From Therapeutic Approaches Towards An Integrated Theory of Body-Related Learning In Rehabilitation of Children And Adults With Neurological Disorders

Heidrun Karin Becker

Abstract
Background: Occupational therapists and physiotherapists seek to enable clients with neurological diseases to improve their occupational performance. In German-speaking countries, several different therapeutic approaches are used. These approaches all promote body-related learning and are based on practical experiences and/or different theoretical frameworks. For most of these approaches, clinical evidence to support a decision for one over the other is lacking. To date, there is no coherent theory, which covers, describes and explains all aspects of body-related learning.

Objectives: The purpose of this paper is to introduce an integrated theory of body-related learning which describes a variety of strategies to promote learning processes in occupational therapy and physiotherapy.

Method: In order to determine the major features of body-related learning, six therapeutic approaches for occupational and physiotherapy are analysed based on a content analysis. They cover a broad range of therapies for children and adults, from mild coordination disorders to severe cerebral movement disorders. Based on the literature, interviews, deepening discussions in seminars and congresses, the therapeutic approaches are scrutinized about how they (intend to) support learning processes and how they describe and theoretically explain their own methodology. A comparison reveals differences in the learning processes of the various approaches. Theoretical reflections based on theories of phenomenology, anthropology, sociology and cognitive science lead to the conception of a theory of body-related learning.

Findings: In the various therapeutic approaches, different strategies are used which first and foremost differ from each other with regard to the learner’s attitude towards his own body. The learner either adopts a distanced und reflecting attitude towards his body or he learns through immediate experience. For that reason, a distinction is made between body-related learning and lived-body-related learning. In the German language, there are two words for “body”: “Körper” (the physical body) represents a distanced view of the body; “Leib” (the lived-body) represents the immediate experience. But even the most distanced view does not take a person out of his/her lived-body. Lived-body-related learning is based on imprinting through feeling, perception and experience, on incorporation, imitation, trial-and-error learning, situative learning and procedural learning. Body-related learning processes contain verbalization, reflection and imagination, which are used with motor and problem-solving learning. Cognition theories explain how patterns and symbols emerge, which are essential for learning and living in the environment. Thus, body-related learning occurs through actions, which are experienced as meaningful and relevant and are embedded into the environment. It is these actions, which constitute body, lived-body and environment.

Conclusions: For successful and sustainable learning both body and lived-body must be considered. What is learned through reflection and control must be felt and internalized in the lived-body; what needs to be changed must for the greater part be taken out of the lived-body and into reflection. The theory of body-related learning can support planning, implementation and reflection of the therapeutic practice. It describes the strategies, procedures and theoretical basics of body-related learning, which can be used to provide therapy with a sound theoretical foundation. Further it supports clinical research by focusing on learning strategies instead of approaches.

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Keywords: Occupational therapy; Physiotherapy; Neurorehabilitation; Body-related learning; Learning strategies; Lived body; Skill acquisition; Motor learning.

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Background and Objectives

Background

Occupational therapists and physiotherapists seek to enable clients with neurological diseases to improve their occupational performance. In German-speaking countries, several different therapeutic approaches are used. These approaches all promote body-related learning and are based on practical experiences and/or different theoretical frameworks.

For most of these approaches, clinical evidence supporting a decision for one approach versus another is lacking. Moreover, no coherent theory of learning processes related to body functions has yet been articulated, so that clinical reasoning based on theoretical knowledge is no alternative. Motor learning theories are useful, but do not explain the complete spectrum of body-related learning processes. As a result, clinical decision-making is strongly influenced by the availability of approaches on the education market in German-speaking countries. Most therapists master only one or two approaches because training and certification are time-consuming and expensive. Due to insufficient evidence, lack of theory and limited education of the therapists, there is a risk of ineffective and inefficient treatment. The approaches could be taken at face value to be contradictory, but could also be seen as a source to discover how therapists try to provoke learning of movements and skills and what underlying informative constructs they use to explain their work. In order to offer therapists a theoretical basis for their clinical decision making, body related learning needs to be defined, processes need to be described and therapy relevant strategies to foster learning should be categorized.

Objectives

The aim of this paper is to introduce an integrated theory of body-related learning that describes a variety of strategies to promote learning processes and provide a theoretical basis for decision-making and research. The outline of the theory was developed in a dissertation at the Humboldt-University of Berlin, Germany in 2009. The following research questions were answered in the thesis: How do the approaches intend to support learning processes and how do they describe and theoretically explain their own methodology? How can body-related learning be defined? Which theories can be used to describe and explain body-related learning? Is it possible to deduce an integrated theory from the analysis of the self-descriptions of therapeutic approaches? An adaptation for practitioners with a focus on clinical reasoning is published in 2016 in German. For the German book literature was updated in 2013-15. This paper focuses on learning strategies and gives a brief summary of the theory of body-related learning.

Methods

Different methods were used to extract the central constructs of therapists on the body-related learning processes in rehabilitation:

- Content analysis of books, articles, documents, websites and information for clients
- Two expert interviews
- Personal participation on four seminars which were teaching an approach or its background

Then a theoretical analysis of theories from phenomenology, anthropology, philosophy, sociology, cognitive science and experiential learning were used to interpret the findings. Final synthesis building allowed the designing of a comprehensive theory of body-related learning.

Approach selection

To include a wide range of different procedures that foster learning in clients with neurological problems, six different approaches were selected according to the following criteria. The approach

- addresses children and adults
- includes acquisition of movements, skills and activities
- is described sufficiently
- is currently used in practice
- represents different procedures
- can be further investigated by expert interviews, if necessary

The following six approaches were chosen for analysis:

1. Cognitive orientation to daily occupational performance (CO-OP)
2. Cognitive-therapeutic exercises or Perfetti concept (PC)
3. Affolter or St. Gallener model (AM)
4. Neurodevelopmental treatment (NDT)
5. Conductive education (CE)
6. Concentrative movement therapy (CMT)

Data Collection and Analysis

Literature was searched in bibliographic catalogs, databases and free search on the Internet with the German and English names for the approaches as keywords. Further information was taken from the websites of the associations like e.g. Neuro-Developmental Treatment Association, Association for cognitive Rehabilitation, German association for concentrative movement therapy etc. Handouts from seminars were also included. Literature review was made in 2006 to 2008. A content analysis of all the documents was conducted based on the Mayring.
Using the description of “Cognitive Orientation to daily Occupational Performance – CO-OP” as a road map, the following categories were examined systematically:

- Development of the approach,
- Theoretical background,
- Definition and understanding of learning processes under normal and under pathological conditions,
- Concrete procedure (including target group, goals, strategies, behavior of therapist and client, media, participation of important others).

Two expert interviews (with Helene Polatajko about CO-OP, 2007-10-21, with Clara Scheepers about Concentrative Movement Therapy, 2009-05-23) and the personal participation in four seminars allowed deeper investigation and clarification of open questions (Conference of the NDT Association Germany, seminar about theoretical foundation of NDT, 2008-05-01), seminar about Perfetti concept in children 2007-12-03-04), CO-OP seminars (2007-10-20-21, 2008-10-04-05).

In a second step, the results of the literature were investigated for central constructs about body-related learning.

Thirdly, theories from phenomenology, anthropology, philosophy, sociology, cognitive science and experiential learning were utilized to reflect these findings and finally create an integrated theory of body-related learning. Central analyzed aspects were: definitions of learning, body and lived-body, individual and environment, cognition and body, language and body-related learning, levels of reflection and intentionality. The following findings explain the development of the comprehensive theory.

Findings

Background of the six therapeutic approaches.

The development of NDT, CMT and CE started in the 1940s and 1950s. NDT and CMT have a common base in the gymnastics of Elsa Gindler. Gindler, a gymnastics teacher in Berlin, belonged to the “life reform movement” which came into being in the 1920’s. Based on her gymnastics which focused on the experience of body and self, Stolze created a body psychotherapy for people with mental and psychosomatic diseases.

Berta Bobath was trained as a gymnastics teacher in Berlin by a student of Elsa Gindler. She used Gindler’s method of relaxation in the treatment of children and adults with spasticity. That was her starting point to NDT. In both approaches the feeling of the movement and the body experience of the individual are the central element.

At the same time, Hungarian physician Pető began with the CE of children and later also adults with neurological or orthopedic problems. His approach of conductive education integrates movement and activity training in group setting and special needs education. Pető knew Berta and Karel Bobath and exchanged ideas with them. His central elements of learning are “rhythmical intention” (use of speech or inner speech to express an intention, followed by movement, which is carried out rhythmically), group motivation and intense practice integrated into the daily life of the school class.

These three approaches are created from practical experience. Only afterwards, did their creators added theoretical explanations and foundations. The approaches are still used today and are in an ongoing process of development and adaptation.

In the 1970s, both Swiss psychologist Félicie Affolter and Italian neurologist Carlo Perfetti came to the conclusion that the existing approaches were not effective enough. They conducted a systematic research on the problems of their clients. Even though their clients were different and they worked independently in different countries both came to relative similar results: the perception of movements and actions as well as the cognitive understanding of these perceptions are the keys to motor learning and skill acquisition. The learning person can be enabled to perceive and understand by subdividing actions into smaller tasks and by manually guiding the hands or the whole body of the person during the performance of a movement or an action.

A much newer approach used in rehabilitation is called cognitive orientation to daily occupational performance (CO-OP). This approach originally designed for children with Developmental Coordination Disorder (DCD) and was developed in the 1990s by occupational therapists Helene Polatajko and Angela Mandich. Their approach is derived from motor learning theories, performance, cognitive behavior theory, and occupational therapy. It is systematically tested in practice. As a metacognitive approach it targets to improve the performance of occupations in children and adults with neurological problems by enabling them to self-organized learning. See table 1 as an overview of the six approaches.

Similarities and differences in important constructs of the six approaches.

The analysis showed that the six approaches offer a broad variety of ways to support body related learning. Similarities were found in:

- the aim to enable clients to master their daily living flexibly and successfully
- the fundamental assumption that learning of movement and skills is a result of the interaction of person, task and environment
- the involvement of the physical and social environment, especially the support of significant others is emphasized in most of the approaches
Table 1. Overview of aims, target groups and core concepts of the six approaches in alphabetic order

<table>
<thead>
<tr>
<th>Therapeutic approach</th>
<th>Aims</th>
<th>Target groups</th>
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<tbody>
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<td>AM</td>
<td>improve the performance of daily activities and understanding of the environment</td>
<td>children with developmental disorders, learning disabilities, speaking disabilities, neurological diseases, behavior disorders; adults with neuro-motor disabilities and behavior disorders</td>
<td>manually guiding a person’s body or body parts in problem solving daily activities leads to senso-motor learning, understanding and adapted behavior</td>
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<td>CE</td>
<td>independence in mobility, daily activities, education and personality development</td>
<td>children and adults with neuro-motor disabilities</td>
<td>group support, rhythmical intention and intense training of special movement programs lead to improvement of performance of skills and activities</td>
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<td>CMT</td>
<td>healing of psychosomatic diseases and traumatic experiences, self-awareness, personality development, free and conscious interaction with oneself and others</td>
<td>children and adults with mental and psychosomatic diseases, physical and mental disabilities, people in critical life situations</td>
<td>awareness of body, feelings, perceptions and new experiences with oneself and others allows healing of traumas, development of ego-structures and learning of new behaviors</td>
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<td>CO-OP</td>
<td>to enable clients to perform meaningful occupations and self-organized skill acquisition</td>
<td>children with developmental coordination disorder, ADHS, cerebral palsy; adults with cerebral movement disorders or other problems in performing skills and occupations</td>
<td>the use of the meta-cognitive strategy “goal-plan-do-check” and guided discovery enable clients to self-conducted problem solving</td>
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<td>NDT</td>
<td>adapted functional movement in daily activities, prevention of secondary damages</td>
<td>children and adults with central nervous system pathophysiology</td>
<td>feeling of the movement facilitated by direct handling and guidance allows motor control, selective movement and performance of activities</td>
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<td>PC</td>
<td>adapted functional movement in daily activities by reorganization of the CNS</td>
<td>children with neurological and orthopedic diseases and disabilities</td>
<td>cognitive processes like perception and motor imagination allow control of pathology and movement planning.</td>
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Table 2. Use of learning strategies in the six approaches. Shows which CO-OP strategies are also used in which other approach, and which additional strategies are used.

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Differences were obvious in:

- Paradigms and theoretical backgrounds
- Procedures used to foster learning
- Relationship between therapists and clients and their roles
- Client behavior and perception.

With the exception of CE and CMT which are designed for group intervention, the approaches focus on individual treatments. Treatment structure, frequency and duration are extremely different and can be influenced by the kind of health system in which an approach is applied. This article focuses on client’s behaviors and experiences and learning strategies.

Client’s behavior and learning strategies.

The following client behaviors are described in the six approaches:

- sense, feel
- perceive
- imitate
- try
- discover
- understand
- solve problems
- reflect
- imagine
- control

Therapists foster these different ways of client’s behavior in therapy sessions. In some approaches related learning strategies are described explicitly, e.g. the CO-OP. In their studies on CO-OP, Polatajko and Mandich discovered different learning strategies. Children were observed to develop these strategies during the process of guided discovery. The strategies were highly individual but could be attributed to and summarized in the following categories: body position, feeling the movement, attention to doing, task specification or modification, supplementing task knowledge, verbal motor mnemonic and verbal rote script. These strategies were used to compare the different approaches. Table 2 shows which CO-OP strategies are also used in which other approach, and which additional strategies are used.

The main difference found between the approaches concerns the attitude of the person towards his or her body. The person can either adopt a distanced, reflecting attitude to the body or learn through immediate experience:

- AM, CO-OP, CE and PC are cognitive orientated and focus on solving problems of perception, task or occupation in order to enable the client to recognize and understand the task and the environment. The client takes a distant and reflecting attitude towards his or her body in order to analyze his own movement, perception and behavior.
- NDT and CMT focus on sensing, feeling and the physical and non-verbal dialogue between therapist and client. In these approaches, learning also occurs without verbalization and reflection. The learning person remains in a direct and immediate experience of sensing and feeling the body and in an identification with the body.

These attitudes towards the body was further investigated in the literature.

Theoretical analysis of the findings Lived-body-related learning and body-related learning

In German, there are two words for “body”: “Leib” and “Körper”. Leib is an Old High German word and is derived from “lib” (meaning “living”) and “pilipan” (meaning “remaining”). It represents the living body as the incarnation of a soul and is experienced by the human being. Körper originates from the Latin word “corpus” (corps in English) and was used for the dead body until the 18th century.

Under the growing influence of science, the term “Leib” was replaced by “Körper”. Today “Leib” is used exclusively in a few proverbs and in philosophy, philosophical anthropology and sociology (e.g. Merleau-Ponty et al., Jäger et al., and Lindemann et al.). Nonetheless, the two constructs have much to offer for therapy.

On the basis of the proper use of terminology (Leib and Körper in German and lived-body and body in English respectively) and the corresponding literature the different ways of learning and experiencing can be structured and explained. Lived-body-related learning represents the physical-emotional experience, the feeling and sensing, while body-related learning means the distant, reflective ways of learning of movement, skills and behavior.

Phenomenological anthropologist Plessner used two terms to describe the double aspect of the human nature: self-attitude (equals lived-body) and object-attitude (equals body).

Plessner further, differentiates between centric and eccentric positionality. Centric positionality, which is also part of the animal nature, is based on a central nervous system. It allows perceiving a center of the body through inner representation. From this center, the animal relates to its environment with the body as a medium to make contact. “The animal is a body and has a lived-body” and is living completely in the “here and now”. In contrast, the human being can adopt a second positionality because of its ability to reflect on itself. This is what Plessner calls eccentric positionality. The human being can put itself into opposition to its own body and observe it from the outside like an object. Therefore, the human being has a body but at the same time is a lived-body. The human being is unable to live solely in centric positionality and in the „here and now“.
Nevertheless, body and lived-body are not to be separated from each other, even in the object attitude or eccentric positionality a person is at the same time a lived-body. “The lived-body is always in our back.” Body sociology deals with the question of how body and lived-body are connected with each other and how they are influenced during and through social interaction. Jäger connects phenomenology with the sociological perspective. On the one hand, she regards the body and lived-body as socially and culturally imprinted, but on the other hand she also recognizes the individual, experienced dimension of the lived-body. Social conditioning has been described by Foucault, Bourdieu, Butler and Lindemann. The body is formed by social and cultural norms. In social practice, these arrangements or patterns determine the perception, thinking and actions of a person. This "habitus" unconsciously effects the body and shapes it on a very basic level. Butler uses the concept of performativity:

Performativity cannot be understood outside of a process of iterability, a regularized and constrained repetition of norms. And this repetition is not performed by a subject; this repetition is what enables a subject and constitutes the temporal condition for the subject. This iterability implies that ‘performance’ is not a singular ‘act’ or event, but a ritualized production, a ritual reiterated under and through constraint, under and through the force of prohibition and taboo ...

By this unaware incorporation social norms appear to be natural and part of the human nature. In this way a society reproduces itself.

Lindemann points out that the lived-body experience is also shaped by the body knowledge which is provided by the society: "We experience the lived-body which we are as the body we have."

One criterion for mental health is the ability to flexibly alternate and mediate between body and lived-body, individuality and intersubjectivity, mental occupation and non-percipience of a body part.

Based on the theories of body and lived-body, a fundamental distinction is made between body-related learning possibilities and lived-body related learning possibilities. Merleau-Ponty argues for the existence of different ways to be a lived-body and different ways of the consciousness to be conscious. The different ways of learning and experiencing found in the therapeutic approaches support this distinction.

For the theory of the body-related learning five different ways of experiencing and learning can be

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**Figure 1.** Five different ways of experiencing and learning can be distinguished: 1. Feeling or sensing, 2. perceiving, 3. Reflecting and controlling, 4. imagining and 5. Transcending.
distinguished: 1. Feeling or sensing, 2. perceiving, 3. Reflecting and controlling, 4. imagining and 5. transcending (see figure 1).

In the circle, these five different strategies used in body-related learning are represented. They are related to the different attitudes of the learning person as described above: immediate experience in lived-body-related learning or reflective attitude in body-related learning. In the figure, there is no separating line or border between the two attitudes, because human beings - as Plessner explained - are always living in a double aspect of centric and eccentric positionality. All learning processes happen in interaction with the environment. Therefore, the environment is part of the circle and not outside of it. Between body and lived-body ways of learning, an important change in the person allows reflection: understanding, recognition and verbalization.

Lived-body-related learning is located on the right side of the figure. It allows feeling and perceiving.

1. Feel or sense is the first modality in which young babies experience the world. It also is the dominant way of learning in children or adults with severe brain damages. Sensations happen in or outside the body and reach the person. The person feels the sensations in a diffuse way and categorizes them into pleasant or unpleasant experiences. At this stage, learning is a very passive process. It is a kind of imprinting and incorporating on the basis of external influences as described in the theories of Bourdieu,21 Foucault25 and Butler.22 It is not accessible to reflection.

2. After some time and a number of repetitions, the person differentiates between patterns and starts to perceive. He or she starts to develop expectations and recognizes objects, persons etc. He or she develops an image of his/her own body and positive or negative feelings about it. A lot of learning possibilities occur: learning by trial and error, imitative learning, situative learning etc. This way of learning is procedural. It can be brought into reflection by symbolization.

Body-related ways of learning are:

3. Reflect and control means for example the cognitive stage of motor learning, when body position or movements are reflected and controlled and feedback is important to correct the action. Body scheme and objective time and space are important for these corrections. Metacognition can guide this process.4 Another way of learning is focused more on motor planning:

4. It is the imagination of the body, a movement or an action. It is used in mental training26 or visual and motor imagination e.g. used by Perfetti13 in cognitive-therapeutic exercises.

5. There is a third way of learning which is beyond body and lived-body learning: the transcending way of learning. Used e.g. in techniques like autogenous training or in awareness/mindfulness exercises. Concentrativ movement therapy also makes use of this special state of mind. The mind is open, aware of the situation and the body and relaxed in the same way. These techniques can be helpful for clients with neurological disorders e.g. to reduce muscle tension after stroke. The mindfulness-based stress reduction (MBSR) program by Kabat-Zinn has shown positive effects on cognition, mood, balance and stress reduction in stroke rehabilitation.27

Cognition, reflection and intentionality in body-related learning.

Based on cognition theories, cognition can be either seen as information processing based on mental representations and symbols (cognitivism e.g. Chomsky28 or as cognitive structures that emerge from a network of subsystems (connectionism, e.g. Bechtel29 or from embodied action situated in the environment enactivism.30 The authors conclude: “Organism and environment enfold into each other and unfold from one another in the fundamental circularity that is life itself.”30,217 Embodied action does not dependent on symbols. It emerges from the senso-motor abilities of the individual and its experiences in the environment. Complex cognitive processes emerge from much simpler subsystems by a “history of structural coupling.”30,210

“Structural coupling is a process that occurs when two structurally plastic systems (an organism and its environment, for example) repeatedly perturb the other’s structure (their constituent components and the relationships between them) in a non-destructive fashion over a period of time. This leads to the development of a structural ‘fit’ between the systems. There is an intimate relationship between this process and the emergence of ‘appropriate’ behaviors from the interplay between interacting systems, because the structure of a system determines its responses to perturbatory environmental events.”31,655

Varela32,80-81 points out that “all cognitive phenomena are also emotional-affective” and that affect is a “pre-verbal” and “pre-reflective dynamic in self-constitution of the self”.

Referring to the theory of connectionism, cognition can be understood as a broad range of structure building processes with the aim of providing the perceived world with meaning. Cognition then has different levels: simple principles (like “pleasant or unpleasant”, “small or tall”, “red or blue” etc.) emerge on a sub-symbolic level in the pre-verbal and pre-reflective area of the lived-body and constitute the more complex area of symbolic and reflective cognition.
Learning by sensing and feeling can be attributed to the sub-symbolic level of cognition. It is done by classical and operant conditioning, incorporation and imprinting. In the perceiving way of learning in the lived-body patterns of perception, movement, action and interaction emerge and lead to symbols and verbalization. Body image and body perception evolve.

The symbols allow reflection, control and imagination in body-related learning. Body knowledge can be integrated influencing the body image and perception in the lived-body as described by Lindemann.

Sub-symbolic incorporations, experiences and traumata can be brought into reflection by expressing them through symbols, non-verbal and verbal language. However, there also exist impressions that remain inaccessible for reflection and cannot be addressed through therapy. Schäffter provides in his Iceberg-model different levels of reflection in learning that can be related to different levels of cognition and the theory of body-related learning (see table 3).

Human sensing or perceiving the world are intentional, directed towards phenomena which are in- or outside of the person. Intentionality can be passive in a sense of being responsive, receptive, or what Merleau-Ponty called “motor intentionality”: “The body’s response to the affordances of the situation.”

Active intention emerges from these experiences and, brought into reflection, can lead to knowledge. The emergence of intention can also be seen as an embodied action that raises new ways of feeling, perceiving, experiencing and acting. Varela et al describe how an open, mindfulness state, e.g. as used in Buddhist meditation, allows to reflect this circle of action and perception and to break through that concatenation.

Table 3 gives an overview of body-related and lived-body-related learning.

Table 3. Overview of the theory of body-related learning

<table>
<thead>
<tr>
<th>Theory of body related learning</th>
<th>Cognition</th>
<th>Learning processes</th>
<th>Intentionality/intention/reflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>sense, feel in the lived-body, subject attitude, centric positionality (Plessner)</td>
<td>history of structural coupling ↓ sub-symbolic cognition</td>
<td>imprinting conditioning incorporation mimetic imitation</td>
<td>passive intentionality, reflexive, responsiveness</td>
</tr>
<tr>
<td>perceive in lived-body, subject attitude, centric positionality (Plessner)</td>
<td>pattern of perception, movement, action-and interaction ↓ symbolic cognition</td>
<td>imitative learning procedural learning situated learning</td>
<td>motor intentionality pre-reflexive</td>
</tr>
<tr>
<td>reflect, control, body-related, object attitude, eccentric positionality (Plessner)</td>
<td>symbolic cognition</td>
<td>motor learning problem solving metacognitive learning</td>
<td>intention and reflection</td>
</tr>
<tr>
<td>imagine, body-related, object attitude, eccentric positionality (Plessner)</td>
<td>imagination, fantasy</td>
<td>abstract learning imagination mental training</td>
<td>intention and reflection</td>
</tr>
<tr>
<td>transcend, beyond body-related</td>
<td>awareness, mindfulness and intuition</td>
<td>meditation, awareness/mindfulness exercises, autogenic training /autosuggestion</td>
<td>open, mindful reflection</td>
</tr>
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Discussion

A content analysis of literature, documents, interviews and information from and discussions in seminars of six therapeutic approaches was conducted. Different strategies to enhance learning of movement and skills could be extracted. The method was appropriate to understand how the approaches intend to foster body-related learning and what underlying informative constructs they used to explain the learning processes. A deeper analysis of theories from phenomenology, anthropology, philosophy, sociology and cognitive science allowed integrating different learning strategies into one model, instead of seeing them as competing approaches. The major point of difference in the learning processes could be identified: the attitude of the learning person towards his or her own body. The attitude can be either distant and reflective (object attitude as described by Plessner) or a form of identification with the immediate experience of the lived-body (subject attitude). Learning on different levels of reflection and with different strategies could be explained and categorized as lived-body related or body-related. Body-related learning could also be explained by traditional learning theories as a spectrum between stimulus-reaction learning, imitative learning, trial and error learning, procedural learning, motor learning and problem solving learning. However, in this view the phenomenological perspective of the lived-body is neglected and learning is reduced to the body and his physiology. Waldenfels emphasizes two aspects: (1) Learning requires the acquisition of general skills and not only the training of single repeatable tasks. Therefore, general structures are necessary to act flexibly. (2) Learning means creation; it is more than just adaption. It changes the world and its meaning.

Learning of general skills is mainly incorporation of structures into acting, moving, speaking in the form of procedural learning. Procedural knowledge has limited
flexibility and is not accessible to control and reflection. Reflection and control are demanded if

- A perfect performance is required as in sport or art
- Implicit learning is not successful or leads to adverse effects like pain
- Procedural learning is restricted by physical or mental disabilities
- New and complex skills are being taught

Reflexive learning includes improvement of body knowledge, knowledge of task and environment and performance of movements and skills. In order to use the new knowledge and skills flexibly and in daily routines they have to be transferred into the implicitness of the lived-body by repetition and practice.

The analyzed approaches were mainly based on medicine, neurophysiology, neuroscience and psychology. Phenomenological theories of the lived-body experience should be supplemented in the future development of the approaches. A phenomenological perspective on learning means a “way of reflecting ...” which as a “hermeneutics of the experience” tries to point out true-to-life structures of acting, perceiving and thinking as a fundament of both everyday and scientific perspectives of the human existence.

Therapeutic approaches are often seen as competitors about the most effective way of treatment. But the comparison of strategies has shown that they have more in common than expected: six out of 12 strategies were used in at least four of the six approaches (see table 2), three were used by three approaches and only three were used by one or two approaches. With increasing knowledge of motor learning theories, cognitive and neuroscience also the basic concepts of the approaches converge more and more. To choose the appropriate learning strategies for an individual client a broad variety of strategies is needed. Therefore the different ways of learning were integrated in the theory of body-related learning. The theory distinguishes five different ways of experiencing and learning: sensing or feeling, perceiving, reflecting and controlling, imagining and transcending. The question in creating a therapeutic intervention is not, which therapeutic approach is the best, but: which way of learning, which learning strategies are appropriate to foster learning in the individual client. Learning should not be reduced to questions of if and what was learned, but also include the following questions: What provokes learning, how is the body experience and how is the learning process experienced by the learning person? From a phenomenological perspective, not only previous knowledge, conceptions and prejudices should be regarded but also limitations, resistances and the inaccessibility to learning.

This paper has a few limitations: The introductions of the approaches are relatively short and the theories referred to could only be outlined. Further theories that describe and explain experiential learning are mentioned in the doctoral thesis, but are not included in this article. In the doctoral thesis this article is based on, mainly German literature was used and only some English literature could be added for this article. The terms in the pentagram model of the theory are not discussed. Simple words were chosen from the descriptions of client behavior in the approaches e.g. sense, feel, reflect etc. Future research must show if the terms and the theory are intelligible to practitioners, students and clients.

Conclusion

Body-related learning can be defined as a bundle of learning processes that constitute cognitive structures and meaning through contact and action in the environment, either immediate, implicit in and with the lived-body by sensing, feeling and perceiving or by recognizing, reflecting and imagining in a distant attitude towards the body. The cognitive patterns emerge in the process of acting. Therefore, learning related to the body and the lived-body can be imagined as a "path" that evolves while it is being taken.

Clients in occupational therapy and physiotherapy need to (re-)learn their daily routines. The different strategies in body-related learning can be used to support their learning. For successful and sustainable learning both body and lived-body must be considered. Learning strategies must be chosen based on client's individual reflection level and learning capacity. What is learned through reflection and control must be felt and internalized in the lived-body; what needs to be changed must, for the greater part be taken into reflection. Despite the neuroplasticity and cognitive abilities of the brain, there are limits to learning, which must be further researched.

The theory of body-related learning can support planning, implementation and reflection of the therapeutic practice. It describes the strategies, procedures and theoretical basics of body-related learning (see more in deep in Becker et al) which can be used to provide therapy with a sound theoretical foundation and to promote the development of therapeutic professions. Further research is needed to test the theory in practice, to connect it to models of therapy and to clinical reasoning.

Based on the theory of body-related learning, clinical research could focus on the effectiveness of different learning strategies related to different performance problems instead of comparing therapeutic approaches. Sangster et al found that children with DCD mainly develop strategies related to body position and task knowledge. Research on CO-OP showed that, although the strategies developed by the learner are individually tailored to person, task and environment, certain types of strategies are related to specific problems. This aspect should be further investigated. The effect of special learning strategies compared to others could lead to clearer treatment recommendations, e.g. Barclay-Goddard.
found limited evidence that mental practice (MP) in combination with other rehabilitation treatments appears to be beneficial in improving upper extremity function after stroke, as compared to other rehabilitation treatments without MP. Therefore, the theory of body-related learning could contribute to the opening of the “black-box” of learning processes in practice.

Acknowledgements
This article is based on the doctoral thesis of the author at Humboldt University Berlin, Germany. The author gratefully acknowledges the support of the supervisors Prof. Dr. Ortfrid Schäffter and Prof. Dr. Helene Polatajko, and U. Meidert, M. Steffens and the Zurich University of Applied Science for support in realizing this article.

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