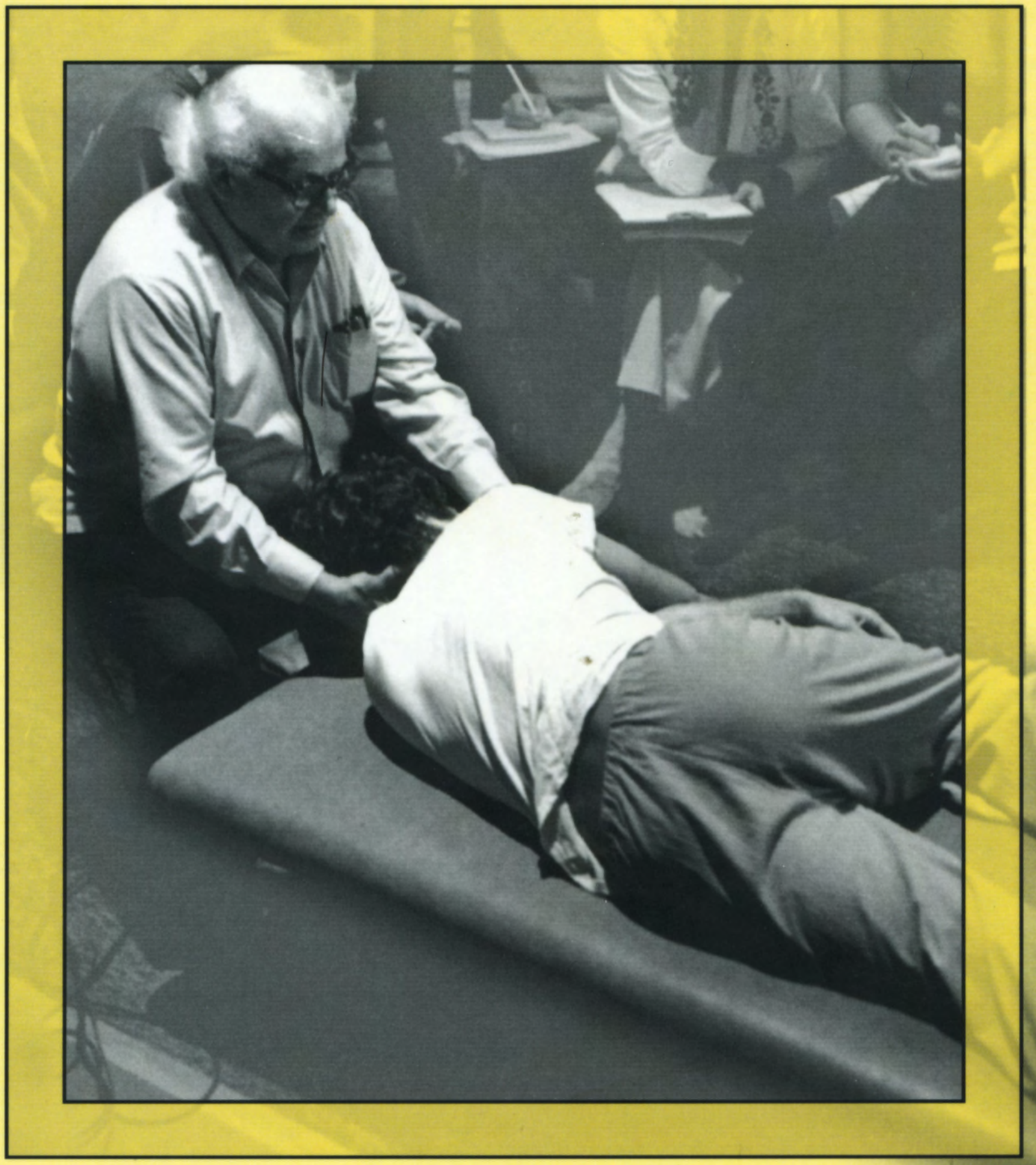
ACQUIRING THE FELDENKRAIS PROFESSION



BY

YOCHANAN RYWERANT

Yochanan Rywerant (b. 1922) was one of the main assistants of Dr. Moshe Feldenkrais. In 1952 Yochanan joined the ATM lessons given by Feldenkrais in Tel Aviv and continued to participate in them once a week for fifteen years. Yochanan was one of the participants in the first Professional Training given by Feldenkrais, starting in 1969. For fifteen years, from 1970, Yochanan worked in the same room with Feldenkrais as his assistant at the Feldenkrais Institute in Tel Aviv. He was also one of the invited assistants at the Trainings given by Moshe in San Francisco CA and Amherst MA. Since then, he has worked extensively as trainer in Professional Trainings in the USA, Canada, Europe and Israel. His book "The Feldenkrais Method, Teaching by Handling" appeared in English in 1983, and has been translated into German, Spanish, Italian and Hebrew.

While dealing with the way the Feldenkrais profession can be taught, this book has a threefold function. The trainers who teach the Feldenkrais Method in professional training programs might use it as a compendium for much of the material presented in such programs. They will benefit from the fact that the material is structured didactically and, in a sense, ready to be presented to the students. Furthermore, the hints for building a training program curriculum are a good tool for starting an endeavor, like a professional training program.

Practitioners of the Feldenkrais Method might use the book as a reminder and refresher. They might want to look at their work didactically as well, perhaps by asking themselves: "How would I use this work for teaching, or for demonstration in a lecture?" The improved clarity that might emerge by dealing with that kind of questions improves the efficiency of the practitioner's everyday work and hence, becomes more satisfying for both practitioner and client.

The general reader interested in the Feldenkrais Method will find here not only a general overview of the Method, but also plenty of items, which, on the one hand, constitute an extensive definition of the Method, and on the other, by their mere structure and didactical processing, show how such a complex system as this Method can be taught efficiently.

ACQUIRING THE FELDENKRAIS PROFESSION

BY

YOCHANAN RYWERANT

Design & Production:
El-Or Ltd. Tel Aviv, Israel
Tel: 972 3 5370771

CONTENTS

I. Preface 1
II. Introduction 3

PART A. THE BASICS 5

III. Review of various "principles" and "working concepts" 5
1. Habitual and non-habitual patterns 5
2. Learning by sensing differences 6
3. Awareness, a way of changing intentional patterns 6
4. The stages of baby-development 7
5. Orientation in space and in the field of gravity 7
6. Hierarchy of levels of control, changing of control-level 8
7. Clarity of the distal and proximal parts involved in patterns of action 9
8. Defense mechanisms (anti-patterns) 9
9. Communicative manipulation (the manipulon) 10
10. The force-surface-pressure relation, the "surface-like" style 11
11. Clarifying alternative choices versus imposing corrections 11
12. Goal-directedness versus attention to process, learning by "playing" ... 12
13. Modes of control : sedate, aroused 12
14. Neutral position versus extreme position 13
15. The potent state, or readiness to act versus mere relaxation 13
16. The efficient use of the skeleton (in the gravitational field, etc.) 14
17. Acceptance of proposed new patterns; the "Aha!"-Reaction 14
18. The constituents of a pattern of action, sensory anticipations 15
19. Corollary discharge and "relative conjugate movements" 15
20. Sensory filtering in habitual patterns 16
21. Cause and effect vs. stimulus and response 17
22. Heuristic learning vs. model imitation 17
23. Using the senses, calibrating the "gain" of the response 18
24. 'What stops me?' as a way to go on exploring 18
25. Using existing ("ingrained") patterns and responses 19

26. Agonists and antagonists linked neurologically..... 19
27. Muscle groups involved in more than one function..... 20
28. Non-normative approach vs. "indoctrinated" (hidden) norms..... 20
29. Cortical involvement in unusual contexts and settings..... 21
30. Different levels of control addressed by different "languages"..... 22
31. Communication as verbal (serial, digital) and as sensory (images)..... 22
32. The concepts and functions of monitoring and choice-making..... 23
33. Reversibility for improved control and efficiency..... 23
34. The role of pain,"measuring" pain, progress and rate of rehabilitation..... 24
35. Meta-messages in ATM and FI..... 24
36. Supplying the missing constituent in a deficient pattern of action..... 25
37. Pattern recognition as a phase of learning..... 25
38. Primitive (old) patterns..... 26
39. Respecting dominance..... 26
40. The view on posture..... 27
41. Respecting the structure..... 27
42. Shearing stress and friction, supporting at right angles to surface..... 28
43. Testing, usually by going to extremes..... 28
44. Repetition, its rationale..... 29
45. Integration through change of environment, position or context..... 29
46. Integration through the head, its rationale..... 30
47. Keystone-manipulon..... 30

IV. Review of various themes appropriate for frontal talks ("lectures")..... 31
1. The origins of patterns of action..... 31
2. Communication by words and by images..... 32
3. Image of action, the map-territory relation..... 32
4. Hierarchy in the CNS, levels of control..... 33
5. Structure and function..... 34
6. The skeleton..... 35
7. The Weber-Fechner principle..... 36
8. The neutral point..... 38
9. On touch..... 38
10. Perception of the world..... 39
11. Damage of the CNS..... 41
12. Muscles..... 42
13. The neuron..... 43

14. Entropy 44
15. The two hemispheres 45
16. Upright stance in the gravitational field 47
17. Physical principles 48
18. Passivity - activity 48
19. Dualism in language and in philosophy 49
20. Recommending a bibliography 51

V. Considerations in ATM: 52
1. "Principles" 52
2. Strategy 54
3. Tactics 56
4. Series of lessons 57

VI. Considerations in FI 58
1. The style of FI 58
2. The FI session 58
3. The limits of FI 59

PART B. Hints for building a curriculum 61

VII. General outline 61
VIII. A few additional specific items 61
1. Didactics of ATM lessons 61
2. Didactics of FI demonstrations 62
3. Didactics of tutoring FI 63
4. Didactics of the practicum 63

I. Preface

This book has a threefold function: The **trainers** in professional training programs that teach the Feldenkrais Method, might use it as a compendium for much of the material which is to be presented in such programs. They will benefit from the fact that the material is didactically structured and, in a sense, ready to be presented to the students. Furthermore, the hints for building a training program curriculum are a good tool for starting an endeavor, such as a professional training program.

Practitioners of the Feldenkrais Method might use the book as a reminder and refresher. They might want to look at their work didactically as well - perhaps by asking themselves: "How would I use this work for teaching, or for a demonstration in a lecture?" The improved clarity that might emerge by dealing with that kind of questions brings higher efficiency into the practitioner's everyday work and, hence, greater satisfaction for both practitioner and client.

The **general reader** interested in the Feldenkrais Method will find here not only a general overview of the Method, but also plenty of items, which, on the one hand, constitute an extensive definition of the Method and, on the other, show, by their mere structure and didactic processing, how a complex system like this Method could be taught efficiently.

This book is organized as follows: Chapter III deals with a series of items relevant in principle or in practice, concisely presentable with the appropriate examples and, in the right context, repeatedly remembered. Chapter IV deals with items or topics involving more material and more effectively presentable as frontal lectures which can be interspersed in the course of the learning process; Chapter V deals with more specific questions that arise in the context of ATM; Chapter VI deals with questions of FI; and finally, chapters VII and VIII deal with hints for

building a curriculum for a Feldenkrais professional training program.

The actual content of ATM and FI lessons to be taught in the framework of a professional training program, is given here mainly as examples. For more on ATM, the reader could consult the translation of the ATM audio-tapes: "The Feldenkrais Method, ATM Lessons by Dr. Moshe Feldenkrais at Alexander Yanai", published jointly by the International Feldenkrais Federation, Paris and The Feldenkrais Institute, Tel-Aviv. For more on FI: "The Feldenkrais Method, Teaching by Handling", by Yochanan Rywerant, Keats Publishing Inc. New Canaan, Connecticut.
Of course I am convinced, that for acquiring the Feldenkrais profession, one must participate in a regular professional training program.

II. Introduction

For the benefit of the general reader, I should state some of the goals of the Feldenkrais Method, as well as some of the Method's means to achieve them.

Every now and then, most of us are concerned with the way we act, with the way we function. More often than not, we might be pleased with some improvement in the way we act intentionally, by discovering how to function more easily, efficiently, less painfully and even more esthetically. Why is this **search for improvement** necessary at all? It seems that alternative ways of acting might not be so clearly at hand; we may learn by imitating others, using instinctive or inherited patterns, like breathing, sucking, coughing and the like, or patterns acquired earlier in life. But we also form habits and are sometimes hampered by structural or other **constraints**. The mere idea of acting **differently** depends on our needs and on our curiosity. But it also depends decisively on **sensory feedback.** This is the information that reaches our conscious mind from our sense-organs and is related to the ongoing action. Once an **image** of possible alternative ways of acting emerges, the first steps are taken towards eventual improvement and more freedom of choice. Habits, perhaps older and stereotyped, become less relevant.

The Feldenkrais Method tries to implement some of the above mentioned ideas, using two techniques: group lessons (called "Awareness Through Movement", **ATM**) in which the teacher guides the group to do certain **easy** movements, usually non-habitual ones, while checking to what extent the **image** of those actions is adequate. The efficient way to do this is to draw the pupil's attention to the **sensory** information accompanying the action. The emphasis is on the **process** rather than on a **goa**l. All this is done playfully and pleasurably and usually results in better awareness of one's actions and of a clearer freedom of choice. The other technique, "Functional Integration" (**FI**), consists of

individual sessions, where the teacher **touches and moves gently** parts of the pupil's body, first to acquaint him- or herself - and the pupil - with functional and sometimes structural constraints, which might be inherent in the pupil's way of functioning, and then **propose** possible alternatives for action. All this is done in a non-intrusive way by going **with** the prevailing pattern rather than against it, 'asking' questions ('How about this?'), rather than imposing changes. In both techniques, there are ways to clarify the **completeness** of images which precede intentional actions, and to familiarize the pupil with possible "new" actions by connecting them with applications in real life. There is no drill, **no correction**, no compulsion. Possible impairments are addressed by way of alternative options and not by "trying harder".

III. Review of Various "Principles" and "Working Concepts"

It is helpful for the Feldenkrais **practitioner** to have those principles in the back of his mind as a reminder of the way he considers thoughts and deeds. The fact that the principles are presented one by one does not preclude their simultaneous consideration, while being applied in practice. The **trainer** in a Feldenkrais Training Program should be able a) to explain to the **students** the necessity of those principles, b) to deal with difficulties students might have accepting some of the principles, considering possible preconceived ideas or superstitions, c) to present them methodically and gradually in the proper context and d) to mention them repeatedly, whenever the need arises, perhaps using only "salient words". These salient words are often **highlighted** here. Some of the principles are related, being actually different aspects of the same basic idea.

1. Habitual and Non-habitual Patterns

These are basic concepts and, since we might propose new. i.e. **non - habitual**, patterns of action, and intend to change them gradually into habitual ones, a way to discriminate between them would be helpful. Going **with** the **habitual** might be easy; it might not need cortical attention. Going **against it,** or even slightly differing from it, might elicit constraining, defensive reactions and the practitioner will feel the difference immediately. Trying the non-habitual presupposes a non-intrusive manner of proposing it, apart from the pupil's cortical attention, and an opportunity for the pupil to familiarize himself with it, in order to **accept it**. Recognizing the pattern as such also comes with the practitioner's help. In the beginning, for didactic reasons, the trainer might choose patterns which are easy to discriminate, leaving the less clear ones for a later stage. It is easy to see that the acceptance of

a non-habitual pattern of action involves at least three components: kinesthetic, sensory and cognitive.

2. Learning by Sensing Differences

Any sensory learning depends on perceiving **differences** in stimuli. A smaller difference might be more easily **acceptable**, as it is felt as being **non-intrusive** and does not elicit defensive action. Another important consideration is the so-called psycho-physical law (**Weber-Fechner**). It holds that the **threshold** of perceiving a difference in stimulus is a **certain fraction** of the overall stimulus already present. It follows that we have to bring down the overall stimulus, in order to allow the pupil - and the practitioner - to perceive **small** differences which will possibly be accepted. In other words, gentle, non-intrusive stimuli are in order here. There are ways to familiarize the pupil with a possible non-habitual pattern that emerges, by associating it with various daily activities. (See also (45)"Integration" below)

3. Awareness, a Way of Changing Intentional Patterns

The ability to change an intentional pattern of action and to perform it, not always in a stereotypical manner, seems important. That ability is connected with the awareness of some alternative or variation, involving the **image** one has of that pattern. A good way to increase that awareness is to draw one's attention toward **sensory information** that comes with the action. Sensory information in this context could be any of the following: whether parts of the self are - or perhaps not - participating in the pattern; the amount of muscular effort involved; how it looks, how it sounds, and so on. Some of this information might have a broader connotation than just a purely sensory one: are any sensory or other consequences **anticipated** from the action to be taken, is it safe enough to perform, does it please, might it affect other people around, etc. Several senses can be involved in this. The **kinesthetic**

sense, which informs us of muscular effort, position of body-parts and acceleration, usually needs special clarification. ('Oh, I didn't know that I moved that part of mine, while doing this.'). Let us not use 'Awareness' as a mere cliché, since there are good ways of using it to the individual's advantage.

4. The Stages of Baby-development

One of the important Feldenkrais ways to enhance the learning process is to follow and to imitate the stages in a baby's development. The sequence of those stages exhibits certain characteristics, which are interesting and didactically important. It proceeds **from innate** patterns towards typically **earlier acquired** ones, **from less differentiated** patterns **to more** differentiated ones, and from patterns which are **low-level controlled** to **cortically controlled** ones. Most of these steps serve a purpose, an application, a more effective way of doing. The **sensory feedback** is used extensively, as in coordinating eye and limb movements and other changes. All deal with transforming intention into action. It might be good practice to draw attention to such a sequence of the stages of baby-development whenever it presents itself. In situations that are perceived as adverse, such as pain, insecurity, inability to function because of social stress, inability to judge what is going to happen, impairment of a structural or a neurological nature, etc., defensive patterns of action might develop. Often a **regression** to some earlier stage of development occurs. This calls for a possible development from that particular stage onwards and gradually towards any acceptable component of a subsequent stage.

5. Orientation in Space and in the Field of Gravity

Intentional actions are done within the immediate environment. The self relates to parts of the **environment** through sensory **communication**, by **moving or changing** these parts, or by adjusting to them. In other words, the self is **oriented** in relation to

these parts and, in a sense, they should be considered ingredients of the respective patterns of action linked by communicative interaction to the self. Hence, the parameters of the environment, **front-back, left-right and up-down**, seem to be necessary ingredients as well. **Gravity** has a special role with its vertical direction, since it is involved in any pattern that deals with support, balance and generally with muscular efforts which are required in movements that have a vertical component.

6. Hierarchy of Levels of Control, Changing of Control-level

We usually assume that we are able to control our actions in a more or less conscious way. 'Action' could mean any of the following: **doing** something, whether intentionally or not, **perceiving** some item through the senses, **planning** ahead, or **associating** ideas. This control is implemented through certain parts of the CNS. These parts are arranged in levels, which are organized in a **hierarchy:** a higher level could inhibit a lower level from exercizing its control. Relating to these facts in a simplified way, one could choose **a higher level** (usually the cortical one) and **a lower level** (often the limbic system) as representing the possible changes of control-levels. The practical aspect of all this is the fact that **learning** is also a change of the control-level **upward** in the hierarchy. Sometimes we have to **relieve** the concern which the lower level might present, while not allowing unknown, untried and insecure actions, and using **defensive** actions instead. As a possible development, we might try to **propose** patterns with a **changeable parameter** (this addresses the cortical level, rather than some lower level with its **all-or-none** response). The changeable parameters could be one of the following: timing, velocity, effort, range and direction of movement. These are suggested non-intrusively, otherwise the chances for these proposals to be accepted might diminish considerably. The moment we sense that a "new" pattern is **easily accepted** coincides with the moment when the level of control **rose** in the hierarchy.

7. Clarity of the Distal and Proximal Parts Involved in Patterns of Action

Our patterns of action, whether planned, performed or remembered, have an image, a representation (an 'engram'). These images might not contain all the details that occur in reality, or be represented with the same clarity. This can happen, either because our conscious attention is not necessarily dealing with certain details, or because sometimes our senses provide us with **filtered-out** information. A special instance is the difference in clarity with which the **distal** parts of ourselves are represented, compared with that of the **proximal** parts of ourselves, as they participate in patterns of action. The distal parts seem to be represented more clearly than the proximal parts, and there are several good reasons for that: the amount of movement as well the variety of movements, determined as it were by the number of joints involved (compare here the possible movements of the index finger in space with those of the shoulder blade); the relation to the immediate environment while acting on it, especially by the distal parts; the role of attention while learning skills (manual or other), focussing mainly on distal parts. In adverse conditions, pain or discomfort, one tends to give up the participation of the proximal parts in patterns of action, and this might easily become habitual. (See also 'The Stages of Baby-development'). We might use that difference in clarity to the individual's advantage, either by drawing the attention of the senses to proximal parts while doing a distally conceived action (as in completing the image), or moving some appropriate proximal part and then perceiving the enhancement of a distal action (thus improving the efficiency of functioning).

8. Defense Mechanisms (Anti-patterns)

The control-level which deals with self-preservation, self-defense and safety, usually does more than just abstain from enacting patterns that have a 'negative' connotation. In fact, it organizes

itself to actively oppose those patterns. In other words, it creates **anti-patterns.** This might occur after experiences of failure, discomfort, pain, or while doubting the outcome, feeling a lack of security, or lacking the right space-image for the pattern. These conditions and anticipated outcomes, along with a possible defense-pattern, become **ingredients of the contemplated pattern.** A simple type of avoidance pattern might express itself through **heightened tonus** in the antagonist muscle groups, that counter the action.

9. Communicative Manipulation (The Manipulon)

The smallest unit of manipulation that deserves the attribute 'communicative', consists of three components :

a) some preliminary knowledge,
b) the action itself,
c) the response.

Units of this kind, or **'manipulons',** set the style of Functional Integration.

The **preliminary knowledge** in (a) stems from three sources: some general knowledge of anatomy, physiology, etc., some specific knowledge about the recipient of the lesson, and the possible responses from previous manipulons. The **action itself** consists of **moving, or touching** some part of the individual, as though proposing a situation, or as if asking: 'How about this?' "Do you sense that?', 'Is this **acceptable** for you?', 'Do you recognize a change now?' The **response** can be positive (less opposition to a proposed pattern, lessening of tonus, easier breathing), negative (opposition to a proposed pattern, no lessening of tonus), or indifferent. Manipulons can be classified as **exploratory** (for finding out what's there), **conforming** (going along with an accepted or habitual pattern) and **leading** (proposing a change). Some special kinds of leading manipulons could be designated according to their connotation, or to the context in which they appear, as **confining** (limiting the range of possible movement), **juxtaposing** (for comparing two analogous situations and realizing

the difference), **integrating** (for applying a certain insight to a new position or context) and **positioning** (for changing positions effectively (as from lying to sitting, etc.)

10. The Force-surface-pressure Relation, the "Surface-like" Style

Pressure (in precise terms) is the **amount of force per unit of area.** This can be expressed in kilograms per square centimeter, or pounds per square inch. **Pressure** indicates what happens in terms of **local impact** when two bodies are in close contact while acting on each other (at right angles to the surface of contact). If the force involved in this contact is transmitted to a larger area, then the pressure is proportionately smaller, and vice versa. This explains why a sharp knife penetrates more easily than a blunted one: the surface to which the force is applied is small, hence the pressure is proportionately very great. The surface of the ski is many times greater than that of the sole of the shoe. Thus the ski is prevented from sinking into the snow. A padded surface is more comfortable to lie upon, simply because the increased area of contact reduces local pressure. In Functional Integration, we prefer to transmit forces (small as they may already be) to a larger surface, with the flat of the hand, rather than with the fingertips. This is **more pleasant and less intrusive.**

11. Clarifying Alternative Choices versus Imposing Corrections

Correcting the way of acting means I know the **ideal way of acting**, and I decide that any deviation from the ideal is not right, or at least not good enough, hence calling for a correction of your way of acting. This means, on the one hand, **imposing limits** and, on the other, the continuous frustration of not finding the ideal way. The other approach consists of not denying the present way of acting, but **adding other options.** This expands possible limits of the way of acting and establishes a **freedom of choice** and, hence, the

adaptability to the need at hand, be it efficiency, comfort, security, and the like.

12. Goal-directedness versus Attention to Process, Learning by "Playing"

In a goal-directed activity the attention is drawn mainly towards the **difference** between the goal, which is not yet achieved, and the state of affairs, as it might be achieved already. There is very little indication how to proceed in order to diminish that discrepancy. On the contrary, by directing the **attention to the process,** one might think of trying alternative ways (See also 'Awareness, a way for changing intentional patterns'). Moreover, by not having the goal continuously in mind, one could remove seriousness and even emotional content from this activity. This opens up the way to relate to it **playfully**. In a sense, this style of learning is reminiscent of the baby-like learning.

13. Modes of Control : Sedate, Aroused

The levels of control, mentioned in 'Hierarchy of levels of control', and the change of a certain controlling level into a different one are often "colored" by the individual's state of mind, in quite a general sense. It seems a good idea to be aware of these "modes" of control, since they might influence the learning process. Sometimes you might be able to change them for the individual's benefit. A tentative classification of the modes of control, not really exhaustive but pertinent to our subject, could yield the following : the **sedate, (or calm)** mode, subdivided into **apathetic** (not interested) and **inquisitive** (curious, interested); then the **aroused (or stimulated)** mode, subdivided into **euphoric** (well being), **alarmed** (sensing some imminent danger) and **distressed** (sorrowful). For the purposes of the Feldenkrais Method, you might prefer the inquisitive mode of control. You might succeed in changing the apathetic mode into the inquisitive one just by drawing the individual's attention towards some

interesting sensory input, of the kind that expands the image of a pattern of action (See also (3)"Awareness, a way for changing intentional patterns").

14. Neutral Position versus Extreme Position

Extreme situations or positions could mean any of the following: extending a joint beyond its habitual range, or beyond the anatomically feasible, achieving a situation where equilibrium is questionable, approaching a place of danger (real or implied), producing a fast movement in proximity to a still object, and the like. **Extreme situations** elicit special care and circumspection, in order not to get hurt and not to put yourself in a precarious, or even dangerous, situation. Defensive patterns arise suddenly and place limits on what is allowed to happen. Backing **away from the extreme** towards a **neutral position**, gives a feeling of safety and calmness, like 'coming home'. The defensive patterns just mentioned are low-level controlled and may thus preclude a learning situation. It follows that we might want to avoid extreme situations as much as possible, while being in the process of clarifying new options. On the other hand, life provides us with numerous occasions to experience extreme situations. Hence, in a later phase, having tried out some new options carefully, it is wise to go nearer towards an extreme, that could be significant for some way of functioning, without pressing the point and without persisting at the extreme position. The same is recommended in trying to perform movements fast after having clarified them and accepted them in a slow manner.

15. The Potent State, or Readiness to Act versus mere Relaxation

Relaxation as a first step towards action is needed; otherwise, increased tonus might serve certain **defensive anti-patterns** that counteract the intended action. The readiness to act means not only a positive consideration of the image of the intended action,

but also a posture (the "potent state") that permits to **start the action without preliminary preparation.** Such a posture can serve a variety of possible actions. To know how to assume an appropriate potent state is to contribute to the efficiency of one's active life.
(See also (40)"The View on Posture", below)

16. The Efficient Use of the Skeleton (in the Gravitational Field, etc.)

One of the functions of the skeleton is to **support** the body in the field of gravity; this is a particular instance, albeit a very important one, of **propagating forces through it** efficiently. The rigidity of bones is a precondition for this function; moreover, if several bones participate in this action, they **tend to be aligned** along the force's line of action. As this alignment takes place, **less muscular force** is needed for the action and in some instances, the muscles that have been used for extending a joint can relax completely, or free themselves for other activities. The above-mentioned tendency stems from the instinct of self-preservation and its **survival value** resides in the efficiency of performing the task, whether supporting, pushing, or pulling.

17. Acceptance of Proposed New Patterns; the "Aha!"-Reaction

In our Method we do not impose, but rather propose. When the proposed pattern is **recognized** as such and **accepted** - and we know about indications that this is happening - in other words, when the new pattern seems feasible to the pupil, comfortable and even helpful, this insight sometimes comes as **a sudden flash**. This is the well-known "Aha!"-reaction. It is like saying : 'Now I know, this is something that I could use, now I've learned something about myself!' (See also (11)"Clarifying alternative choices vs. imposing corrections")

18. The Constituents of a Pattern of Action, Sensory Anticipations

A pattern of intentional action consists of several "agents". There are the immediate necessary agents **within the self** of the acting individual, engaged in the performance of the action : the programming part of the CNS, the sensory-motor cortex, outgoing and incoming neural circuits and the respective parts of the motor apparatus (muscles, bones and joints). Another set of agents is a part of the **immediate environment,** interconnected with the self by **information-flow, or by energy-exchange** in the context of the pattern, before or during its performance. Finally, there is the **anticipation of the sensory outcome** that emerges with the action. These anticipations seem to be determined, of course, by the circumstance whether the pattern in question is **habitual** (the anticipations are known) or **"new"** (no established anticipations).(See also (5)"Orientation in Space and in the Field of Gravity")

19. Corollary Discharge and "Relative Conjugate Movements"

Any **voluntary action** produced by a person involves not only the downward discharge to the peripheral effectors, but also a simultaneous central discharge **from motor to sensory systems, preparing the latter** for those changes that will occur as a result of the intended action. The motor systems mean here specifically the programming centers of the CNS. The sensory systems of the CNS are also those that integrate the afferent impulses coming from the various sensory modalities. This train of impulses coming from the motor to the sensory system is called **corollary discharge** (or **efference copy**). As an example, when I touch myself somewhere (on the knee or on the shoulder), it will not occur to me to ask 'who is touching me?'; or when I am talking, I will not ask 'who is talking here?', because the corollary discharge is preparing the sensory systems for the consequences of my doings. Moreover, the presence or absence of a corollary discharge would determine

whether an action is voluntary or involuntary.
When an **action is repeated** several times (becoming "habitual"), the repeated (learned) corollary discharge converts the anticipated sensory outcome into a **part of the pattern** (See also (18)"The Constituents of a Pattern of Action, Sensory Anticipations").
In certain instances, as constituents, habitual patterns might have anticipated **limiting** outcomes (See "Defense Mechanisms, (Anti-patterns)"). It might be desirable in certain instances (when there is no apparent structural impediment, for example) to "convince" the pupil to give up the restrictive anti-pattern, by using the idea of the **"relative conjugate movement".** For example, it circumvents the limiting anticipation, by changing the **moving of a distal part** of the body relative to a **stationary proximal part**, into **moving this proximal part** relative to **that distal part, which is now fixed.** It is changing a habitual pattern (having its anticipations ready) into a non-habitual pattern (devoid of limiting expectations).

20. Sensory Filtering in Habitual Patterns

Not all the sensory information provided by our sense-organs comes to our attention. Usually there is a process of "filtering" going on, we ignore certain parts of that sensory information; perceptions are based on rather "edited" versions of sensory inputs. This subconscious sensory editing and filtering entails two possible aspects. On the one hand, **this filtering is very welcome,** since it frees our consciousness from unnecessary and distracting details, which would otherwise burden our perception. On the other hand, **the absence** of certain items of sensory information stemming from parts of ourselves or from the immediate environment might prevent us from getting a more complete image of an intentional action. Thus our **inadequate image** of an action, will **diminish** our ability to act more efficiently, or obtain any other change in the intended action. This could be the case, for example, with **habitual** patterns of action. Any change (or

improvement) in the way of functioning might start with the task of **completing** the image of action by using relevant sensory information that might have been filtered out up until now. (See also (3)"Awareness, a Way for Changing Intentional Patterns")

21. Cause and Effect vs. Stimulus and Response

In the context of **becoming aware,** of learning, and more generally, of **reactions to information entering the CNS,** the concepts of **stimulus and response** are useful. Cause and effect, as an alternative description of such processes will be less adequate; usually the response to a stimulus in this context cannot be considered "caused" by the stimulus. The response could be one instance out of a number of choices, or it could be related to a number of circumstances. The response also has its own energy-source, different from that of the stimulant. The response could also be delayed in time, or not happening at all.

22. Heuristic Learning vs. Model Imitation

Whenever feasible, it is preferable for the pupil to **discover by himself** a new insight or a new pattern, rather than telling or asking him to imitate a model that is presented to him. The **sensory insight** arrived at by the pupil has a greater impact than the verbal statement. It is the pupil, who discovers something about himself. This is **heuristic learning.** In ATM, for instance, the group is moving one part of the body (shoulder girdle) and the teacher will say: 'Now that other part (pelvis) **is also moving.'** The alternative way would be to say: 'At the same time, **observe what happens** with that other part.' In the first instance the pupil might be thinking: 'Yeah, he might be right' or 'What is he talking about? Perhaps I myself am no good.'; in the second instance: 'Oh! it's moving!' In FI, moving one part of the pupil's body and touching gently that other part at the same time, thus **drawing the pupil's attention** to that part, and following its movement, small as it might be, might elicit the same learning by discovery.

23. Using the Senses, Calibrating the "Gain" of the Response

Using sensory information as feedback means several things:
a) **comparing** the activity, as it unfolds, with the planned intentional pattern of the action in order to **diminish a possible mismatch** between the two ('negative' feedback),
b) perceiving the **sensory outcome** of the action, with the result that this outcome will now be **included in the pattern** as anticipation (we see this process as **habituation,** learning the corollary discharge associated with the said pattern),
c) in performing **habitual** patterns, to confront the **anticipated sensory outcome** (by way of corollary discharge) **with the perceived** one (this is called "reafference"),
d) to **complete the image** (the engram) of a pattern by drawing the self's attention towards relevant details which might have been 'filtered out' until now, and finally
e) to change, or to **adapt, the "gain" of the response,** this being a more refined way of control. Gain here means **how much correction** (change of muscular force) is supplied for a particular amount of muscular stretch (of change in muscular length, for example). The gain could otherwise be excessive or too small, in other words, not adapted to the goal of the intended action.

24. 'What Stops Me?' as a Way to Go on Exploring

An intentional movement may proceed within a certain range, towards a certain limit and then return. Asking oneself merely 'What stops me?' sheds doubt on that limit. Is it connected with some **structural limitation**, or with some **hindrance of neurological nature,** like spasticity and the like, or is it the **lack of the right image of action** which would otherwise allow one to proceed beyond that "limit"? The latter instance is important, since it uses **increased awareness for exploring** more options. One possible answer to that question could be: 'I just have to use more force', but other answers might be more interesting, such as: 'I had to

allow that other part of myself to participate !', 'I could support myself differently', or 'I could have some use for that'.

25. Using Existing ("Ingrained") Patterns and Responses

While looking for means to improve and expand the pupil's ways of functioning, we face several options: a) to deal with a not too efficient way of functioning and **find ways to improve** it (this is the more frequent instance), b) to **invent**, so to speak, a pattern, which might be appropriate in this particular instance (when structural or other damages place constraints against implementing patterns in the usual way), c) to make **use of ingrained** (congenital, or genetically inherited) patterns, even in cases where such patterns haven't been at all part of the dynamic self-image of the person (they haven't been used before). The latter case is important, because it might allow us to elicit responses, that could then be further integrated. A few examples: Any of the patterns connected with existing in the field of **gravity**, like the tendency to look for support, or the tendency to use the skeleton efficiently (See also (16)"The Efficient Use of the Skeleton"), or any pattern connected with the **instinct of self-preservation,** like defending yourself by pushing away (extending arms or legs for that), and the like. This might work, for example, with persons who never had a chance to straighten their elbow. (See also (38)"Primitive (Old) Patterns")

26. Agonists and Antagonists Linked Neurologically

A certain understanding of the neurophysiological aspect of this issue is needed, of course, but, apart from this, the practical aspect should be clear. Agonist-antagonist pairs can occur in several states:
a. whilst the one works, the other is inhibited (**reciprocal inhibition**); this is the "normal" way of functioning;
b. **both agonist and antagonist are tense,** thus preventing each

other's efficient performance. Here we have various instances. For example, one could intentionally stiffen part of the body. With less good control, the antagonist can be tense anyway, forcing the agonist, while doing some work itself, to **overcome the antagonist's resistance as well;** because of this additional energy spending, such work will be less than efficient in any case.

c. the extreme case, which comes with certain neurological disturbances, is **spasticity,** an uncontrolled stiffness where, by an increased 'gain' of the stretch reflex, there is much difficulty in moving.

27. Muscle Groups Involved in More than one Function

In most neuromuscular actions there is more than one muscle involved. One muscle might be the 'prime mover', the others are 'synergists'. Thus a number of muscles (or muscle-groups) are involved in two or more patterns of action. If **difficulty or impairment occurs in one** of the two patterns, it is worth trying to **clarify the other** pattern (the easier accessible one) that involves the same muscle and then, after the pattern has been nicely accepted, to try the first one again. This is an application of the idea that the **disturbance might be in the pattern rather than in the muscle itself.** A few examples of muscles involved in dual actions: the biceps brachii flexes the elbow and supinates the forearm; the sterno-cleido-mastoideii flex the head (together) and rotate the head (singly); flexor and extensor muscles of the trunk are also involved (as synergists) in the trunk's twisting and side-bending.

28. Non-normative Approach vs. "Indoctrinated" (Hidden) Norms

We often act according to certain early learned patterns of behavior, some of them imposed on us by parents, school or society ("indoctrinated" in the positive sense as well). Here are a few of those norms, that can also limit and hamper a possible

improved adjustment, and some alternatives, to be proposed in a non-normative way, thus extending the freedom of choice.

1) "Can't you just be straight? Make an effort! Shoulders back!" The alternative: You opted, perhaps even without thinking, for keeping your belly-muscles short and tense. Another option could be to keep those muscles softer. The breathing will then be easier and you will straighten out with less effort.

2) "Don't spread your knees! It's not nice." How about not tensing up your adductor muscles continuously? You could release them, but together with the glutei muscles. Then you will have the knees free, as you might wish.

3) "Don't show your sway-back! Tuck in your behind!" The alternative: Constantly avoiding a swayback also means stiffness. How about allowing some flexibility in the lower back and occasionally permitting various movements: bending forwards, backwards, sideways and twisting?

4) "The muscles of your back hurt? They are weak! You have to strengthen the belly-muscles!" Avoid a misunderstanding! **Tensing up** the belly-muscles puts an extra burden on the already painful back-muscles. Try the other way around. On the other hand, a good, **controlled muscle** should be able to **assume any strength at will,** from maximum strength to complete release (relaxation), at any amount of tonus and for any length of time.

29. Cortical Involvement in Unusual Contexts and Settings

One of the ways to engage the pupil's conscious part of the brain (the cortex) in clarifying and accepting new patterns of action is to **capture its attention** by an unusual or non-habitual context. This could be an **unusual position** or an unusual way of relating to some item in the immediate environment. If it is done gently and slowly (not "endangering"), then attention might be reverted to the sensory input relevant to the pattern in question. The habitual setting might just call for an established way of functioning with less or no cortical attention involved.

30. Different Levels of Control Addressed by Different "Languages"

Each control-level has its specific ways of reacting to **external stimuli.** For example, the level of deep **reflexes** has its very definite reactions to the appropriate stimuli and there is almost **no way to change** this, no stopping, no delaying the response, or changing its intensity. The **limbic system**, for example, being very much involved in **safety and self-defense**, will naturally react to any sign of danger, real, implied or imagined. The **cortical system,** with its verbal ability, has a much richer **variability** in its responses. The response can be discussed, doubted, delayed, stopped, or changed in its intensity and in its duration. In other words, there are several **parameters** of the response, specific to the cortex, that could influence the outcome. If we intend to create a learning situation, we have to address each level in its own 'language'; the lower system, also concerned with safety, by doing the necessary in order to transmit a message of 'supported', 'stable', 'nothing intruding', 'no danger!'; the cortical system, by proposing an alternative, asking 'how about this?', changing or modifying any of the parameters, in order to find out what is more easily accepted, and so on.

31. Communication as Verbal (Serial, Digital) and as Sensory (Images)

Words are extremely important for communication. We should, however, be very aware of their **limitations.** Words, even those that denote practical matters, are **abstractions** and could serve us only with difficulty to describe images of any kind: visual, auditive, multimodal (based on more than one sensory modality), or actions that might imply bodily movements that unfold in time. **Verbal descriptions are serial** (by strings of words, one by one), or 'digital',and are **unable to catch the simultaneity** and the striking togetherness of many details that are related to an image presented to us. It is helpful to be aware of the **components of an**

image that is going to be presented to a pupil. Both ways of communication can be used, but if it's about recognizing a new pattern, then the **sensory insight is the decisive one.** Verbal clarification could come later.

32. The Concepts and Functions of Monitoring and Choice-Making

We are able to know **what, how and why** we are **acting** as we do. We also know about our **perceptions, thoughts, feelings and memories.** It is plausible to assume that there is a function of ourselves that does this "monitoring". Whether the monitoring has a specific location in the brain or not, is still not answered in any decisive manner. But a simple introspection shows us that we do this monitoring during most of our waking hours. Speaking here of 'acting', we might **not always be attentive** to the course of action (usually with actions done habitually); differently, while being attentive to this, we might sometimes decide to **change the course of action** or to **stop** it altogether. About the above mentioned 'thoughts', those include **remembering, considering** alternatives and perhaps **deciding** accordingly, pondering the **consequences** of the action, **planning** ahead, etc. It is as though a certain part of the brain initiates those functions: the **cognitive** ones, like the gathering and integrating of sensory input related to the present state of our ongoing actions, and the functions that represent our **intentionality**, like **comparing** the present state of our ongoing actions with what has been planned before, and deciding about the future course of action.

33. Reversibility for Improved Control and Efficiency

To do a movement in a **reversible** manner is a sure way to improve efficiency. It means that in **any phase** of that movement you can **stop** without falling and then, either **continue, go back,** or change to **any other direction.** In ATM, for example, it means to have

improved control over the amount of **force** used, over the gradual shift of the **center of gravity**, over the **speed** of the movement and not having to stop the **breathing** while moving.

34. The Role of Pain, "Measuring" Pain, Progress and Rate of Rehabilitation

Pain shouldn't be considered a **punishment for behaving badly**, but rather a signal that **something is damaged** or is functioning in a way that uses the relevant structural parts not as they are meant to be used. Except for obvious cases, it might be difficult to ascertain what induces the pain. To alleviate pain (except through painkillers), might be even more elusive. Anyway, these considerations and decisions are the exclusive prerogative of the **medical profession.** In some instances we might get indications that the pain is associated with an **inefficient way of functioning.** If this is the case, then changing the way of functioning might somewhat alleviate the pain. How could this be perceived ("measured")? The pupil's subjective statement: 'Less pain now' should be accepted without doubt. But very often, the "objectively diminished pain" - related to less irritation, less stiffness and less overtonicity - might still be perceived by the pupil as 'the pain is the same, no change'. In such instances, the possibility of **moving more easily** than before provides us with a way to evaluate the beginning of some progress.

35. Meta-messages in ATM and FI

The pupil, both in ATM and in FI, often needs information **about the lesson** ("meta-messages"), The content of such a message could be a) about the relation of the ongoing to some previous lessons, whether this is seen as **a continuation** of the former or perhaps a clarification of some **new aspect** of functioning, b) setting the **context** in which the pupil might chose his reactions, such as engaging attention towards the sensory input, or imagining a possible application in everyday life, or c) to indicate the

importance of the ongoing for further development, as while trying to regain an impaired function and making only slight progress. Information of this kind is more easily **done verbally** than in any other way. But, since **sensory insights** are the decisive ones, it is good to postpone these verbal messages **after** the sensory insights have taken place.

36. Supplying the Missing Constituent in a Deficient Pattern of Action

A pattern of action has a number of components (constituents). (See also 18. The Constituents of a Pattern of Action). When any one of those components is impaired, or even missing, the pattern itself might not be realized. **Finding** this component and **supplying it** (from the "outside"), while the pattern is tried out, enables the pupil to **perceive it as an image being performed in practice.** The impaired component might then get a chance to develop and strenghten. When the impairment is about some channel of sensory feedback, it might help to use some other sensory modality (**"sensory substitution"**), like visual feedback replacing the impaired kinesthetic one, or auditory feedback, in playing the flute for example, substituting for the missing sense of touch in some of the fingertips. If the impairment is connected with **lack of awareness** of the participation of certain parts of the self, then again, supplying the unclear part of the pattern might give the pupil a chance to realize a changed way of functioning.

37. Pattern Recognition as a Phase of Learning

Any new pattern of action, whether discovered exploringly by the pupil or proposed by the teacher, might be defined through a great number of details, but a **small number of significant details** could be enough for **recognizing the essence** and hence the applicability of the pattern in question. It follows that drawing the attention (in words) towards such details could enhance the recognition of the pattern and thus be considered as a phase of the learning process.

For example, having the pupil sense with his fingers the distance between the small (floating) ribs and the anterior superior iliac spine and the changes of that distance while moving or while just breathing, and then commenting 'You see that your pelvis and chest are moving in relation to one another' Or let the pupil observe (with the fingers of his left hand) the protrusion of the tip of the right scapula, while the right arm is up, and then comment: 'You see that, while lifting your arm, you shoulder blade is sliding to the outside'

38. Primitive (Old) Patterns

It is advantageous to be aware of **primitive patterns** that are part of our image of achievement. Those patterns are primitive in the sense that they are **firmly established and secure**, either by **heredity,** or by acquisition (learning) at an **earlier phase of the individual's life.** In the process of **regression,** following damage to the structure, or even more so to the CNS, these are the patterns that might still be viable, although changed in their relative prominence, a possible starting point for regaining the impaired or lost ways of functioning. Here are some of these patterns: The **foetal** position, bringing **hand to face** (or mouth), patterns stemming from the instinct of **self-preservation,** the efficient use of the **skeleton,** the tendency to look for **support,** the tendency to look for **equilibrium,** and finally **postural and righting reflexes.** (See also (25)"Using Existing ("Ingrained") Patterns and Responses)

39. Respecting Dominance

Asymmetry of structure and localization of functions in the cerebral hemispheres is closely related to the way we function. Let's say that the **left** hemisphere is the dominant one, which is so in approx. 93% of the population, most of those people are right-handed. That means not only **favoring the right hand** for writing and other skilled tasks, but often being right-legged and

right-eyed as well. The dominant hemisphere is the one associated with **aphasia**, a group of disorders in **communicating and using symbols.** Aphasia could occur due to certain types of brain damage, but there are also "normal" (mild) cases. Dominance in itself is not an affliction that has to be "corrected" and there is not much sense in "fighting" left-handedness, for example. On the other hand, ambidextrousness might be very welcome in performing various complex skills.

40. The View on Posture

Posture, apart from being a **static** attribute of the self, connected with stability, ease, elegance and symmetry, has the **dynamic** attribute of serving as a **starting point for action.** Looking for efficiency of action, we have an efficient way to look for that starting point, a posture that allows the action **without preliminary preparation.** This idea embodies the dynamic aspect of our Method. A posture could be a starting point for a number of different actions (the **"potent state"**) and our appreciation of posture could base itself on its adequacy towards the intended actions. (See also (15)"The Potent State, or Readiness to Act vs. mere Relaxation")

41. Respecting the Structure

Respecting the structure means several things. There is **no intention to change** the structure (bones and ligaments) and **no testing the anatomical range** of movement in a joint. Approaching the range's limit might elicit a restrictive anti-pattern in any case, but this, again, is a different issue. If any **damage** to the structure is known, or even suspected, no action should be taken, since this is the **exclusive prerogative of the medical profession.** A **change in the way of functioning** might influence some **structural development,** which on the one hand could be considered a very natural occurrence, but on the other hand, cannot be planned specifically ahead of time. An example of this: a person suffering

from CP, who never fully extended the right elbow, learned to use the triceps muscle (by pushing away!) and **gradually** achieved full extension of the right arm. What happened was that the depression at the back of the humerus bone, where the tip of the elbow was supposed to move in during the extension of the forearm (the olecranon fossa), had been filled with hardened interstitial tissue. With the change of the way of functioning, this material, having already been part of the structure, softened and adjusted itself to receive the olecranon.

42. Shearing Stress and Friction, Supporting at Right Angles to Surface

Any appreciable support or pressure should preferably be **directed at right angles** to the surface of contact. Think of support along the vertebral column and the direction being at a right angle to the facets of two neighbouring vertebrae. An **oblique** direction will either produce **sliding,** or stopping the sliding by **frictional forces.** This action, directed **across** the direction of support, is called "shear". Shearing stress could be **damaging,** unless it is done with extreme gentleness. If the vertebral column is **slightly arched,** then in any case support can be in the direction of the **tangent** to that arc and further propagate itself that same way.

43. Testing, Usually by Going to Extremes

The practice of testing is a quite common procedure. We test the present state of affairs and then, after some development, test again in order to know about a possible change for the better. Testing **movement abilities** usually means going to the **limit of the movement's range,** to the extreme. This might elicit a self-protective pattern and shift the level of control towards a lower center, obviously not a learning situation. If taken by surprise, the structure could also be **damaged**. On the other hand, learning gradually about the expectations from going to the limit, might encourage the pupil to try extreme situations too,

sometimes even for the sheer pleasure of doing so. Not testing doesn't mean avoiding the extreme altogether: after all, life itself provides us with opportunities which require extreme states. (See also (18)"The Constituents of a Pattern of Action")

44. Repetition, its Rationale

Repeating any pattern of movement several times could be done for some good reasons. With each repetition, some **new aspect** or new component of the pattern is clarified. With each repetition the pupil gets more **familiarized** with the pattern, learns what the **expectations** might be (establishes the corollary discharges) and transforms the pattern into a **more habitual** one. On the other hand, mere mechanical repetition, devoid of any new insights, averts the attention from the process and could merely produce fatigue, or even pain.

45. Integration through Change of Environment, Position or Context

Any new element of action, twisting the trunk, for example, should be "integrated" after having been clarified in the sense that **chances** that the element will be used in everyday life **are increased.** There are a number of ways to do this: proposing actions that include the said element and relate to **different items in the environment;** changing **position,** which means different ways of being supported (different parts of the self sensing the support as well) and a different direction of gravity; performing a similar action in a **different context,** such as looking at an object, reaching out for it, or pushing that object away; proposing a **combined pattern** and thus **increasing the complexity** of the action. The more we rely on a variety of associations of that kind, the more this element will be **viable and applied** in practice.

46. Integration through the Head, its Rationale

The head is the seat of the **teleceptors** and thus one of the main agents that connect the self with the environment. Through **righting reflexes,** and more generally through the **tendency to face** the objects of attention, the head is also connected to the **readiness for action.** These are reasons enough to include the integration though the head as an important item in the general endeavor of integration. Here is just one example: suppose a pupil keeps his belly-muscles short and strains the extensors of the neck in the upright stance; after a clarification of the possibility of lowering the tonus of the belly-muscles, comes the clarification of the relation head-trunk and head-shoulders and then, the **easily** achieved repositioning of the head in the upright stance, with the obviously needed **change of self-image.** (See also (45)"Integration through Change of...etc.")

47. Keystone-manipulon

In certain situations, after having clarified a number of related fragments of a pattern of action, there might be some central integrating manipulon (usually a **gentle support** in the right direction), that lets all the fragments and details **come into place.** Feldenkrais metaphorically called this a "keystone". Such a keystone-manipulon has the ability to sum up and clarify the pattern **in one go,** thus constituting an efficient integrating stage. (See also (18)"The Constituents of a Pattern of Action")

IV. Review of Various Themes Appropriate for **Frontal Talks** ("Lectures")

This section covers some of the theoretical material, presentable as frontal talks. Most of this cannot be done here other than in **brief sketches** and in any case, each trainer will choose the items, the specific details, the extent and the sources according to his own experience, knowledge or interest. Any of those themes, having been chosen, presupposes a thorough **preparation** and the ability to answer the listeners' questions, which might sometimes transgress the previously intended plan of presentation. Timing, when to present an item, seems to be important. It is best not to have the themes too close together, on the other hand, did some aspect of a theme come up in a discussion, announce the theme and bring it up at the nearest opportunity.

1. The Origins of Patterns of Action

Patterns of voluntary action arise from a variety of sources. Some are "wired in" by heredity, like breathing, swallowing, sucking, etc. These patterns don't have to be learned, they are just there, ready to be used in life from the moment of birth. In addition to these **phylogenetic** patterns, there are obviously the **ontogenetic** ones, acquired during the individual's lifetime. These patterns are learned, either by trial and error, or by imitation, others are occasionally "created" or invented, perhaps for solving a specific problem. The different stages in which that learning occurs seem to be important; those which are learned **earlier in life** are more deeply ingrained and can become habituated by **repetition.** One aspect of that learning, not always so obvious, is the **adaptability** to changing circumstances and to possible constraints stemming from the self or from the environment. A special instance is the adaptability to damage or deterioration of the body or, specifically, the CNS. Many examples should be given, pointing to what the pattern comprises.

2. Communication by Words and by Images

The most important interaction between the Feldenkrais practitioner and the pupil is communication, by words or by images. This calls for some clarification. Words have their advantages: **logical precision,** the ability to express **abstract concepts,** the "digital" (one-dimensional) way of presenting information. However they also have disadvantages: words are abstractions, so there is much **imprecision in describing** images that are based on the sensory modalities (visual, auditory, or other) as well as **dynamic** patterns that describe evolvement or development. Images, on the other hand, have the advantage of presenting patterns of the latter kind with the **immediacy of perception** ('in one go'), in the "analog" way, without requiring words, or even when the appropriate words are missing. There are of course disadvantages: the language of images doesn't form logical sequences (for example, there is no image for the word "not"). In conclusion, for a more or less complete communication needed in the Feldenkrais Method, we can use both modes of communication, analog and digital, images and words.

3. Image of Action, the Map-Territory Relation

Intentional actions are preceded by the image of that action (this is an enlargement of ch. III, § 18 "The constituents of a pattern of action" and § 23 "Using the Senses, etc.") An image of action or of a state of affairs represents or symbolizes the action or the state of affairs. This representation might not always be complete, in the sense that not all the details that occur in reality are represented. We might sometimes see this incompleteness as a challenge and the awareness of additional aspects of the action as one of the endeavors of the Feldenkrais Method. Still, that image can be used for certain operations concerning the said action: for planning ahead, for changing the action, for controlling and comparing it with the ongoing outcome as it unfolds, for weighing

the advantages, for postponing it, or for giving it up altogether. The **image is related to the action** itself, **like a map to the territory.** Most maps also contain an 'explanation of symbols', that clarifies the 'codes' by which territorial items are represented by (or translated into) map items. It is not yet clear how this 'encoding' is done in the case of the images of actions. On the other hand, the analogy is quite obvious. Operations that can be done with the help of a map are the same ones that can be done, as mentioned above, with images that represent actions. It should be quite clear though, that **the 'map' is not the 'territory'.** Following a 'road' on a map is not the same as walking across the land; similarly, the picture of a cat, or the word 'cat' for that matter, cannot scratch you.

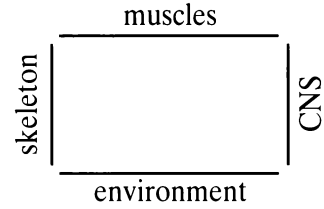
4. Hierarchy in the CNS, Levels of Control

This is an enlargement of ch. III, § 6, "Hierarchy of levels of control, etc." One of the first ways to become aware of such a hierarchy has been the studying of "preparations" of animals, obtained by cutting the neuraxis at different levels and comparing the specific preparations by certain neurological parameters, such as rigidity versus laxity. The neuraxis is the line, along which most of the structures of the CNS are arranged. Another way to recognize that hierarchy was studying cases where some damage had been sustained in particular locations in the CNS. The concept of hierarchy is quite central to the Feldenkrais Method, in the practical sense as well. Even by simple introspection one can convince oneself of the way that some of these levels function and control one's actions. The **cortical level** controls speech, deliberate or detailed actions, decision making, judgments and planning ahead, in short, it is the conscious self in action, which seems to be quite clear in our awareness. Just below (in the sense of being subordinate and controlled by what is 'higher' in the hierarchy) are the **subcortical levels.** These levels deal with the **habituated and recently learned** patterns of action, where conscious control is not required. Still lower are the levels that control patterns of

action **learned and habituated at earlier stages** of the individual's life, from childhood on. Such patterns are "more deeply" ingrained ('wired in') in the system. One quite important level is **the limbic system,** which controls emotions, instincts, defense patterns, especially when a quick reaction is called for; it is often the one that "takes over" in case of **regression,** when some damage has occured to the CNS. There are still the **hereditary patterns,** like breathing, sucking, coughing, anti-gravity responses, and the like, and finally the **reflexes** proper.

5. Structure and Function

We can define four relevant factors that constitute a human being acting within his or her environment: the skeleton, the muscular system, the central nervous system, and the environment. Each of these require the special professions that can deal with the respective issue: orthopedists, surgeons, neurologists- psychiatrists, and professionals who deal with the various aspects of the environment - constructors, architects, carpenters, and the like. We can envisage the four factors as the four sides of a quadrangle:



With the Feldenkrais Method we have a way to deal with the links between the sides of the quadrangle, the "corners". The corner 'environment-CNS' symbolizes the interface through which sensory information arrives from the **sense-organs to the brain,** and serve there as the basis for planning suitable actions, either to change parts of the environment, or to adjust to it. The Feldenkrais Method deals with efficiency and with the possible alternatives for those processes as well. The corner 'CNS-muscles'

denotes the processes that come into play with the **intentionality of the action** itself: deciding to take the action or choosing an non-habitual way of acting, etc., again, typical considerations of the Method. The corner 'muscles-skeleton' refers to the conversion of **muscular effort into movement,** and all the considerations of alternative options and efficiency are our concern. Finally, the corner 'skeleton-environment' alludes to a twofold interaction: **adjustment to the environment**, including the tendency to look for support and the various anti-gravitational responses, and the actions by which one does **work** on parts of the environment, by exchange of energy. Here again, the Method has its own way of clarifying the situation and seeking efficiency.

6. The Skeleton

This is an enlargement of ch. III, § 16, "The efficient use of the skeleton". The human skeleton, as that of other vertebrates, fulfills several functions: It provides **protection for organs inside** the skeleton, like the brain within the skull, or some susceptible organs inside the bony pelvis. **Muscles are attached** to bones at certain points, usually prominent sites, and the muscles, contracting and pulling at those sites, produce movements whereby parts of the skeleton act as mechanical **"levers"**; the skeleton enables us to find **support in the field of gravity**, for standing and for moving about (compare with the jelly-fish on dry ground); this last point is a particular case (albeit an important one) of a more general function, the **propagation of forces** along a bone, for pushing or for pulling; when more than one bone are involved in this, then the **alignment of the bones** becomes a factor in defining the efficiency of the action. To further expand on the issue of **"levers"**, here are a few examples: There are two forces acting on **the head** (in the vertical stance): the weight of the head acting vertically down through the center of gravity, and the pull of the neck's extensors (also down); the fulcrum (or pivot) is somewhere at the top of the first cervical vertebra (the atlas),

while the center of gravity is located a little in front of the fulcrum; this means, by the way, that even in such a habitual position, like standing, there is a tonic contraction of the neck muscles, needed to counteract the weight of the head. Another example is **the foot,** while one stands and lifts oneself on the toes. The lever is the foot, pivoted at the toes, one of the forces is the body's weight with its downward thrust at the ankle-joint, and the other, the upward pull of the soleus and gastrocnemius muscles (through the Achilles-tendon) at the heel. An example, not so often described, is the upper part of **the trunk** (the chest) moving in flexion or extension relative to the lower part (the pelvis); the pivot is somewhere at the lumbar vertebrae, and the forces are: the flexors of the trunk (the belly-muscles) and its extensors (the back-muscles). The quantitative view of looking at levers is expressed in a well-known formula for a lever's equilibrium: the ratio of the forces equals the inverse ratio of the lever's "arms". The arm is the distance of the pivot from the line of action of the respective force. Without having to apply that formula numerically, one can nevertheless gather that in order to preserve the same posture, a small increase in tonus of the flexors will call for an increase of tone of the extensors several times the intensity of that of the flexors; all this, because the extensors have their line of action much closer to the pivot than the flexors.

7. The Weber-Fechner Principle

If we intend to induce some change in a person's way of functioning and not impose it on him or her, then we have to get their acceptance of the fact that the change is feasible and perhaps applicable in everyday-life. We have to convey certain information in this context. Information is said to be "a difference that makes a difference". It is obvious that the bigger the change, compared to the habitual way, the smaller the chances that it will be accepted. In other words, we should prefer to propose rather small changes. A small change of an image of action is related to

afferent nervous impulses that also produce only a small increment (difference) in a sensory stimulus. Nevertheless we have to consider that there is a **threshold** below which that difference will not be perceived. The Weber-Fechner relationship (the Psycho-Physical Law) says in this respect that **"the threshold of perceiving a difference in stimulus is a certain fraction of the overall stimulus already present"**. This relationship holds for the middle ranges of the background stimulus, which is what interests us in this context. The said fraction, or ratio, is particular to any of the sensory modalities. For example, for perceiving the effort needed to hold an object in our hands, the ratio is 1/40, which means that one has to add or to subtract at least 1/40 of the weight already there, in order to perceive that a change happened at all. One can now draw some practical conclusions; the active part of any manipulon is preferably **small in energy-exchange,** so that eventually the pupil will more likely agree to the change (as giving a positive answer to the question). On the other hand, the teacher, while making a smaller muscular effort, is able to perceive the pupil's eventual responses, since these could be, for example, very minute changes in tonus. The pupil's system would appear to say: 'accepted', 'no need to be alert', 'this is allowed'; or the other way around: 'this is not allowed', 'here is a small obstacle', 'this goes into an non-habitual (or extreme) region'. Considerations of that kind set the gentle and non-intrusive style of the Method. Teachers still find themselves in situations where the optimal conditions for applying the Weber-Fechner law are not easily met; for example, when holding the pupil's head with **all its weight** in his hands (the pupil in a supine position) and **still intending to feel** those very minute changes in tonus, which might come as a response to various gentle manipulons. Another consideration is the fact that items of communication that come in small degrees might not be conspicuous or noticeable enough against the background of "noise". Making the message very clear and even repeating the "question-proposal" of the active part of a manipulon could be the answer to a concern of that kind. It is the application of the idea of "redundancy" in communicating information.

8. The Neutral Point

This is an enlargement of ch. III, § 14, "Neutral position vs. extreme position". Through the idea of 'readiness for action' we lead the pupil to give up any "holding" of body-parts by some increased muscular tonus. This increased tone is often unintentional, or in other words, low-level controlled. There are a number of instances, such as movements of the upper arm at the shoulder-joint, of the thigh at the hip-joint, of the head, or of the scapula sliding over the rib-cage, where improvement can be achieved through the idea of the "neutral point". First of all by very gentle explorations, one should find any **preferred direction** allowed by the pupil. Very often this is the habitual direction. On this direction one goes back and forth a few times, until a very definite sensation is established of **"two extremes versus an intermediate region."** Optimally, the teacher and the pupil would become aware that going towards one of the extremes gradually increases resistance, and coming back towards the intermediate region decreases that resistance. The outcome will be that this intermediate region, the "neutral point", feels like "home", **a secure place** which allows the lessening of muscle tone. It is like **reassuring** that lower level, which might be concerned with safety. Such a neutral point, or region, is not conditioned by the structure as such, but rather by the process of discovering that there is this place where tonus could be diminished. It does not always coincide with the symmetrical middle. Now comes the **use of the neutral point as starting point** to move in any other direction, different from the previously preferred one, even at right angles to it. This will now be much easier, to the pupil's surprise, of course.

9. On Touch

Touch is essential for doing FI. Still, touch can have a series of possible **connotations**, ranging from intimacy to communication.

Clearly, we should keep to the communicative significance, and thus serve the purposes of the Feldenkrais Method; the clarity of this distinction has more to do with the style of touch than with some verbal explanation. The uses of touch in this context can be any of the following: exploration for locating anatomical details, such as projecting parts of the skeleton; sensing the mobility of bodily parts and its degree of ease; doing the active part of a manipulon; sensing the response to a stimulus; directing the pupil's attention to a place, so that he might discover that it participates in a pattern of action, or the fact that it is resting and not participating; providing support. We should abstain from any **superfluous touching**, not only out of respect for the pupil's privacy, but also for not spoiling the effect when you expect the touch to be truly communicative. There are also important **considerations of culture, gender and age.** Different cultures allow or forbid touch between people in different ways, except for close relatives, all of this even before realizing that touch is intended for communication. Considerations of gender presuppose particular caution, especially when pupil and teacher are of the opposite gender. There are places where no touch whatsoever should be allowed, and others, where it is best to put the pupil's palm on the place (for example, on the small ribs near the belly) and the teacher touching with his hand the pupil's hand from above, which is obviously allowed. When the pupil is a minor, a session can be held only in the presence of at least one parent. The cautious approach is then similar to the one mentioned above.

10. Perception of the World

This is an enlargement of ch. III, § 19, "Corollary discharge and ..." Intentional or voluntary movements may change the sensory input from the environment, and hence the relation to that environment; when turning the head to the left, for example, the image on the retina moves as if the world would turn to the right; when tilting the head to the left, a vertical line seems to tilt the other

way; and still, we get the clear perception that the **world is stationary**, invariant. A **compensatory process** (or mechanism) elicited by the appropriate **corollary discharge**, which is in a sense a certain subtraction performed on the sensory input, leaves the perception of the outside world unchanged ('I moved, and not the surrounding.'). As a reminder, cerebral motor systems discharge not only down to the peripheral effectors, but also, at the same time, centrally, into the sensory systems, presetting the latter for the consequences of self-produced movements. This corollary discharge mechanism thus provides a vehicle for maintaining the **spatial order** of one's perception while moving; allows one to **readapt** after peripheral changes or distortions; might be involved in the original establishment of **sensory-motor coordination** in the course of early development and thus give clues as to how voluntary motor control might arise in the neonate; permits one to distinguish physiologically between **voluntary and involuntary** movement; and, finally, after one learns the anticipated outcome of a pattern of action by a few repetitions, such a pattern is perceived as **habitual,** as distinguished from a 'new' or **non-habitual pattern.** A few more examples: while handling an object (by bringing it nearer or turning it around), one still has the clear perception that it's the same object; while stepping down a ladder, one learns, after a few steps, to anticipate the next rung, but if this next rung happens to be misplaced (higher or lower), one is unpleasantly surprised. As for the invariance of the visual field while performing a self-produced movement, one can show - this is the classical example - that, while pushing the eye-ball slightly with a finger, the invariance of the visual field is not preserved - the visual field seems to move - and this, because the push of the finger is **not the habitual way** to move the eye and thus lacks the corollary discharge with the appropriate compensatory mechanism, as it is learned (very early in life), with habitual self-produced movements. The spatial order of perception mentioned before also enhances the ability to make "mental maps" or similar symbolic representations connected with the image of the environment and enabling one's **orientation** within

that environment. Still another way to show that learning corollary discharges is involved in **readaptation**, are the experiments with goggles. These are spectacles with **prisms** as lenses, for example, which cause the field of vision to shift aside at a certain angle. If one attempts to orient oneself in the usual way, like reaching for an object or moving in a certain direction, one does the wrong thing, until, after some minutes, one learns to compensate for the distorted input, and the orientation then works once more. Taking off the goggles then, leaves one disoriented anew because of the shifting compensation that has been learned in the meanwhile but is no longer needed. Again, after some minutes, usually less than before, normal orientation is reestablished.

11. Damage of the CNS

Trying to improve the way of functioning in case of damage to the CNS could mean addressing mainly the healthy part of the CNS, that part which is able to receive information and to learn. This requires two preconditions: A statement obtained from the attending physician that an ongoing, or perhaps completed, medical treatment and the possible outcome of the method will not contradict each other; secondly, any change in the pupil should be of some appreciable significance within the context of the pupil's condition. Other preconditions might still need to be considered before attempting any lesson. For example, the pupil should know in advance, that he will surely not undergo a treatment, but rather experience a learning process, during which he might discover something about himself that will allow him to function a little better. Any damage to the CNS might manifest itself by changes of the level of control. A typical example is **regression**, which might mean a loss or impairment of ways of functioning that have been acquired more recently in life, while still preserving the older, more deeply ingrained ways of functioning. The person appears to have reverted to an earlier phase in their development. This also means that any suggestions

of possible changes will preferably **start from such a phase** and then move on gradually, thus increasing chances to have them accepted rather than by jumping directly to the desirable final state. Sometimes, depending on the severity and site of the damage, any of the following may occur: a **release** of extra-pyramidal reflexes, which are not inhibited now by the cortical level because of the impaired cortico-spinal pathway (the pyramidal tract), and generally, a number of possible deficiencies of the neuro-motor system: spasticity, myoclonus, paralysis, Babinsky's sign, athetosis, and the like. A number of **approaches** come into consideration. Since the impairment is often in the pattern of action rather than with a specific muscle involved, one can look for **another pattern that involves the same muscle** and, if this happens to be more accessible, through it one might obtain an improved control over the initial pattern. A similar outcome can be expected using the idea of **relative conjugate movements**, which is essentially the possible preference of a pattern devoid of limiting anticipations over one that has obvious limitations. Working **through the skeleton** might achieve some lowering of muscle tonus along that part of the skeleton. One should not overlook the **proximal part** of an otherwise clearly distally acting deficient pattern. If, in the context of some deficiency the pupil has a preferred way of moving, intentionally or not, one might try to **go with** the pattern, changing slightly one of the **parameters usually controlled by the cortical level:** direction, speed, amount of movement, rhythm, or timing. For example, in the last instance, one could say: "Move as you do, or react as you do, try only to delay it for a second or two. Ready?"

12. Muscles

Besides information about anatomy and physiology of muscles (from relevant books), it is advisable to clarify some notions about proprioceptors in the muscle, the central control of movement, the role of the stretch-reflex in posture and in movement, antagonists

linked neurologically with agonists, reciprocal inhibition of antagonists, and residual tonus.

13. The Neuron

Relevant books could provide information about the neural cell, its nucleus, axon and dendrites. Still, it is advisable to clarify additionally at least the items: 'the neuron as communication-link and as processing element', and 'the synapse and its role in theories of learning and of memory', since they are relevant to insights connected with the method. The important signaling functions of the brain - the processing of sensory information, the programming of motor and emotional responses, learning and memory - are carried out by **interconnected sets of neurons**. The neurons can be classified functionally into three major groups: **afferent** (sensory), **efferent** (motor) and **interneuronal.** The afferent or sensory neurons carry information from the sense organs into the CNS both for conscious perception and for motor coordination. Motor neurons carry commands to muscles and glands. Interneurons are the largest class and are not specifically sensory or motor. They process information locally or convey information from one site within the CNS to another. Any flow of information, within this context, assumes the form of **electrical impulses traveling along neurons.** An electrical impulse of that kind, or action potential, may be initiated within a neuron, near the origin of the axon, once a critical threshold is reached. The axon, being the neuron's main conducting unit, can transmit the action potential over great distances, up to one meter, within the body. A neuron at rest has its membrane **polarized electrically** in a steady state balance, the membrane separating positive ions outside from negative ions inside. The arriving action potential actually changes the **permeability** of the membrane: some channels open across the membrane and ions penetrate, initiating a transient **depolarization** that "travels" along the axon like a wave. Near its end, the axon divides into fine branches with

swellings, 'presynaptic terminals', which are the transmitting elements of the neuron. By means of its terminals, one neuron transmits information about its own activity to the receptive surfaces - the dendrites and cell bodies - of other neurons. At the point of contact, the **synapse,** small amounts of **neurotransmitters** flow from the presynaptic neuron into the postsynaptic one and initiate the further depolarization of its respective membrane, thus continuing the action potential. Neuronal impulses can be **excitatory** or **inhibitory.** The nature of electrical impulses is similar; they can cause inhibition or excitation only by releasing **different** neurotransmitters at the synapses. When **several impulses arrive** at a neuron, it will "fire" (send out an impulse) only if the **net excitation** reaches the **firing threshold.** In this matter, the neuron itself is an **information-processing element** and to fire or not is in fact a **decision-making process.** In the processes of **learning and habituation**, there are strong indications that one of the factors involved is **facilitation** at the relevant synapses; it is probably an enlargement of the surface of contact at the synapse, granting a "trodden out" pathway for neuronal impulses. Any theory for **memory**, especially those involving larger groups of neurons, might also utilize the same process of synaptical facilitation.

14. Entropy

Entropy is a physical concept, related to the laws of **thermodynamics.** One way of defining it emphasizes the **qualitative,** and not the quantitative, aspect: entropy is **the degree** to which relations between the components of any aggregate (or assembly of many small elements) are mixed up, unsorted, undifferentiated, unpredictable, and random. The converse is called **negentropy** (negative entropy): the degree of ordering or sorting or predictability in any aggregate. In **physics**, certain sorts of ordering are related to the quantity of available energy. **In any closed system, entropy increases**. By 'closed' we mean that no

energy exchange with other systems is taking place and no inner energy source is available to possibly increase a present ordering, or at least maintain it. This follows from the **laws of thermodynamics.** There are plenty of examples for this: the building of an edifice and its maintenance (keeping the material in a very definite state of order) calls for spending energy for this purpose, otherwise, a process of increasing entropy will result, meaning that the order is gradually ruined. A similar, more striking example is the building of sand-castles; archeological sites very often reveal the obvious increase of entropy; remembering and forgetting are related to a certain ordering in the brain, and any way we might have to improve memorizing and remembering actually counteracts entropy; deterioration of information-content in general, not only in the brain, does happen in many electronic devices (such as telephones, TV, computers) and all the energy spent for improving the transmission and storage of information is used to counteract entropy. Examples from thermodynamics proper: closed volumes of **gases or liquids** at different temperatures in different locations, **equalize their temperatures,** thus increasing entropy; cooling in refrigerators or air-conditioning units, for example, means using energy to achieve and maintain a separation between cool and warm air. Any **learning,** whether by acquiring knowledge or a skill, increases negentropy, since it fosters specificity and reduces randomness; the last point also includes a person's increased awareness of body-parts participating in patterns of action. Now, anything that the Feldenkrais Method has to offer could be considered as an effort directed against the increase of entropy.

15. The Two Hemispheres

The two cerebral hemispheres are functionally connected each with the opposite half of the body. (See also ch. III, § 39, "Respecting Dominance") Since functionally and structurally the body is not symmetrically organized, (think of right-handedness,

etc., but also of the location of the various inner organs, such as the heart, lungs, stomach, etc.) the same is true for the cerebral hemispheres. One is the **dominant** hemisphere (usually the left one), where the **analytical cognitive functions** are represented: Wernicke's area (where the neural representation of both auditory and visual information is registered as language and associated with **meaning**), Broca's area (where the sensory representation coming from Wernicke's area is transformed into a motor representation that can be used as **spoken or written** language), the primary auditory cortex, the left thalamus and the left caudate nucleus. The **non-dominant** hemisphere (usually the right one) is involved in appreciation of the **spatial aspects** of sensory inputs (from the body or the environment), of the **emotional aspect** of communication (art and music, and the **affective aspect of language**). Still, the non-dominant hemisphere often contains rudimentary (undeveloped) homologues of speech-centers. A thick bundle of neural fibers, the **corpus callosum**, connects both hemispheres and lets the entire brain **function as one large unit**. This fact can be shown in so many ways of functioning based on bilateral coordination, like handling an object with both hands, playing a musical instrument, etc. In the Feldenkrais Method, we also learn by comparing insights from left and right (juxtaposition), and that special way of actually working on one side and doing the other just in our imagination. In 1962, Roger W. Sperry made experiments with brains that had their **corpus callosum cut through.** This cutting was intended to stop the spreading of epileptic seizures over the whole brain. The results were very interesting and helped clarify facts about localization of functions in the brain. But, as Sperry himself emphasized, there is no direct way to infer from these experiments about people with **intact** brains; "There are so many **unifying factors** in the situation, and functional harmony is so strongly built into the **undivided** brainstem and spinal networks by express design, that one does not see much overt expression, or motor overflow into action, at least, of such conflicts between willpower-right and willpower-left." The understandings about **localization of**

functions in the brain have evolved over the years. The contemporary model maintains that, in addition to the **serial** (sequential, linear) way of transmitting and processing of information, there is also a **parallel** way, meaning that the line branches into two or more lines, using more sites that may represent the same function, or mere nuances of it. This means that sometimes, if one line has sustained some damage, the other can take over, an important underpinning for rehabilitation, and for **learning to overcome functional impairment**. As an aside to the theme of localization, one could mention a study done in England on four patients with hydrocephalus, who were observed from birth to adulthood. The serous fluid accumulated in the skull, although having been drained out, has pushed the cerebral tissues to the side, and there was no way of identifying the localization of functions according to the "usual map". Obviously, the map was reshuffled, but there has been no change in any of the brain functions; quite the contrary - all four were highly intelligent and gifted individuals.

16. Upright Stance in the Gravitational Field

In the evolution from apes to early man, **cervical and lumbar lordosis** emerged, as well as other changes, such as the pelvic angle (lumbo-sacral angle). All this gradually established man's upright stance. The human race can be considered an **evolutionary peak**, for many reasons, and specifically the erect posture, for increasing the **survival-value** by: a) easier **rotation of the head** for efficient scanning of the surrounding, b) efficient **use of the skeleton** frees the muscles from holding posture, but using them for action, and c) efficient **quick changeability of the front** by a diminished **moment of inertia.** The latter is a measure of the distribution of the mass of the rotating body at various distances from the (vertical) axis of rotation; the moment of inertia in the upright stance is the smallest - the mass of the body is nearest the axis of intended rotation - thus enabling the fastest change of the front.

The question of stability calls for additional consideration. From the purely mechanical, static, point of view, erect posture is unstable, of course. But seen from a dynamic point of view, the body has its highest potential energy (the center of gravity at its highest) and thus: d) movement is easily initiated in any direction, and equilibrium is easily recovered. e) starting action without preliminary adjustment, and f) the least work yields the greatest efficiency. The above descriptions might be **inadequate** for certain types of behavior. Some of these are congenital, some related to trauma or degeneration; more often than not, these deficiencies are related to what Dr. Moshe Feldenkrais called **the body pattern of anxiety** (see M. Feldenkrais: Body and Mature Behaviour), which is manifested by activation of the flexors and inhibition of the extensors. Anxiety here could mean fear of falling, reaction to a loud noise, but also any related state in which the individual reverts to passive self-protection when lacking the means, or doubting one's power of active resistance.

17. Physical Principles

Most of the issues are partly described in the book "The Feldenkrais Method" by Y. Rywerant, ch. 6, "Some Physical Principles Involved in Functional Integration". This might present a schematic outline of the information necessary for certain insights and for a more efficient application of the Method. Anyway, the issues should include: Newton's Second Law, forces and pressure, frictional and elastic forces, pressure at right angles, shearing stress, levers, work and energy, oscillatory movements, self-regulating frequency and damping.

18. Passivity and Activity

Is the pupil in a Functional Integration session really passive? This depends on how we define passivity. We might expect the pupil

not to show any consciously controlled initiative, as it were. On the other hand, as the teacher does an action that brings the ends of a muscle nearer to each other, like the biceps while flexing the elbow, the muscle **takes up the slack** and doesn't crease. If one puts a piece of cloth on a table and tries to slide two ends of it towards each other, then the cloth creases; this will not happen with a live muscle. (The idea of the "creasing tissue" is one of Moshe Feldenkrais himself.) The muscular length receptors (in the muscle-spindles) send an afferent signal to the spinal cord, where it is transmitted synaptically to a motor neuron; this sends an efferent signal to the muscle, eliciting the **reflexive adjustment** to the new length. This model is usually rendered more complex by involvement of the brain (higher levels of control) in the way of responding. Making the same movement in the **context of ATM**, the initiative lies with the pupil; but it might be difficult for the teacher to ascertain whether the pupil's effort to do the movement is not also used to **overcome the resistance** of a contracted antagonist muscle. The situation is of course different in the context of FI. One should add also that the **acceptance** of a pattern of movement is an **active process** going on in the brain. All these conclusions also serve to clarify the concepts of passivity and activity.

19. Dualism in Language and Philosophy

The **dualism in language** - separate concepts and words used to describe situations and events for **the body** and for **the mind** - is quite old and parallels the **dichotomy** of mind and matter, a prominent controversial theme that appeared as early as in old Greek philosophy. The contemporary emphasis is shifted towards the **mind-brain** issue, and numerous symposia with neurologists, psychologists, philosophers and cyberneticists have been held, in order to exchange information and discuss theories on the subject. The hope is to solve the problem of the **relationship of consciousness to brain**, to unravel what Schopenhauer called "the

world knot". In spite of the fact that huge progress has been made in both neural sciences and psychology, there is a strong feeling that the 'gap' between the mental and the physical still awaits to be 'bridged over'. Some **philosophical views** on the matter could be outlined as follows :

a) **monism** - all things that **appear** different are of **one kind** only. One variety, **spiritual monism**, contends that things that appear to us material are, in themselves, spiritual (Spinoza). The other variety, **materialism**, holds, for example, that sensations are identical with brain processes (the contingent **mind-brain identity** hypothesis, or **reductionism**, meaning that all mind processes can be described and explained by reducing them to some lower level of description and explanation, like inter-neuronal or inter-molecular connections).

b) **dualism** - there are two kind of substances, **mind**, the essence of which is introspectible thinking, and **matter**, the essence of which is quantifiable extension (Descartes). As for the mind-brain issue, there are again several varieties; the relation between mind and brain can be **interactionistic**, by which, for example, 'free will' acts on the relevant parts of the motor cortex through a 'liaison cortex' (John C. Eccles), **parallelistic**, holding that each kind of mental event (or mental state) is invariably accompanied by its own peculiar kind of physical correlate, but there is no causal interaction in either direction, or **epiphenomenalistic**, holding that mental events or states, like consciousness, are a side- appearance (epiphenomenon) of physical events, emerging out of the multitude of brain structures and brain connections. In the Feldenkrais Method, we cannot participate in this exchange of ideas, but are aware of the **strong link** between **sensation and perception**, as well as between **volition and action**; in other words, from the phenomenological point of view (as things present themselves to us), the unity of mind and brain is undoubtedly there. Even in language, we have a few unifying terms such as SELF, PERSON, that denote the conscious mind **and** the body.

20. Recommending a Bibliography

The list of books dealing directly with the Feldenkrais Method are a necessary part of a practitioner's library. The remainder of the list could be replaced by other material, according to the reader's judgment or taste.

Feldenkrais, M. *Awareness through Movement.* New York: Harper & Row (1977)
- *Body and Mature Behavior.* New York: International Universities Press (1979)
- *The Case of Nora.* New York: Harper & Row (1977)
- *ATM Lessons at Alexander Yanai. Paris:* IFF and Tel-Aviv: The Feldenkrais Institute (1995-6-7) (several volumes)

Rywerant,Y. *The Feldenkrais Method: Teaching by Handling.* New Canaan, Connecticut: Keats (1983)

Grant's Atlas of Anatomy. Baltimore: Williams & Wilkins (1991)

Carpenter, R.H.S. *Neurophysiology.* London: Edward Arnold (1990) This book has the advantage over many similar ones of having been conceived with the idea of hierarchical levels of control.

Bateson, Gregory. *Steps to an Ecology of Mind.* New York: Ballantine (1975) This book is an assembly of many works. The following chapters are recommended: A Theory of Play and Fantasy, The Logical Categories of Learning and Communication, and Cybernetic Explanation.

Bateson, Gregory. *Mind and Nature.* New York: Bantam Books (1980)

V. Considerations in ATM

While planning or conducting ATM-lessons in professional trainings, it may be useful to consider some ideas, partly already clarified, that, implemented in the structure of the teaching, make these ATM-lessons what they are, rewarding learning experiences. Some of these ideas can be shared with the students in due time as "meta-comments", thus transforming the lessons into a process that not only offers personal advantages, but also teaches how to conduct ATM-lessons. These meta-comments have their place during the intervals of rest of an ATM-lesson; used sparingly in the earlier stages of training, and more frequently later, they also provide a kind of overview of the method.

1. "Principles"

a. The building blocks of images of action are predominantly of a sensory nature. This is true with changes or alternatives of those images. Even the intellectual or rational insight of a possible change can hardly replace the sensory insight needed to effectuate the change; there is, of course, nothing whatsoever to preclude the rational insight from following. In order to substantiate the idea that **sensory insights** are of prime importance, one can, for example, draw the attention of the participants to the sensory input that accompanies a certain activity; it is like completing the image of action by inclusion of some additional details. On the other hand, verbal guidance and coaching don't have to go into most precise details concerning the amount of movement, effort, speed, or direction; the student should be allowed any adjustment or restriction as might be required - by his or her senses - for comfort.

b. The fact that ATM is taught in a **group-situation**, does not necessarily make it similar to a regular classroom. The group is a social unit, but each participant pursues his or her activity; there is no model to be followed, and when a choice between alternatives

is to be made, this is done individually anyway. When the teacher asks a question (about some sensory input, for example), there is no sense in trying to report the answer verbally to the teacher or to the group, but rather to realize for oneself how it feels. Finally, there is no showing-off, such as saying: "Look how good (or how bad) I am!" Still, usually at the conclusion of a lesson, there might be activities where two or more participants are engaged in a coordinated movement. One could also ask everyone to continue their activity and, at the same time, observe the others, not in order to see what's wrong and what's right, but to be aware of the action's variability as such.

c. It is advisable to suspend a goal-directed attitude and direct the **attention to the process** instead (See also ch. III, § 12). This can be done simply by saying: 'Go slowly!', 'Go only as far as it is comfortable', 'Don't use effort!'. Another important way is by suggestions such as these: 'While you do this, observe which other part of yourself is also moving (or not moving)?', 'Which part of yourself is now pressed more (or less) to the floor?', etc. When it happens that a few participants execute your instruction with some bias or variation, instead of correcting "faulty" execution one could take this as another alternative or option and have the whole group try it, to distinguish the alternatives more clearly.

d. Propose a **distally conceived** pattern, clarify its relation to the environment, then direct the attention towards the proximal part (is it participating or not?); try out both alternatives (one might be the preferred one), see the outcome (for the distal part of the pattern), with the **proximal involvement** now clarified. Think also of the other direction: propose a proximally conceived pattern, clarify it, then shift the attention towards a relevant distal part, comparing with its habitual way.

e. **Various constraints** may be manifested with pupils during an ATM lesson. Any **structural** limitations, whether congenital or acquired, should be respected; the attentive teacher can always

follow pupils and keep them from overdoing. **Functional** limitations, whether related to stiffness or lack of clarity about what the pattern entails, sometimes conditioned by insecurity or even by what might be expected from the individual socially or culturally, should be approached with care. One may clarify the situation by trying the same pattern, supported differently perhaps, in a different posture, which could come up in later stages of the lesson.

2. Strategy

a. Choose a **central element**, clarify it, and then integrate the element's use with various patterns and ways of functioning; a central element could be any of the following: movability of the hip-joint, the scapula, ankle, upper dorsal vertebrae, head, the chest-pelvis connection, and so on.

b. Try to involve the **cortex** and avoid the defense systems: do the non-habitual (unusual), but in an acceptable way; respect limitations, abstain from testing, advise to go slowly and to reduce efforts; apply the idea of reversibility and moving without holding the breath; do one side completely in order to perceive differences, and only then, perhaps, equalize; sometimes do one side and only imagine the work on the other. Always prefer the playful way; is a complex pattern already clarified in its various phases, you can also propose to do it fast, and, if appropriate, have three or four participants do it in coordination.

c. Take **orientation in space** as part of patterns of action: by perceiving the cardinal directions, left-right, front-back, up-down (gravity), and the changing of the front, which means a rotation of the pelvis relative to a vertical axis; by appreciating distances (static or dynamic) from walls, other participants or any objects. Draw attention to the fact that shifting the self entails shifting the pelvis.

d. Attention to **sensory feedback** is an integral part of becoming aware of alternative options, and transforming the non-habitual and new into something acceptable and easy; sensory feedback enables the learning of expectations and corollary discharges, related to the said actions; they become ingredients of the patterns, while these become habituated. It is worth paying attention to the following: **visual** feedback, by looking at the target of the action, following a moving object (even imaginary), or pointing with the index finger at the target; **tactile** feedback, by asking: What touches me, where am I supported (weight distribution), are the supporting surfaces changing, is the pressure on the floor increasing, decreasing, or is it the same; the **kinesthetic** feedback: ask what is participating in the pattern (efficient or parasitic participation), to appreciate effort or ease, to become aware of the participation of the proximal parts, to sense balance, to use body-parts for balance, to use the moment of inertia for easy movement.

e. Propose, as far as possible, actions taken from **real-life situations** and related to the **environment**, rather than "abstract" movements; instead of saying: 'Contract your biceps brachiae' you can say: 'Bend your elbow', or 'bring you hand nearer to yourself'. This is in keeping with insights obtained long ago: "To speak figuratively, the central nervous system knows nothing of muscles, it only knows movements"(John Hughlings Jackson, 1889); in other words, **items of cerebral function** are represented in the CNS, not to be simply equated with 'contraction of muscles'. Thus one can conceive that **identical** contractions of a certain muscle could form part of the eventual exteriorization of **different** items of cerebral function. Cerebral lesions may cause loss of some categories of movement or actions, with preservation of others, even involving the same muscle in both instances.

f. A lesson will always profit from being **structured** didactically. This should make it interesting and logically sound. Thinking of a **form** or a structured outline, one may start by choosing a central

element (see § a. above), explicitly, or merely keeping it in mind for the time being, and, after trying it out in some habitual context, start combining it with various additional alternating items, changing some of its parameters, sensing it in different contexts, environmental or others. When summing up the lesson, one proposes to try out the pattern again in what had originally been a 'habitual' context and sense the difference; if it's about a complex pattern, one can also propose also to do it 'in one go', or to have it done while engaging several pupils in playful participation.

3. Tactics

It is appropriate now and then to draw the participants' **attention to the changes** in the way they are organized, but only when such a change is already to be expected in the teacher's mind. It is best to ask: 'Now try to see if the area of support is smaller, bigger, or the same, as before?', or 'Do you do this now easier, less easy, or the same as before?'. For someone who is experienced in perceiving kinesthetic changes, even the question 'What do you feel now?' will do; but usually, presenting the **possible alternatives** makes it easier for a participant to direct his or her attention to obscure sensory input and now impart some significance to it. A leading question such as: 'Don't you feel that this is now so and so?' will hardly have a desired effect.

b. Scanning the body could take up entire lessons. Still, **scanning** at the beginning of a lesson and again toward the end, might be appropriate **after** certain clarifications have taken place, in order to enhance again the awareness of the change, or of certain aspects of it.

c. The teacher could interfere with a general remark (not a personal one) if some follow the suggestions **too fast** ('Go slowly!'), with **too much effort** ('Do less, do only where it's comfortable'), or when the intention to achieve a goal results from an indication of movement direction: 'Bend forward so your

fingertips come nearer to the floor; this doesn't mean that you have to reach the floor!').

d. At times one could **change the course of a lesson**: when a significant part of the group turns out to be restricted in movement (if it's about one or two participants, one can say to them: 'Do this part of the lesson only in your imagination'); when one participant follows the advice by adding an element not expected by the teacher, or when part of the group does it one way, and the other differently (differentiated movement and non-differentiated one, for example), one may ask the whole group to do it one way and then the other. Thus, **feedback from the group** turns into a learning experience.

e. About **repeating** movements, one is referred to ch. III, § 44 ("Repetition, its Rationale").

f. One might tell a story during a lesson, provided it is short and - whether funny or serious - **touches upon** an idea or thought connected with the lesson.

g. Comments **about the lesson, "meta-comments"** dealing with the expected outcome of a lesson, with "principles" that have been applied, and with difficulties one might encounter while trying to have certain patterns accepted, should be intercalated now and then in lessons for the general public, and more and more in professional training.

h. The lesson gains didactic advantage when it is structured with the idea of **gradation in complexity**. Having a simple pattern accepted, it can now be combined with some other pattern, or an additional element can be integrated in it, and so on.

4. Series of Lessons

What has been said in the last paragraph about **gradation in**

complexity applies, of course, to **planning series of lessons**. Unforeseen complexity might often be misinterpreted by participants as difficulty, while ATM lessons are generally known to be interesting, challenging, perhaps unusual, but always comfortable. One can always structure a series of lessons around a theme, like crawling, movability of the upper dorsal spine, or movability of the hip-joints (not necessarily in sequence). Other themes could address various ways of functioning, such as the use of flexors, the use of extensors, twisting, rolling, combined patterns, as well as the use of various starting positions.

VI. Considerations in FI

1. The Style of FI

FI style is established by purposes and principles inherent in the Method. Specifically, the **exploring** attitude, first of structural and functional characteristics, then to ways of responding. The particular way is **asking questions, proposing** and not imposing. While exploring, one looks out for some possible **functional lack of clarity**, an unnecessary restriction which might not always be conscious, as it were, or an option in the way of functioning, not yet part of the pupil's dynamic image. One attempts to **clarify** the situation, and then **integrate** the change.

2. The FI Session

The teacher uses his or her ability to discern a **habitual** pattern that has been proposed to the pupil from a **non-habitual** pattern. He or she will be aware of the response to a stimulus, and recognize **signs of acceptance** or rejection by the pupil's system. Signs of acceptance could be, for example, a movement that becomes easier, or a small obstacle or hurdle, which is felt at a certain place along the motion's trajectory, gets smaller or simply

vanishes; sometimes, when muscle tonus diminishes, locally or generally, a deep breath follows, showing genuine acceptance. The moment the **level of control** of the pupil's system changes (higher up in the hierarchy) can sometimes be perceived very clearly, also indicating at which phase in the learning process one is situated. A different phase in the process, perhaps a preceding one, is the **recognition of the proposed pattern** (see also ch.III, § 37); this can also be induced **gradually**, by emphasizing the **distal** parts involved in the pattern, or by stressing the fact that the pattern of action is connected with the immediate **environment**, or conditioned by it; a complex pattern then emerges by **combining** parts of the pattern that have already been clarified. Short sequences get longer by **integration** (see also ch.III, § 45 and 46). To summarize, an FI session that is didactically structured, acquires a **form**: exploration, clarification, integration, and, eventually, summing up (see also Y. Rywerant, "The Feldenkrais Method", ch.8). It is advantageous for the teacher to be aware of the particular **efficiency** of certain approaches, such as effort substitution, neutral point, the "judo" principle, relative conjugate movements, and so on. **Sensory insight** about a change, or about the freedom of choice that the pupil might have, has its priority, so that talking about it before it happened does not help very much. If the change happens to be very small, but perhaps be the start of a further important development, then it is worthwhile to draw the pupil's attention to it. When trying to appreciate the **amount of change**, one should take into account the state of the person involved and its **prevailing limitations**. Sometimes a **very small** change is essentially an event, compared to no change at all.

3. The Limits of FI

The Feldenkrais Method is not only multidisciplinary in the sense of the required background knowledge, but also "multi-effective" in the sense of occasionally transgressing into **other disciplines**: psychology, social behavior, and even **medicine**. The latter should be approached with the utmost awareness and caution. Perhaps it

is not enough **to call** these sessions **lessons and not treatments**. In any treatment, change is related to what the practitioner does; in a Feldenkrais session, the change, if any, is related to the insight the pupil gains about him- or herself and about the alternative options of acting; such a session, if only held in proper style, is definitely a learning experience, a lesson. Still, the domains of the Feldenkrais Method and of medicine overlap slightly: **rehabilitation** and **pain control**. In order to keep the issue of responsibility clear, and out of fairness to the client, one should not attempt any lesson unless an attending physician has declared the person free of any medical treatment, and has consented to the lessons. In pain control, the presupposition is that after having excluded any structural or systemic causes, the issue is perhaps **functional**, such as lack of awareness of easier options, or overtonicity. There are also very clear **ethical and transactional limits** to respect. No promises for the outcome should be offered, but one can ask for cooperation in the process of clarifying the situation. The decision to continue lessons is best taken by the pupil, presented with the alternatives: fix next date now, communicate at a later date, or stop. Minors must be attended by one of their parents. Little children offer the very interesting challenge of underscoring the playful aspect of whatever is done with them.

PART B: HINTS FOR BUILDING A CURRICULUM

VII. General Outline

A curriculum for a professional training can vary, depending on the teaching staff and their choices and perhaps on the number of participants as well. Anyway, the items that follow are a necessary list of themes, as part of a curriculum. Some could be dealt with sequentially, others alternating in a parallel way. The two last themes are best placed towards the end of the training. A few of these themes have been discussed previously.

a. lecture of introduction: purposes of the Feldenkrais Method,, working with the self-image, acceptance, integration
b. ATM for the students
c. FI for the students
d. work in pairs with efficient supervision
e. working principles and their importance
f. lectures on theoretical background
g. ATM professionally (for the public)
h. FI professionally, with demonstrations on persons not participating in the training
i. bibliography recommendations
j. talks for clarifying issues and for answering questions
k. ATM by the students
l. practicum of FI by the students on persons not participating in the training

VIII. A Few Additional Specific Remarks

1. Didactics of ATM Lessons

Chapter V applies to ATM's done in the training; the ATM's for the students (b) further serve to clarify theoretical issues; they provide examples for the sensory input of patterns or responses that will be reviewed verbally during the lesson, or immediately

afterwards. This is not necessarily the case with ATM's for the general public (g). In ATM's by the students (k), one participant leads part of the group while the others sit around; this is followed by a "round-table" discussion, not for the sake of criticism, but to consider different possible options, or the logic of the presentation, the outcome, voice production, posture, and even the "dramatic" qualities of the presentation.

2. Didactics of FI Demonstration

Demonstrating an FI lesson in class, one actually presents an inherently complex process. Therefore factors should be considered that allow a **gradation in complexity.** One might start with approaches that present less variety and point out only a few of the themes to be addressed. Subsequently, after the group has worked in pairs and reached **first approximation**, one can proceed further to the next stage of the same lesson by pointing out more themes and going into more details. Another point that permits gradation in complexity is the following: the more a schematic approach gets a variety of responses and applies to a variety of instances, the more the approach can be considered advanced; instances similar in structure and terms of response are rather **repeatable** and **less advanced**, and thus fit for the start. A few further remarks on the theme: one emphasizes the way of functioning rather than the touched body-parts; one can intersperse the demonstration with theoretical background and practical applicability; one discriminates the habitual from the non-habitual by starting with conforming manipulons; one points out signs of acceptance and of non-acceptance as well and takes them as hints for the next step; one points out the shift in the level of control; when one does more than one demonstration for the same issue, one varies, alternating easy and difficult, light and heavy, etc. and various approaches for varied situations; one can point out that the various approaches can also be seen as different examples of the same underlying principles.

3. Didactics of Tutoring FI

While students work in pairs, the teacher should be around in order to provide an **atmosphere** of being supervised and not of being left to their own resources; they have to be allowed the time needed for exploration, and for recognizing patterns and responses; still, there are circumstances, where the teacher should **intervene**: When he or she observes too much doing and too little sensing; sees that no attention is paid to response; seeing an idea that seems right, or almost so, it can be **acknowledged**; sometimes he or she could **advise a shortcut**, or something that increases efficiency; upon seeing someone stuck, not knowing how to proceed further, he or she might ask: **'How about integrating?';** when a pattern seems unclear for several, they go **back to demonstration**, with a different student. It is good to make the **tutoring student-specific**, for each according to the level they have already reached, and frontally sum up issues that came up with several students. The choice of subsequent themes should be made according to the average level reached by the group. It is good to point out that this learning process transforms one **from imitator of movements to applier of principles**.

4. Didactics of the Practicum

The practicum is best held in the last section of the training, and all participants take part in it; two or three students could do it simultaneously, in presence of the others. A preliminary trainer-client dialogue takes place, which in itself should be considered a learning item. Supervision is restricted to a minimum and can consist of remarks like: 'You could also try this!' without actually interfering. Immediately after that, and not in the client's presence, one can sum up a few questions of principle with the whole group, starting with the student who just worked.