included in the quantitative reviews that will be discussed here. Although the
interventions that are incorporated in the meta-analyses reported here are evaluated
by measures other than the trained task, this evaluation is in most cases restricted to
the assessment of cognitive functions using neuropsychological tests, while outcome
at the level of activities and participation has seldom been evaluated.

Drill and practice interventions are usually distinguished from strategy training, although terminology is not consistent across authors (automated task practice/strategy oriented task practice in Twamley et al. (2003) versus rehearsal/strategy learning in Krabbendam & Aleman, 2003). Moreover, Twamley et al. (2003) distinguished computerised drill and practice from “paper and pencil” drill and practice. Twamley’s review concluded that both approaches resulted in improved performances on outcome measures used in the studies reviewed. The mean weighted effect size (Cohen’s d) was .42 (number of studies=3) for paper and pencil drill and practice and .49 (number of studies=8) for the computerised interventions. Krabbendam and Aleman obtained a slightly lower effect size (also Cohen’s d) of .34 (number of studies=6). The difference between the effect sizes is due to the fact that samples in both quantitative analyses do not completely overlap. Moreover, one study (Bell et al., 2001) was considered drill and practice by Twamley et al., while Krabbendam and Aleman labelled this study as strategy training. Despite this difference in absolute effect size, according to Cohen’s (1988) nomenclature all effect sizes fall within the medium range. Krabbendam and Aleman (2003) conclude that evidence for generalisation of effects of cognitive rehabilitation to activities and participation in the ‘real world’ is limited. Social skills and job performance do not necessarily improve after drill and practice cognitive rehabilitation. This makes it hard a muscle that can by strengthened by frequent training as a metaphor for the brain. If drill and practice does have an effect at the level of the body (improving cognitive functions), performance on more distal outcome measures should also improve. Since this is not the case, it is not likely that specific cognitive functions improve. Even in the case of enhanced performance on outcome measures other than the trained tasks, gains are restricted to “learning how to perform well on assessments of certain cognitive functions”.

Cognitive training may also be focused on remediation via developing cognitive skills or strategies that improve functioning in a range of situations, but which are not necessarily aimed at restoration of underlying impaired cognitive processes. An example of this approach is Delahuntly and Morice’s (1993) protocol, later developed into Cognitive Remediation Therapy (see Wykes and Reeder, 2005). The main focus of this intervention is on improving executive functioning by training in strategy use, combining errorless learning methods, immediate feedback, and targeted reinforcement to enhance flexibility, working memory, and planning skills (Wykes et al., 1999). In the working memory module for example, patients are required to retain two sets of information simultaneously and carry out manipulations on one of them. The intervention has a positive effect on performance on tests of memory and
executive functioning and also enhances self-esteem (Wykes et al., 1999), though no claim is made that cognitive functions are restored to normal.

Like in drill and practice, Twamley et al. distinguished computerised strategy training from “paper and pencil” strategy training. For computerised strategy training the mean weighted effect size on cognitive functioning as measured by test performance (Cohen’s d) was .23 (number of studies= 4), while Cohen’s d was -.38 (number of studies=1) for the computerised interventions, both moderate effect sizes. It should be noted that the latter study has a negative effect size: patients did not show improvement in the experimental condition (Medalia et al., 2000). The effect size found by Krabbendam and Aleman was substantially higher (d=. 52, number of studies= 7), this effect size falls just within the range of medium effect sizes. Again, the difference in effect size is due to a slight difference in inclusion and exclusion criteria. Two additional studies have demonstrated that performance on a measure of social cognition can improve after strategy training. Teaching patients to identify and discriminate facial signs of basic emotions leads to improved perception of facial affect (Wölver et al., 2005). Hogarty et al., (2004) have combined cognitive rehabilitation with group exercises focussing on social cognition and found that patients in the cognitive rehabilitation condition demonstrated enhanced performance on cognitive measures as compared to patients in the control condition. They also demonstrated marginal improvement on behaviour composites of cognitive style, social cognition and social adjustment.

6.1.2 Interventions at the level of Activity Limitations and Participation Restrictions
Interventions aimed at this level include the use of aids and strategies (including external aids) that aim to compensate for cognitive impairments in specific functional situations, task or activity-specific training and modifications to the environment. Interventions at this level do not aim to improve underlying cognitive functions, and in general spontaneous generalisation would not be expected. Therefore, interventions in this category often include efforts to stimulate generalisation to other functional situations.

Rather than trying to approach cognitive functioning per se, some interventions focus on an individual’s environment to facilitate coping with cognitive impairments. This is most often done in the form of prompting by external aids, discussed below. Another form of contextual adaptation that been applied in schizophrenia is the token economy. About three decades ago, the token economy was quite a popular intervention. Instead of providing cues for action, token economies try to promote specific actions by using operant conditioning and social learning. In a token economy,
tokens are used to reinforce specific adaptive behaviour. At a later time, these tokens can be exchanged for personal reinforces. Substantial evidence supports the efficacy of token economies (Dickerson et al., 2005).

While token economies have been studied extensively, studies on environmental adaptation in the form of external aids or ‘cognitive prostheses’ in schizophrenia are few, although interventions of this kind are common practice in the cognitive rehabilitation of patients with traumatic brain injury. This difference is remarkable, since the cognitive impairments of both patient samples are similar. Typically, cognitive prostheses are used to reduce the load on impaired (executive and memory) functions by providing environmental cues in daily life situations, often using assistive technology. Kirsch et al. (1987) proposed a conceptual framework for cognitive rehabilitation that is helpful in defining “cognitive prostheses”. Cognitive prostheses are described as compensatory strategies (as opposed to a graded drill) that alter the patient’s environment (as opposed to improving the patients’ abilities) and are directed to an individual’s activities and participation (as opposed to retraining of component cognitive functions). They are considered to reduce the gap between the recovery that traditional cognitive rehabilitation can provide and the patient’s need for functional restoration (Cole, 1999). Most cognitive prostheses are used to compensate for impaired memory functioning. Four main categories of cognitive prostheses can be distinguished: electronic organisers to enhance event related or prospective memory, speech storage devices when long messages need to be stored, electronic communication devices such as telephones and pagers are associated with a variety of reminder systems, and computer-based technologies for knowledge acquisition and utilisation (Kapur et al., 2004). Cognitive prostheses may function as event memory aids to improve prospective memory functioning, or the ability to perform intended actions in the future (Herrmann et al., 1999), or as knowledge memory aids to facilitate the acquisition and utilisation of factual information. Often, a single memory aid serves both purposes, and one function may merge into another (Kapur et al., 2004). Cognitive prostheses may also act as motivational cues to help with problems such as apathy. For example, the auditory alerts that some cognitive prostheses provide may promote goal directed behaviour in dysexecutive patients, by temporally enhancing their alertness. This facilitates monitoring and behavioural flexibility (Manly et al., 2002).

In this thesis, it is proposed that an electronic communication device (a mobile telephone) will be helpful in the cognitive rehabilitation of schizophrenia: SMS-text messages will serve as prompts to activate mental schemata of activities. An example of an electronic communication device that has proven to be successful in the rehabilitation of patients with impaired everyday memory or planning problems
is the NeuroPage: the system uses radio pagers to which reminders are sent from a central computer. The first NeuroPage was developed by a Californian engineer, whose son suffered from brain damage, together with a neuropsychologist (Hersch & Treadgold, 1994). Patients receive messages at scheduled times, these messages are signaled by a light, a vibration or an audible signal. Simultaneously, the content of the message is displayed on the screen of a receiver (Lynch, et al., 1995). The Neuropage was used both to compensate for memory (Hersch & Treadgold, 1994; Wilson, et al., 1997) and executive deficits (Evans et al., 1998) in patients with acquired brain injury. Compliance and temporal accuracy improved to normal levels when patients used the pager; the number of tasks achieved improved significantly (Wilson et al., 1997). Patients were more successful in self-care, self medication, and keeping appointments when using the pager (Wilson et al., 2001). After returning the pager, performance dropped slightly, but remained well above baseline level (Wilson, 2005).

In schizophrenia, only Velligan et al. (Velligan et al., 1996: Velligan et al., 2006) have systematically studied environmental adaptations/ cognitive prostheses as a means to enhance everyday functioning. The authors use a manual driven program (Cognitive Adaptation Training or CAT, Velligan, 2001) of environmental supports, such as alarms, labels and reorganisation of belongings to bypass executive problems and enhance adaptive community functioning. Assessment of executive functioning and overt behaviour styles preceded the training. The patients living environment was also examined. Compensatory aids were based on this assessment and therefore differed between subjects. Velligan et al. (2000) compared CAT to standard medication follow up and standard follow up plus a condition to control for therapist contact time and environmental changes. They found an improvement of adaptive functioning and quality of life and less psychotic relapses during the intervention. In another validation study (Velligan et al., 2006) CAT was compared to generic environmental supports (environmental supports set up by the patients themselves, without the help of a trainer) and assessment only. Functional behaviours improved most in the CAT condition. Since environmental supports are used more often in the CAT condition than in the generic environmental control condition, the authors concluded that environmental supports should be tailored to individual needs and set in the home environment of the patients in order promote use. Furthermore, Velligan et al. (2005) showed that medication compliance in schizophrenia was enhanced by the use of mechanical pillboxes. Although mechanical pillboxes are used as reminders to improve prospective memory functioning in schizophrenia more often, further systematic evaluations are lacking.

A small number of studies have systemically examined the role of prompting by
external aids to enhance treatment compliance in schizophrenia (Reda & Makhoul, 2001). In two studies telephone prompts were used. Patients received a telephone call 24 (Kluger & Karras, 1983) or 48 (Burgoyne et al., 1983) hours before the clinic appointment and their compliance was compared to a control group. Attendance increased by prompting, although this effect did not reach statistical significance. Reda and Makhoul suggest that this might be caused by the relative small sample size. Text-based prompts, a few days before the appointment day, did increase clinic attendance (Kluger & Karras, 1983; Swenson & Pekarik, 1988). When telephone prompts are compared to text-based prompts, evidence is in favour of the latter (Reda & Makhoul, 2001).

Similarly, telephone-based reminders also have been demonstrated to enhance compliance in other patient groups. For example, telephone-based reminder systems have been shown to be useful in improving patient compliance with taking medication in elderly people (Leirer, et al., 1989; Leirer, et al., 1991), in increasing attendance in respiratory outpatients (Roberts et al., 2007) and inpatients in an adolescence clinic (O’Brein & Lazebnik, 1998), and in keeping appointments in both elderly and younger adults (Morrow et al., 1999). SMS text-messages were successfully used to remind outpatients of an Australian hospital of their clinic appointments. Attendance increased and the authors concluded that reminding patients using SMS text-messages is very cost effective (Downer et al., 2006). Wade and Troy (2001) used mobile telephones as cognitive prostheses in the true sense of the word. They describe five case studies of individuals suffering from every day memory problems after traumatic brain injury. Spoken messages were recorded into a computer and were sent to mobile telephones at scheduled times. Self-initiated performance in remembering to carry out target tasks was compared prior to and with the mobile telephone. Measurements included diary-format observations and qualitative feedback. The results of their pilot-study show that all patients in this trial improved while they used the memory aid.

In Chapter 2 of this thesis a rational for the use of a cognitive prosthesis in schizophrenia based on mental schemata theory was provided. It was argued that in schizophrenia, the automatic use of contextual information to predict relevant stimuli is impaired (Hemsley, 1993). Many patients do not use contextual cues automatically to anticipate relevant stimuli; they act on irrelevant environmental or cognitive cues and therefore often do not achieve goals that are important to them. These patients will profit from an environment that offers clear and unambiguous stimuli to trigger relevant schemata and action. It is expected that environmental adaptation in the form of providing clear stimuli by offering a cognitive prosthesis will facilitate performance at the level of activities and participation by providing
relevant cues for subsequent action.

Another means of helping patients to cope with cognitive impairments is the training of specific task skills (or activities). Several training programs focused on daily living skills in patients with cognitive impairments have been developed (Withaar & Arends, 2002). Probably the most familiar examples of this approach are the Liberman training modules (Liberman et al., 1992). The Liberman training modules encompass several domains of functioning (self-care and grooming skills, leisure activities, medication and symptom management, substance abuse, social functioning and independent living skills) and are based on the principles of learning theory. Each training program aims to teach complex skills by practicing subskills and encompasses five phases: theoretical introduction, a video demonstration by a model, role playing and practicing problem solving, and transfer- and homework assignments to stimulate generalisation to daily life (Withaar & Arends, 2002).

Few interventions have been developed to enhance participation, or involvement in daily living situations, but several authors have successfully combined cognitive rehabilitation (both drill and practice or strategy training) with relevant daily activities, such as vocational rehabilitation (Vauth et al., 2005): cognitive rehabilitation plus vocational rehabilitation was associated with the highest rate of successful job placement.

In the same vein, Bell et al. (Bell et al., 2001; Bell et al., 2003) tried to enhance the generalisation to daily activities by the addition of a cognitive rehabilitation module to a vocational program. Cognitive rehabilitation consisted primarily of computerised exercises of attention, language operations, and problem solving; an information processing group, and feedback on cognitive performance on the workplace. Training exercises proceed from simple to complex. Improvement on cognitive measures in the case of work treatment and cognitive rehabilitation was greater than in work treatment alone. Furthermore, cognitive performance on the job and work performance improved, and patients receiving cognitive rehabilitation were more likely to remain employed after the end of treatment (Wexler & Bell, 2005). In a comparable study, combining computerised cognitive training with supported employment resulted in more jobs, more hours on the job, and more wages than patients with supported employment alone (McGurk et al., 2005).

### 6.1.3 Integrative Rehabilitation Programs

A number of comprehensive cognitive rehabilitation programs have been developed during the past two decades. As these programs included a number of interventions aiming at each of the first three levels of the ICF classification, they will be discussed here as a separate category.
Brenner et al. (1994) developed a multi-element hierarchical program that aimed to enhance basic cognitive capacities: Integrated Psychological Therapy (IPT). IPT is based on the assumption that impairments in schizophrenia are hierarchically organised. Improvement on the level of basic cognitive skills should therefore generalise to more complex behaviours, like social and symptomatic levels of functioning. The program consists of five hierarchically organised subprograms: cognitive differentiation, social perception, communication skills, interpersonal problem solving and social skill training. A positive effect of the program was found on psychopathology and cognitive functions, while no significant effect on social functioning was found.

Spaulding et al. (1996) adapted and elaborated Brenner’s program. They compared a task practice condition to a comprehensive rehabilitation program. Preliminary results showed promising findings, indicating that IPT is superior to group therapy in reducing psychotic disorganisation and improving social-cognitive problem-solving and early attentional processes. A larger scale evaluation of this program (Spaulding et al., 1999a; Spaulding et al., 1999b) showed that patients in the program improved on several cognitive tests, symptom measures, functional skills, and interpersonal problem solving.

In the Netherlands, Appelo et al. (1994) based a bottom-up rehabilitation program on Brenner’s ideas. This program consists of two stages, each encompassing a number of subprograms. The first stage was composed of psycho-education of participants as well as their relatives, agenda training, news orientation, individual counselling, psychomotor skill training, basic vocational therapy, menu planning and cooking training, household skills training, grooming skills training and sports. At this stage, participants also received either cognitive skills training or extra counselling. The second stage of the program encompassed social skill training, community skill training, vocational therapy, physical condition training and housekeeping and cooking. The rehabilitation program had a positive effect on measures of psychopathology and cognitive functioning compared to a control group.

6.2 SUMMARY AND CONCLUSION

Cognitive impairments are considered “rate limiting factors” in schizophrenia; they hamper activities and participation in daily life. Effects of psychopharmacological interventions on cognitive functioning are limited. This has led to the development of behavioural interventions aiming to enhance cognitive functioning or to compensate for cognitive impairments. Consensus on the terms that refer to these interventions
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within the field of schizophrenia is lacking. For this thesis we prefer the term: “Cognitive Rehabilitation”, defined as any strategy or technique that is intended to help patients with cognitive problems caused by brain injury, and their families, to cope with these problems, to learn to live with them, to overcome and/ or to reduce them (Wilson, 1989, p. 117).

Some cognitive rehabilitation interventions aim to improve functioning at the level of the body function (e.g. restoration of cognitive functions through drill and practice, or training of compensatory cognitive skills) whilst others are aimed at the level of activities (external aids), while participation has been targeted as well by combining drill and practice or strategy training with vocational rehabilitation. Moreover, integrative rehabilitation programs have been developed.

In drill and practice interventions, researchers aim to stimulate the functioning of brain systems that are involved in the trained task, while in strategy training other ways to perform a task are learned. In both cases, cognitive functions are trained in the hope that activities and participation also improves. However, effects of these interventions are in most cases at best moderate. Although most studies do not include outcome measures at the level of activities of participation, those that do so demonstrate that improved task performance does not generalise to activities and participation. Because of this lack of generalisation the assumption that brain functioning improves after the training of a cognitive task does not seem to hold. Furthermore, these results render the validity of these forms of cognitive training questionable.

With regard to overcoming the generalisation problem, it is worth emphasising Wilson’s (1997) assertion that cognitive rehabilitation should be aimed at the level of activity limitations (which are the ways impairments manifest themselves in the form of everyday problems) and participation restrictions (which are experienced by the patient because of social or environmental inadequacies) rather than at impairments, identified by scores on tests. In the face of limited generalisation, this seems the only logical approach, since patients that have improved to a large extent on neuropsychological assessment may still suffer from major activity limitations and participation restrictions.

There are at least two ways to deal with this generalisation problem. First, the combination of drill and practice and strategy training with specific vocational training seems promising in this regard. In the same vein, the Liberman training modules encourage a patient to practice newly learned skills in daily life. A second way to overcome the generalisation problem is to adapt the patient’s environment. Examples of environmental adaptations are token economies and cognitive prostheses. Token economies were popular in the 1970’s and have been demonstrated to be effective in
promoting adaptive behaviour in schizophrenia (Dickerson et al., 2005). In contrast to token economies, cognitive prostheses have hardly been studied in schizophrenia. An overview the scarce literature of the use of cognitive prostheses in schizophrenia and a brief overview of literature on cognitive prostheses in other patients samples was provided in this Chapter. It is argued that providing people with schizophrenia with clear cues or prompts will enhance activities and participation.

Following this line of reasoning a cognitive prosthesis consisting of SMS text-messages to compensate for cognitive impairments in schizophrenia is proposed. Its efficacy will be evaluated in Chapter 7 and 8 of this thesis. The use of cognitive prostheses may require involvement of executive functions such as initiation of behaviour, planning/ organisational skills, problem solving abilities and focussed attention: all functions that are known to be impaired in schizophrenia. As mobile telephones are familiar to most patients and many will have used them, it is expected that use of a mobile phone as a cognitive prosthesis would be relatively straightforward, even for patients with cognitive impairments. The extensive use of mobile telephones in the general population means that the use of this kind of cognitive prosthesis is non-stigmatising.