

# International Handbook of Occupational Therapy Interventions

## Chapter 22

# Strategies to Compensate for Apraxia Among Stroke Clients – The Cognitive Strategy Training

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*Apraxia influences the daily life of stroke clients. Strategy training is the preferred intervention because it is expected to include generalization; that is, training effects are established from trained to nontrained tasks and across settings.*

**Abstract** Apraxia is a “cognitive disorder characterized by the inability to perform previously learned skills” (National Library of Medicine, 2008) that influences stroke clients’ ability to perform daily life tasks (Bjorneby and Reinvang, 1985; Foundas, 1985). Treatment of apraxia should be part of a rehabilitation program because of its negative impact on daily life. *Cognitive strategy training* is the preferred form of treatment, as it focuses on improving daily life functioning by compensating for lost functions, despite the probably lasting presence of apraxia. In addition, strategy training has the advantage over skills training because of generalization of training results to other tasks and other contexts.

**Keywords** Apraxia • Generalization • Stroke.

### Definitions

There are two types of apraxia that may cause severe disabilities in activities of daily living (ADL):

- *Ideomotor apraxia* is a condition that affects the implementation of purposeful and meaningful skills, such as the inability to carry out a complex motor activity. A client with ideomotor apraxia knows what to do, but does not know how to do it (De Renzi, 1989). The most frequent errors in ideomotor apraxia are (1) the use of body parts as objects, for example, brushing the teeth with a finger; (2) spatial orientation problems such as use of inappropriate hand postures as for example, cutting with the wrong part of a knife (Heilman and Gonzalez-Rothi, 1985; Miller, 1986; Shelton and Knopman, 1991). A client with ideomotor apraxia may not be able to perform on command, while the same activity may be executed perfectly in a natural setting (De Renzi et al., 1980).

- *Ideational apraxia* is the inability to formulate mentally the processes involved when performing an action. The person does not know what to do because the idea or concept of the motor act is lacking (De Renzi, 1989). It is expressed as (1) omitting parts of an activity; (2) incorrect use of tools and things; and (3) sequence errors, that is, errors in the order in which activities are done (De Renzi and Lucchelli, 1988). Dressing apraxia may result from an inability to formulate mentally the act of placing clothes on the body (National Library of Medicine, 2008; Tate and McDonald, 1995); for example, the person first puts on his shoes and then tries to fit the socks over the shoes.

*Cognitive strategy training or substitution* (Donkervoort et al., 2001; van Heugten et al., 1998) uses compensatory strategies for clients with apraxia. It is based on theories of neuropsychology (such as models of human information processing) (Schiffrin and Schneider, 1997), occupational therapy practice (Kielhofner, 2004; Law, et al., 1998; Trombly and Ma, 2002), and educational psychology (Singley and Anderson, 1989). The client's independent functioning is maximized by improving ADL performance, while little change is expected in cognitive remediation that influences the severity of the apraxia itself.

*Compensation* is achieved by teaching clients to change their behavior to perform motor actions. Clients are taught to use *external strategies* (e.g., point-lists with one instruction for each of the movements required to carry out the motor functions for performing a specific daily-life task, such as brushing one's teeth) or *internal strategies* (e.g., verbalizing the steps of which the daily-life task consists covertly), and techniques to reach their goals in alternative ways. Strategy training is widely used and is effective in the rehabilitation of cognitive deficits such as memory, executive functioning, and apraxia (Cicerone et al., 2000; 2005). During the intervention, the client is taught to use more efficient and more independent strategies.

The newly learned strategy is expected not only to be item-specific, for example, the client is able to perform the trained task more smoothly and easily, but also to *generalize* to other, nontrained tasks. Generalization means that a strategy is not task-specific but relies on principles that are more general. Generalization is the degree to which transfer effects are found. The client is able to transfer the motor actions to different tasks and settings. Transfer relates to the way in which prior learning affects new learning or performance (Geusgens, 2007).

Cognitive strategy training is practiced in the Netherlands as the "*occupational therapy protocol for the assessment and intervention of stroke clients with apraxia*" (Stehmann-Saris et al., 1996).

## ***Purpose***

Cognitive strategy training is the occupational therapy intervention aimed at improving the clients' ability to carry out motor actions, establishing generalization

effects from trained to nontrained tasks and across settings (Cicerone et al., 2000, 2005).

## **Method**

### ***Candidates for the Intervention***

Cognitive strategy training is intended (1) for clients who present with apraxia behavior in the subacute phase of a stroke, caused by damage in the left or right hemisphere of the brain (De Renzi, 1989), and preferably with the apraxia persisting beyond the first 2 weeks and before 15 weeks post-stroke; (2) for clients diagnosed with Huntington's disease; and (3) for clients diagnosed with Alzheimer's disease. Either sex can be enrolled for the intervention. The intervention is effective in clients of average age 60 to 70 years (range 39 to 91 years). There are no reasons to exclude clients because of old age. Moreover, neither the severity of the apraxia nor the presence of cognitive comorbidity seems to cause a less favorable intervention outcome.

### ***Epidemiology***

Stroke is the second most common cause of death and a major cause of long-term disability worldwide (Doman et al., 2008). Of all survivors, 54% experience ADL disabilities. Usually apraxia follows left-hemisphere lesions and is reportedly present in 30% to 50% of all left-sided stroke clients (Zwinkels et al., 2004). Apraxia at the start of the rehabilitation period predicts a dependent ADL outcome 1 year after stroke (Sundet et al., 1988).

### ***Setting***

Cognitive strategy training is given in rehabilitation centers, nursing homes, and hospital departments. It has been offered from 8 to 15 weeks post-onset (Donkervoort et al., 2001; Van Heugten et al., 1998).

### ***The Role of the Occupational Therapist***

The role of the occupational therapist (OT) during the cognitive strategy training is to (1) determine the client's level of functioning, (2) apply the intervention

individually, (3) teach the cognitive strategies, and (4) structure the various tasks used for training during the sessions.

## **Results**

### ***Clinical Application of the Intervention***

*The presence of apraxia* hindering the client's execution of ADL is established by a multidisciplinary team and with the special responsibility of a neuropsychologist.

*Occupational therapy assessments* are used to define what tasks the client cannot execute and are important for the client to relearn. The protocol contains (1) the assessment instruments recommended for use, (2) the ADL observations (van Heugten et al., 2000), and (3) a description of the process and contents of the strategy training.

### **The Intervention Includes**

#### The Individual Choice of Meaningful Activities

The individual chooses meaningful activities to perform for the training sessions. These choices are made in collaboration between the client and the family together with the OT. Any task that relates to the client's interest, lifestyle, and remaining capacities can be used. For example, the Canadian Occupational Performance Measure (COPM) (Law et al., 1998) or the Activity Card Sort (ACS) (Baum and Edwards, 2001) is suitable to use for making this choice. The COPM is an individualized outcome measure for use by OTs to detect change in a client's self-perception of occupational performance. The ACS provides an immediate impression of the client's activity patterns.

#### The Intervention Goals

The intervention goals are determined by investigation of the specific consequences of apraxia for the client's daily life. Clients' problems and errors in motor performance and their style of action are investigated. This is attained with ADL observations using a standardized way to assess clients' level of independent functioning. Here, the Arnadóttir OT-ADL neurobehavioral evaluation (the "A" one) (Arnadóttir, 1990) may be used. The ADL observations are performed by choosing two or more tasks and following the client's performance in a natural environment.

The client's performance of the completed task (the overall independence score) and following three sequence phases, representing the course thereof, are observed:

- *Orientation*: The OT prepares the task by explaining how the task should be performed in the actual environment.
- *Execution*: The OT observes how the client performs the actual task, with special regard to how the client starts, performs, and stops the motor functioning.
- *Control*: The OT checks the results of the actions.

The client's errors and the level of assistance needed are noted on the protocol using a scale of 0 to 3:

- 0 = no assistance needed, performance is adequate
- 1 = verbal assistance needed
- 2 = physical assistance needed to handle objects and guide hand postures
- 3 = OT takes over activity

Each of the three phases (orientation, execution, and control) is linked to a specific type of intervention, as follows:

- If the focus is on the orientation phase, the intervention will be aimed at instructions.
- If the focus is on the execution phase, intervention will be aimed at providing guidance.
- If a focus is on the control phase, the intervention will be aimed at providing feedback, or teaching the client how to use feedback.

### The Specific Strategy

The specific strategy that will be used during training is the next decision the OT makes. This needs to be adjusted to the phase of task performance, and thus to the intervention type. The strategy needs to be attuned to the client's strengths and weaknesses, as follows:

- Strategies for instructions to support the preparation of the performance when the client's performances deficits occur in the *orientation* phase:
  - Give instructions more than once and use extra attention.
  - Ask questions about the performance.
  - Demonstrate the performance or its parts.
  - Give a written description of the performance.
  - Show pictures of the task performance.
  - Show objects needed for the task.
  - Hand objects to the client one by one.
  - Take over performance or its parts.

- Strategies for instructions to support the preparation for the performance when the client's performance deficits occur in the *execution* phase are guidance strategies:
  - Show pictures.
  - Guide with verbal support.
  - Guide with physical support.
  - Start with a slow tempo.
  - Start with only one object.
  - Show objects needed for the task.
  - Hand objects to the client (one by one).
  - Take over the performance or its parts.
- Strategies for instructions to support the preparation for the performance when the client's performance deficits occur in the *control* phase are feedback strategies:
  - Give verbal feedback.
  - Show the result in a mirror.
  - Make video recordings to show to the client.
  - Ask questions about the result (“Did you put on your socks?”).
  - Make pictures to show to the client.

### The Role of the Occupational Therapist

The OT has to monitor the client's task performance and can evaluate the effects of the intervention after each fourth training session, using the ADL observations. This evaluation will help the therapist to decide how to continue with new goals.

### ***Evidence-Based Practice***

Evidence for the effectiveness of interventions that compensate for apraxia has only been established for stroke clients with left hemisphere lesions, not for apraxia clients with Huntington's disease or Alzheimer's disease (Donkervoort et al., 2001; Edmans et al., 2000; Smania et al., 2000; Van Heugten, 2001; West et al., 2008).

The effectiveness of cognitive strategy training has been demonstrated in a non-controlled pre- and posttest study involving a 12-week intervention using the OT protocol for strategy training included left-hemisphere stroke clients with apraxia ( $n = 33$ ) (Van Heugten et al., 1998). The findings showed that the clients had learned to compensate for their apraxia-based problems.

A randomized two-group clinical trial (cognitive-strategy training, or intervention as usual) was conducted with left-hemisphere-stroke clients with apraxia ( $n = 113$ ). After 8 weeks, strategy training was significantly more effective in improving ADL functioning than was the usual intervention (Donkervoort et al., 2001).

In another study, the cognitive strategy training transfer (generalization) effects from trained ADL tasks to nontrained ADL tasks and from the rehabilitation setting

to the clients' own home improved daily life functioning in left-hemisphere-stroke clients ( $n = 29$ ) with apraxia. The transfer effects of ADL functioning were stable at a 5-month follow-up (Geusgens et al., 2007a).

## Discussion

The OT intervention using cognitive strategy training for apraxia in stroke clients with left-hemisphere lesions demonstrably improves daily life functioning and has generalization effects. Educational psychology has considered how to promote transfer of learning. If positive transfer effects are to occur, clients should know what transfer of strategies is and how it works, and should be aware of their own functioning before they will acknowledge that a strategy is needed to improve their motor functioning, and finally to be able to judge when and where the transfer can be applied. The client needs to understand the connection between what is learned and the situation in which it is learned. This might be overcome by practicing a strategy or skill in greatly varying situations. Training that promotes transfer should be addressed during the training sessions, as transfer cannot occur automatically.

The OT should teach general knowledge because this type of knowledge is easier to transfer than specific knowledge (Geusgens et al., 2007b).

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