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Autor: Seyboth, Margret / Machleb, Franziska

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Treating Aphasia by using implicit and explicit instructions and methods: a narrative review

Margret SEYBOTH & Franziska MACHLEB
Universität Erfurt
Philosophische Fakultät
Nordhäuser Str. 63, 99089 Erfurt
margret.seyboth@posteo.de; franziska.machleb@gmx.de

Eine Aphasie ist eine Sprachverarbeitungsstörung, die durch eine hirnorganische Schädigung (z.B. Schlaganfall, Schädel-Hirn-Trauma) ausgelöst wird. Je nach Lokalisation und Ausmaß dieser Schädigung können alle sprachlichen Fähigkeiten – Verstehen, Sprechen, Lesen und Schreiben – in unterschiedlich starkem Maße betroffen sein. Linguistisch lassen sich die Beeinträchtigungen auf den Ebenen Phonologie, Lexikon, Syntax und Semantik beschreiben. Sie haben weiterführende Auswirkungen auf die Pragmatik und die Kommunikation.
Die Rehabilitation aphasischer Störungen ist ein Teilbereich der Klinischen Linguistik. Dabei werden gestörte kognitive Fähigkeiten vor dem Hintergrund psycholinguistischer Modelle interpretiert und behandelt. Die Therapie zielt auf die Restitution, Substitution und Kompensation sprachlicher Fähigkeiten ab. Hierfür wird implizites und explizites sprachliches Wissen genutzt, und es kommen implizite und explizite Methoden zur Anwendung, die im Fachbereich der Klinischen Linguistik jedoch meist nicht als solche differenziert werden.
Der Übersichtsartikel stellt zunächst Studien vor, die den Erfolg impliziten und expliziten *Lernens* bei Aphasie untersucht haben. Aphasie*therapie* fokussiert allerdings weniger Lernprozesse als mehr die Verbesserung der Zugänglichkeit von vorhandenem Wissen, welches infolge der hirnorganischen Schädigung nur eingeschränkt abrufbar ist. Der zweite Teil des Artikels widmet sich Methoden, die in der Aphasietherapie angewendet werden, und bewertet diese hinsichtlich ihrer Implizitheit und Explizitheit.

Stichwörter:
Aphasie, explizit, implizit, Rehabilitation, Behandlung, Therapie.

Keywords:
aphasia, explicit, implicit, rehabilitation, treatment, therapy.

1. Introduction

Children acquire their first language by interacting with their caretakers. With that, they build up profound knowledge of the language structure. While they are usually able to apply this knowledge correctly, they are incapable of describing it. Thus, for example, children of preschool age are well able to understand and produce a structure like "Ich habe einen Hund gesehen." ("I have seen a dog."), but they would not be able to explain the linguistic means that are necessary to construct a correct past perfect structure ("habe … gesehen") or an indefinite nominal accusative phrase ("einen Hund"). Their ability to understand and produce correct sentences is *implicit knowledge* that has been gained by *implicit learning*, that is, unconscious learning without the intention to recognise underlying rules (e.g. Ellis 2008; cf. also Hulstijn 2005; Dinh 2017; Silagi et al. 2020). In contrast, in school, children gain metalinguistic *explicit knowledge* of their first language (and further languages) by *explicitly learning* underlying rules

that teachers make aware of by using *explicit instructions*. With that, they learn to analyse a sentence like "Ich habe einen Hund gesehen" with regard to e.g. parts of speech, case or tense features. Thus, most adult speakers have near to perfect implicit knowledge and many also have substantial explicit knowledge of their native language.

However, there are circumstances under which the access to language knowledge or even the knowledge itself might be disturbed. This might happen, for example, when a person emigrates to another country and lives in a foreign language community where no further contact with the native language is given anymore. In such a situation, people might temporarily "forget" words or grammatical rules of their native language, but will usually regain them quickly when presented with native language contexts. Longer lasting language access disturbances might be a result of cerebro-organic damage – mainly in the left hemisphere –, e.g. from a stroke or a traumatic brain injury. Such language disorders are called aphasia. Depending on the location and extension of the lesion, they can affect all language modalities – speaking, auditory comprehension, reading, and writing – in a different manner (Blanken et al. 2004). Linguistically, they can be described at the phonological, lexical, semantic, or syntactic level (Huber et al. 2006). These disruptions, in turn, usually result in more or less severe pragmatic and communicative disturbances.

Aphasic language disorders are heterogeneous, and there are a great number of theories on the underlying processes. However, the question of preservation or loss of implicit versus explicit knowledge and the ability to access implicit versus explicit knowledge in aphasia has been widely neglected in empirical studies and therapy so far. But these aspects are relevant for a better general understanding of language and learning processes, on the one hand, as well as decisions in therapeutic intervention, on the other hand. For this reason, the present article offers a review of studies on implicit versus explicit learning in aphasia and implicit versus explicit approaches in aphasia therapy. The insights are summarized in order to increase awareness of the topic and to encourage further research.

In section 2, we review studies testing the ability of people with aphasia to gain new knowledge implicitly or explicitly in experimental settings.

But teaching new language knowledge is different from treating aphasia: people with aphasia have already established a language system, and usually stored language information is not lost but only temporary unavailable. Thus, typically, treatment does not aim at relearning lost information or learning new information but rather at regaining access to stored information (e.g. Kotten 1991). In section 3, common methods in aphasia therapy are presented and rated with re-gard to implicitness and explicitness of instruction, task, demanded knowledge, and therapeutic impact.

2. Implicit and explicit language knowledge and learning in aphasia

In the following section, we will present studies focussing on implicit and explicit language knowledge in people with aphasia and their ability to gain *new* knowledge in implicit versus explicit tasks. The studies cover semantic, syntactic as well as lexical processing.

2.1 Implicit and explicit language knowledge in aphasia

Regarding implicit and explicit *knowledge* in individuals with aphasia, several studies have concluded that people with aphasia are impaired at making explicit linguistic judgments but perform much better in tasks assessing implicit sensitivity to the same aspects.

For example, Milberg and Blumstein (1981) tested implicit and explicit semantic activation in aphasia. For this purpose, a lexical decision task was conducted, in which the participants had to decide whether a visually presented stimulus was an existing English word or not. Test items were preceded by semantically related, unrelated, or non-word primes. As no explicit reference to the semantic relation between primes and targets was made, this task was classified as implicit. In the explicit condition, the participants should decide whether orally and visually presented pairs of words were semantically related. Identical stimuli were used in both conditions. The results showed an associative priming effect in the implicit task in a subgroup of patients. This indicates implicit activation of semantic information. Explicit semantic rating of the same words, on the other hand, was impaired.

Tyler (1992) described the patients RH and JW who were diagnosed with severe comprehension deficits. Several monitoring tasks served as a test of their implicit linguistic knowledge. For example, the patients were presented with different types of sentences in which a target word was embedded in a syntactic context which was either grammatically, pragmatically, and semantically normal ((a), e.g. "John carried the guitar.") or semantically (b), pragmatically (c), or grammatically (d) abnormal (e.g. "John buried / drank / slept the guitar."). RH and JW had to react as soon as the target word (here: "guitar") turned up. Their reaction times resembled those of healthy controls, in that they were faster in (a) compared to (b), (c), and (d). This can be interpreted in terms of the patients' ability to build up an internal syntactic structure. On the other hand, the patients showed poor performance in an explicit task in which they had to judge the grammatical acceptability of sentences. The author concluded that patients like RH and JW can develop appropriate representations of an utterance, a process that is not under voluntary control. However, they are impaired at gaining the conscious access that is necessary to make explicit decisions.

Scarná and Ellis (2002) described the distinction between implicit and explicit access to syntactic information in the bilingual Italian-English aphasic patient ED. He was able to modify gender marking in adjectives when translating

English adjective-noun phrases into Italian. This task reveals his implicit knowledge of gender marking rules. On the other hand, ED was impaired at explicitly categorising Italian nouns for grammatical gender. This result implies preserved implicit access to gender information while explicit access to gender information was disturbed. Scarná and Ellis (2002) concluded that when assessing linguistic abilities, it is important to use tasks requiring explicit knowledge as well as tasks that simulate natural language processing as far as possible.

2.2 Implicit and explicit instruction and learning in aphasia

Several studies have addressed explicit and especially implicit *learning* abilities in people with aphasia.

In this vein, Goschke et al. (2001) compared implicit learning abilities of patients with aphasia and healthy controls in serial reaction tasks. In such a test, participants must respond to a repeating sequence of stimuli. Implicit learning presents itself as a response time cost when the repeating sequence is switched to a randomised sequence (blocked vs. randomized design). While both groups performed well in a spatio-motor version of the task (cf. Schuchard et al. 2017 for similar results), the persons with aphasia were impaired in a version including phoneme sequences. According to the authors, the results revealed the general ability of patients with (agrammatic) aphasia to learn implicitly, on the one hand. On the other hand, they indicate the involvement of independent brain systems in implicit learning of different types of sequential structures which might be affected separately in aphasia.

Christiansen et al. (2010) tested implicit learning of artificial grammatical structures. For this purpose, they conducted a visual match-mismatch training task without feedback, with people with aphasia and healthy control participants. For this task, participants were confronted with grammatical strings derived from an artificial grammar. Afterwards, they were asked to classify a set of new strings, some of which were generated by the same grammar whereas others were not. Both groups performed well in the training phase, but only the control group was able to classify novel test items in a better way than by chance. The authors concluded that agrammatic aphasia is associated with an impairment in implicit artificial grammar learning. However, it must be noted that for the test, the existence of rules was explicitly stated, which might have overruled the original implicit approach.

In contrast to these studies, Schuchard and Thompson (2014) found evidence of implicit learning abilities in persons with aphasia also in the linguistic domain. They compared implicit and explicit learning abilities in ten individuals with agrammatic aphasia and 18 healthy controls in an adaptation of the serial reaction task. Following the auditory presentation of a word, participants had to choose out of four pictures the one depicting the word. The spoken words

followed a sequence during most of the experiment. Participants were either informed about the existence of this sequence (explicit condition) or not (implicit condition). Subsequently, a test of explicit knowledge of the sequence was administered, in which three words at a time were presented and the participants had to guess which word would follow in the fourth place. While the control participants learned under implicit as well as explicit conditions, the participants with aphasia showed significant learning in the implicit, but not the explicit, condition. The authors suggested that the explicit condition was demanding of working memory functions since it was necessary to actively retain the sequence. They concluded that people with aphasia might be impaired in applying explicit instructions in learning tasks because of associated high-working memory demands.

Furthermore, several studies have focussed on how people with aphasia learn novel words (e.g. Peñaloza et al. 2016; Tuomiranta et al. 2010, 2012, 2014, 2019). In sum, it turned out that individuals with aphasia can learn with very explicit instructions. However, learning effects are transient. The results of the study of Tuomiranta et al. (2014) indicated that modality should be taken into account since orthographic input in combination with orthographic output resulted in fast and accurate learning of novel words. So, multiple learning channels should be considered when learning new information in patients with aphasia.

Taken together, the studies focussing on implicit and explicit learning in aphasia so far indicate that individuals with aphasia are able to learn implicitly, but this ability might be disturbed in specific language tasks. They are also able to learn with explicit instructions, but demands on working memory might interfere with this ability.

The presented studies have tested implicit and explicit *learning* of *new* information in aphasia, that is, e.g. novel words or previously unknown sequences. Language therapy in aphasia, however, is different because it aims at re-accessing information that has already been stored. Therefore, results on learning cannot necessarily be transferred to therapy. Hence, in section 3 we take a closer look at implicitness and explicitness of treatment methods in aphasia.

3. Implicitness and explicitness of treatment methods in aphasia

Aphasia therapy is the working field of speech therapists and clinical linguistics who offer treatment in regular hospitals, rehabilitation centres, and logopedic practices. Rehabilitation comprises a great variety of different methods that can be classified following different parameters, e.g. whether they are more language- or more communication-oriented, whether they focus on the receptive, productive, oral, or written modality, or whether they primarily address single word, syntactic, or text level. However, in the education and the daily

therapeutic routine of speech therapists and clinical linguists, usually no differentiation is made between implicit and explicit approaches. Nonetheless, it is possible to rate common methods regarding their implicitness and explicitness. We will do so in the following sections and suggest a rating at different levels, namely instruction, task, demanded knowledge, and task impact. For each of these aspects a continuum from most implicit to most explicit configuration is conceivable. Table 1 depicts our idea of the implicit and explicit poles of this continuum.

	Maximally implicit	**Maximally explicit**
Instruction	The instruction does not focus on the task and the results to be measured. There might even be no instruction at all. Instead, "intuitive" reactions of the patient are triggered by natural language input of the therapist.	The therapist explains exactly what to do, which rules are to be followed, and what kind of answer is correct or incorrect. The explanation is supported by examples and practice trials.
Task	The patient is not aware of rules to be applied for the successful completion of a task.	Completion of the task is accomplished by the conscious application of metalinguistic knowledge and rules that have been explained in preparation of the task. The application of these rules is scored and corrected if necessary.
Demanded knowledge	The patient draws upon implicitly acquired knowledge.	The patient draws upon explicitly learned metalinguistic knowledge.
Task impact	The task results in a general increase of activation within the language system. Also, addressing a given ability or component / route within the language system results in changes in an associated ability or component / route. The patient does not train explicit rules to be applied later on.	The task addresses a given ability or component / route within the language system, and changes affect this ability or component / route. The patient is made aware of metalinguistic knowledge and rules and is trained to apply this knowledge / these rules in the future.

Table 1 Implicitness and explicitness in different aspects of common treatment methods

In this vein, for example, training of a certain sentence structure would be implicit across all aspects when it is integrated in a dialogue sequence between the patient and the therapist where the latter takes the role of a model. As such, the therapist produces the intended sentence structure repeatedly but does not

centre the patient's attention on this structure, explain the underlying rules nor correct the patient's responses. Step by step, the patient might adapt his or her manner of speaking according to the therapist model but is not able to explain the rules.

On the other hand, training of the same sentence structure would be explicit across all aspects when the patient produces the given sentence structure exactly (e.g. based on situational pictures) with the underlying rules being explained and examples being given. The patient is supposed to learn the rules and apply them to different language material.

Finally, a therapeutic approach might include implicit as well as explicit aspects. For example, explicit treatment of an impairment at a phonological level (e.g. discrimination of pairs of spoken nonwords which are phonologically similar) might result not only in an improvement of phonological discrimination skills but might also have an implicit impact on orthographic skills.

3.1 Single word processing

3.1.1 Theoretical background

Currently, aphasia treatment is strongly influenced by the theories of cognitive neurolinguistics. This approach uses psycholinguistic models to describe unimpaired and impaired language processing. These models base therapeutic intervention on the location of a patient's functional deficit (e.g. De Bleser et al. 1997; Whitworth et al. 2005; Stadie & Schröder 2009).

With regard to single word processing, most studies on cognitively oriented treatments refer to the Logogen Model, which describes processing in all modalities (e.g. Morton 1970, 1980; Morton & Patterson 1980; Patterson & Shewell 1987). According to this model, the semantic system – i.e. a network of concepts – forms the centre of the language processing system. It is connected to four lexicons, one for each language modality (auditory and orthographic comprehension, phonological and written production). The entries (logogens) in each lexicon are connected to analysis systems and intermediate storage systems where stimuli are broken down into their constituting phonemes or graphemes. With the assumption of different connections between the components as well as conversion routes, the model allows for the explanation of the basic processes of auditory and visual comprehension as well as phonological and orthographic production of single words and processes like repetition, writing to dictation, reading aloud, and copying of words and non-words. Disorders of any of the components or routes of the Logogen Model result in specific difficulties and are reflected by the influence of different parameters (e.g. length or frequency, cf. Whitworth et al. 2005 for an overview). Note that, for the most part, disturbances in aphasia are not limited to one lesion site or error type. Effects occur and interfere with each other.

3.1.2 Methods and their implicitness and explicitness

When addressing deficits at the single word level, therapists can draw on a great variety of tasks. The selection is based on assumptions regarding the underlying functional deficit. Hence, sublexical disorders are addressed by tasks that focus on features of phonemes and graphemes and their discrimination as well as detection within larger units. Treatment of lexical disorders comprises tasks like oral or written word production, lexical decision, and word-picture matching or veryfication. Disturbed semantic processing is addressed by tasks that are supposed to build up or strengthen relations within the semantic system, such as word-picture matching with semantic distractors or semantic categorisation of pictures or words (cf. Whithworth et al. 2005 or Stadie & Schröder 2009 for an overview of empirically evaluated tasks).

Usually, in the treatment of single word processing, task instructions and tasks are highly explicit since the therapist explains precisely what to do and how. Instructions are often repeated. Rules must be applied. Thus, for example, in lexical decision, a patient is asked to decide whether a given stimulus is a word or not. If errors occur, the therapist assists and explains. Also, the demanded knowledge is very explicit and must be presented in an explicit manner.

Regarding the impact of the method itself, classification as implicit or explicit is not as straightforward. Therapy might aim at improving access to specific entries in a specific component of the language processing system by using tasks that are supposed to directly address these entries and this component. This methodical access is very common and has often been described to be successful (cf. Whithworth et al. 2005 or Stadie & Schröder 2009 for an overview). For example, Kiran & Thompson (2003) trained four patients with semantic disorders to name and categorise pictures. Furthermore, they had to decide on and answer questions regarding semantic features of typical and atypical items of a given semantic category. The intended impact was explicit as the naming of the trained items was supposed to improve and did so indeed. However, the training effect generalised from trained atypical representatives of a given category to more typical ones. This is known as the complexity effect in aphasia treatment and would be classified as an implicit effect.

Usually, the goal of aphasia therapy is in fact some kind of generalisation. Therefore, tasks are chosen to improve a general access mechanism to a specific component of the language processing system. Hence, the choice of a specific target item is secondary compared to the importance of repeated execution of the task and use of a specific route or component. As the patient is not aware and in control of the underlying processes (and even for the therapist, they are a matter of theoretical modelling), this impact can be described as implicit. In this vein, a lot of studies report explicit training effects as well as implicit generalisation effects (cf. Whithworth et al. 2005; Stadie & Schröder 2009). Most training effects are based on a one-on-one connection, for example,

between a picture and a word processed during treatment. Generalisation, on the other hand, results from an improvement of an access mechanism regardless of stored information.

Furthermore, as explicated in Table 1, methods might be called implicit when they facilitate processing in the disturbed component by not directly addressing this component but by drawing upon less severely or even unimpaired routes within the language system (e.g. Francis et al. 2001a). This kind of methodical access has also been called cognitive relay (cf. Luria 1970), and it is widely and successfully used (e.g. Nickels 1992; Hillis & Caramazza 1994; Greenwald et al. 1995; Howard & Harding 1998).

3.1.3 Comparison of effectiveness

A few studies have directly compared the effectiveness of so-defined implicit and explicit methods at a single word level. For example, in the study mentioned above, Francis et al. (2001a; cf. also Francis et al. 2001b) described the patient KW with a functional deficit at the phonological input lexicon. In the first part of the study, KW was supposed to memorise written definitions and write down the target word. Furthermore, KW had to decide whether two visually presented words were synonyms. The tasks in the second part of the study were the same, but this time, stimulus presentation was both, visual and auditory. While instruction, task and demanded knowledge were explicit throughout the study, according to the authors, task impact was implicit in the first and explicit in the second part. That is, with auditory, but not written stimulus presentation, the disturbed phonological input lexicon was addressed explicitly. Both methods resulted in significant training effects, but only the explicit treatment had a lasting effect (two weeks or more).

Davis et al. (2008) compared implicit and explicit tasks of a verb retrieval deficit in a patient with aphasia. Again, instruction, tasks, and demanded knowledge were explicit, but the impact of therapy was supposed to be implicit in the first part and explicit in the second part of the study. In the implicit task, the participant selected one in four pictures in response to questions about perceptual, categorical, or associative characteristics of a target word. No overt naming was required, that is, the naming deficit was not directly addressed. In the explicit task, the patient had to name the pictures. Both methods resulted in a decrease of null responses. While in the implicit task, the number of semantic errors increased, in the explicit task, more correct responses were recorded. The authors suggested that the first task may have helped the patient to overcome a reluctance to respond, which in turn may have contributed to the success of the second approach.

In sum, the studies described did not compare implicit versus explicit instruction, task or demanded knowledge, but implicit versus explicit impact of therapy in that the component or process disturbed was either addressed directly or not.

The results obtained so far show that both accounts can be efficacious and result in a change of language behaviour.

3.2 Syntactic processing

3.2.1 Theoretical background

While the Logogen Model is quite established in cognitive diagnostics and treatment at single-word level, often Garrett's (1975, 1980, 1988) sentence processing model is used to describe and treat syntactic deficits in aphasia (e.g. Hanne 2018). This model describes four levels of language production. First, at the message level (1), the speaker creates an abstract mental model of the intended message, including non-verbal features of the storyline, agents and – if desired – objects involved. Subsequent grammatical encoding includes a functional level (2), where content words are retrieved, and a positional level (3), where the syntactic structure is built up by mapping lexical elements with their thematic roles and grammatical functions. It is also here that functional morphemes are retrieved. Finally, at the articulatory level (4), the message is phonologically encoded. Sentence perception might be organised in a reversed order, though authors differ when considering whether production and per-ception access the same structures or operate in two distinct parallel systems (e.g. Caramazza & Hillis 1989; Garrett 1995; Mitchum et al. 1995; Schröder et al. 2015; Adelt et al. 2018).

Syntactic disorders in aphasia are usually classified as agrammatism and paragrammatism. Many studies on the treatment of syntactic disorders focus on agrammatism. This disorder is characterised by omissions of free and bound morphemes and the use of shortened and simplified sentences. It is supposed to result from an impairment of the automatic use of grammatical rules rather than from a loss of syntactic knowledge.

3.2.2 Methods and their implicitness vs. explicitness

Most theoretically based approaches in the treatment of agrammatism aim at remapping meaning and sentence structure through an explicit training of linguistic rules. Thus, for example, with the *Treatment of Underlying Forms* (TUF; e.g. Thompson & Shapiro 2005; Mack & Thompson 2017), patients gain meta-linguistic knowledge about thematic roles around verbs and movement of syntactic constituents that are necessary to gain the proper surface form of target sentences. Non-canonical sentences are used during therapy, and generalisation, particularly with less complex sentence structures sharing underlying linguistic properties, can be observed (cf. also Thompson et al. 2003; Thompson & Shapiro 2007). With the *Mapping Therapy* (e.g. Schwartz et al. 1994), patients are trained to make meta-linguistic judgements regarding the verb in a sentence, the noun representing the agent, and the noun representing the patient or the theme. The complexity of sentence structure is raised during treatment. The authors showed improvement on structural production as well as syntactic

comprehension measures, the success being associated with indivi-dual characteristics of the patients' deficits. In both accounts, treatment is very explicit regarding instruction, task, and demanded knowledge. Knowledge transfer to other sentence structures and improvement in spontaneous speech can be viewed as an implicit consequence of this therapy.

On the other hand, there are several approaches focussing on the training of syntactic structures without explaining syntactic rules. For example, in the *Helm Elicited Language Program for Syntax Stimulation* (HELPSS; Helm-Estabrooks 1981), the therapist produces syntactic structures which the patient has first to repeat and then to produce on his own. The same syntactic structure is used repeatedly with different content words. When a certain amount of patient responses is correct, the complexity of the sentence structure is increased. Significant improvement in verbal expression in patients with agrammatic disorders has been described (e.g. Helm-Estabrooks & Ramsberger 1986). Similarly, a growing body of literature supports the notion that structural priming – that is a speaker's tendency to repeat syntactic structures from recent expe-rience – can result in long-lasting learning of syntactic structures without explicit presentation and recognition of the grammatical rules. This applies not only to unimpaired speakers but also to persons with aphasia (e.g. Lee & Man 2017). Thus, while task instruction is explicit in this kind of account, no explanation of rules is included and, therefore, the resulting improvement in the use of varying syntactic structures is based on implicit learning (e.g. Silagi et al. 2020; but see Schuchard et al. 2017).

3.2.3 Comparison of effectiveness

The results suggest that implicit and explicit treatment of grammatical disorders in aphasia can be successful. However, to our knowledge, so far only one study has directly compared the effectiveness of implicit and explicit accounts in the same individuals. Silagi et al. (2020) treated individuals with agrammatic aphasia using an adapted account of the Mapping Therapy as explicit method and an adapted account of *Oral Reading for Language in Aphasia* (ORLA; Cherney 2010) as implicit method. In this latter approach, sentences are read through a hierarchy of steps with increasing complexity. While the explicit treatment resulted in a significant improvement in written speech production, the implicit method had an impact on oral speech production. This result supports the notion that both explicit and implicit methods have the potential to be successfully applied in grammatical disorders in aphasia.

3.3 Processing at discourse level

Aphasia treatment as described so far focusses on systematic training of language features. Language, however, is just a tool for the actual goal: improving the patients' communicative skills so they can again participate in social life. Therefore, treatment usually includes sequences aiming at the

improvement of communicative skills in real-life situations. For example, treatment sessions start and end with salutations and small talk. Here, the patient does not have to fulfil formal language tasks. The therapist directs the conversation and sets a good example, but usually does not provide feedback. The setting of these sequences is similar to natural language situations and hence discourse guidance is most implicit.

Besides these informal parts, there are treatment methods focussing on communicative skills. For example, *Promoting Aphasics Communicative Effectiveness* therapy (PACE; Davis & Wilcox 1985) is widely used. Here, patient and therapist, in turn, take a picture card and describe the object depicted while the vis-à-vis makes a guess at what it is. While instruction is explicit, task completion and impact are implicit. That is, the patient is supposed to find a way to describe the picture. The therapist sets examples and helps to reflect on the effectiveness of the descriptions but they usually do not correct errors explicitly. Note that the task does not aim at linguistic correctness, but at reaching a communicative goal that can be gained via oral production but also by writing, gesturing, or drawing.

Another example is *Visual Action Therapy* (VAT; Helm-Estabrooks et al. 1982), where severely impaired patients are supposed to learn gestures displaying objects or actions in order to circumvent their language impairment. Presentation of these gestures is explicit. However, during treatment they are integrated into communicative tasks like those of the PACE-setting, marking a shift from explicit to implicit training. As a result of the treatment, patients are enabled to consciously apply the gestures in non-therapeutic situations. This is an explicit impact of the task. However, Helm-Estabrooks et al. (1982) have also demonstrated a level of implicit impact with this approach. VAT-therapy in severely impaired persons with aphasia not only led to improved use of gestures, but also to improved auditory and reading comprehension. According to the authors, the results were induced by the evocation of inner speech during the exercises, reintegration of semantic concepts, and improvement of attention as well as visual, spatial, and search abilities.

Improving conversational success often depends on improving communicative skills not only of the patients themselves, but also of their conversation partners. Appropriate approaches are, for example, *Supported Conversation for Adults with Aphasia* (e.g. Kagan 1998), the *Conversation Partner Scheme* (e.g., McVicker et al. 2009), or *Solution Focused Aphasia Therapy* (e.g. Boles & Lewis 2003). In these accounts, speech behaviours are often explicitly addressed, for example, within role plays or by video recording and analysing conversation sequences (e.g. Cunningham & Ward 2003; Wilkinson et al. 2010). Such approaches might involve working with the dyad: patient and con-versation partner. However, training the communication partner in the absence of the patient with aphasia might also improve participation of the patient in conversation (see Simmons-Mackie et al. 2005 for a review). Here, explicitly

instructing the conversation partner, for example regarding non-facilitative behaviour, can result in a change of their own conversation behaviour. This implicitly affects participation possibilities and consequently communication skills of the patient.

4. Summary

We presented insights into findings regarding implicitness and explicitness in learning and treatment in aphasia. In the light of the great variety of methods and theoretical approaches, these insights could be only exemplary. Still, several results can be highlighted.

First, people with aphasia are proficient in implicit and explicit language knowledge, which is usually not lost but temporarily unavailable (e.g. Kotten 1991). While explicit access of knowledge might be blocked, it might be implicitly accessible (e.g. Scarná & Ellis 2002).

Generally, people with aphasia can learn explicitly as well as implicitly. However, their learning ability might be disturbed by accompanying disorders like working memory deficits (e.g. Schuchard & Thompson 2014), and certain domains of learning might be affected while others are not (e.g. Goschke et al. 2001). Thus, besides language tests, profound neuropsychological assessment should also be conducted. The selection of adequate therapeutic approaches must take their results into consideration.

However, aphasia treatment usually does not aim at learning novel information; it rather focusses on the access of stored information. Reactivation is achieved by applying implicit or explicit treatment methods.

At the single word level, instructions, tasks, and demanded knowledge are mostly explicit. The impact of the tasks can be explicit when access to specific entries, components or routes is trained. Usually, however, therapy aims at generalisation and therefore an implicit impact. Furthermore, addressing one component or route might result in changes in an associated component or route. Both kinds of impact – explicit as well as implicit – have been shown to result in treatment success.

At the syntactic level, implicit accounts are based on structural priming. Explicit accounts, on the other hand, employ a training of linguistic rules which focus on the remapping of meaning and sentence structure. Here, people with aphasia might even learn rules explicitly that they have only known implicitly so far. In both accounts, task instruction is explicit, but the task itself is implicit or explicit, respectively. As in single word processing, generalisation and transfer of structures can be classified as implicit.

Within the field of aphasia treatment, implicitness is probably most relevant in communication-oriented settings of treatment where language practice is

integrated into natural language use. Nonetheless, here also explicit methods can be applied and result in a change of behaviour.

In sum, in aphasia treatment, it is possible to apply implicit and explicit methods on all levels of language processing. It is up to the therapist to decide whether a task is useful and effective for a certain patient. This decision depends, amongst others, on the patient's linguistic performance, cognitive deficits as well as personal goals and preferences. Implicitness or explicitness of instruction, task, demanded knowledge, and therapeutic impact as well as the patients' ability to use implicit and explicit strategies is usually not differentiated in therapeutic education and daily life. This differentiation, however, represents a challenge as well as a chance in aphasia therapy and should therefore be further examined.

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