

The two cultures

In recent years we have witnessed the differentiation of the two tendencies, long before highlighted, one defined physiotherapy and the other neurocognitive rehabilitation. The first postulates the use of physical means in the search for physical modifications, the second believes that rehabilitation can be regarded as a learning process and that the use of strategies of mental character may be more favorable to a more satisfactory recovery.

For more information, here is an extract from an interesting article by Prof. Carlo Perfetti, and below the article itself, almost in its entirety.

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It is possible still today to come across two completely different settings, to be considered as consequence of the differentiation of the two tendencies, which until now had been able, for better or worse, to coexist in it. You can definitely talk about two cultures, as the differences concern not only some rehabilitation strategies, but the perspective on man, his brain, history and products.

A first culture is identifiable in the “physiotherapical” point of view. It is based on the use of physical means to evoke or modify that motor activity, in some cases defined as neuromotor, whose search is considered essential to the recovery of the altered functions. It proposes that physical means are to be used to achieve physical purposes: it tries to make the best use of physical force consisting of weights, stretching, stimulation, as occurs in neuromotor techniques, to achieve effects such as increased muscle strength, or the appearance of muscle contractions, often also on the level of single muscles.

According to enthusiasts of this discipline (physiotherapy), it would be totally useless, if not counterproductive, to refer to physical processes that cannot be quantified, such as cognitive processes.

The second culture suggests, instead, the recovery as a learning process and that, at its core, the processes defined as mental play a role at least as important as the physical ones. For supporters of this vision it continues to be worth using the name of “rehabilitation”.

Its enthusiasts often consider it appropriate to propose a denotative term to highlight the main features of the processes that they consider most significant to reach recovery, which are not merely represented by motor activity. Thus you have a “cognitive” rehabilitation if you want to emphasize the recourse, therapeutically, to processes that underlie knowledge, or “neurocognitive” if you want to emphasize instead the close relationship they propose between the biological and physical processes (neuro-) and the mental (cognitive).

The distance between the two settings (physiotherapy and cognitive rehabilitation) is currently so strong, that you are faced with two completely different views as to the tools, and purposes and proposals for research.

As a result of this state of things at the moment two types of operators, that have very little in common in the way they deal with the problems related to the recovery and search for it in practice, are living together under the same roof theoretically, normatively and even physically (in the same workplace).

In fact, one (the physiotherapist) tries to change the behavior of the patient by subjecting it to mechanical stimuli and planning, when needed, their processing at the lowest levels of integration of the central nervous system.

The other instead considers the visible aspects of the behaviour only as the result of a series of processes that take place at all levels of integration of the central nervous system. It is against these that the action of exercises must be planned and it is clear that you can get there in the best way through cognitive tools rather than by physical means.

Neurocognitive Rehabilitation

Four-monthly of science of recovery

The two cultures

1.1

To evolve towards higher levels of complexity and methodological rigor, all disciplines, whatever their constitutive knowledge, have had, at some point in their history, to free themselves of a series of theoretical and practical elements, that for a certain period, at the beginning of their existence, they had accepted and often also recognized as the fundamental constituents.

The reasons for this development can not always be identified as elements of the same discipline, but often originates from progress and changes that have been carried out within the related scientific disciplines and which demonstrate the lack of validity of what was consid-

ered as valiant in the related discipline.

This often traumatic operation does not always lead to the abandonment of the old ways of doing things by all lovers of the discipline or to the final demise of procedures that have been overtaken by science history. They often remain for long periods on the evolved discipline's side, settling at lower levels of false consciousness or popular belief.

At the moment a similar process seems to be operating in rehabilitation.

The progress of those basic sciences, unquestionably considered as sound reference for all legal proceedings that deal with recovery, is actually showing the irrelevance of the old-fashioned theoretical and practical ways of doing and thinking, to point of making them obsolete.

Accordingly, it has been underway for some time now an action, not painlessly, of criticism of the old ways of working, which, although considered outdated in terms of scientific relevance, are being abandoned only with difficulty and very slowly due to their deep roots in the history of the discipline.

1.3

It is proposed to make use of physical means to achieve physical purpose: that is, they try to use the best physical forces consisting of weights, stretching, stimulation, as occurs in neuromotor techniques to achieve effects such as increased muscle strength, or the appearance of muscle contractions, often on a level of single muscles.

According to the supporters of this discipline (physiotherapy), it would be totally useless, if not counterproductive, to refer to non physically quantifiable processes, such as cognitive processes.

The second culture describes, instead, the recovery as a learning process and suggests that, at its core, the processes defined as mental play a role at least as important as the physical ones.

Thus, rehabilitation can be “cognitive” if you want to emphasize the therapeutic recourse, depending on the processes that underlie knowledge, or “neurocognitive” if you want instead to emphasize the close relationship suggested between the biological and physical processes (neuro) and the mental ones (cognitive).

The distance between the two settings (physiotherapy and cognitive rehabilitation) is currently so wide, that you are faced with two completely different perspective on the means, purposes and propositions of study.

In fact, one (the physiotherapist) tries to change the patient's behaviour by subjecting it to mechanical stimulation and planning, when needed, their processing at the lowest levels of integration of the central nervous system.

The other, instead, considers the visible aspects of the behavior only as the result of a series of processes that take place at all levels of integration of the central nervous system. It is against these that the action of exercises must be planned and it is clear that you can get there better through cognitive means rather than through physical ones.

2.1

B. Neuroimaging based researches

In recent years, technological progress has allowed to analyze, although without completely satisfactory accuracy, the activation of specific neurological structures during the execution of tasks varying in terms of physical and mental contents.

The analyses conducted this way, during the course of activities considered and referred to as “mental”, finally granted scientific dignity even to concepts that until a few years ago had been set aside from the scientific field as not detectable.

Just think of the motor image example, once almost considered as mere delight of philosophers and psychologists, which has recently demonstrated its practicality and the possibility to hold considerable significance even within the therapeutic exercise.

We should actually wonder if it is not a matter of operators belonging to two different disciplines.

In conjunction with kinesiologically identical movements, for example, cortical and subcortical areas activate, significantly varying depending on whether the movements are automatically performed or being learned (Jenkins, 1994).

Those who see recovery as a learning process related to planned activation of cognitive processes have considered these elaborations as extremely interesting in that they came to confirm the basic principle that a satisfactory recovery is relevant not so much for its final result (joint movement) but for the intermediate steps leading to it.

C. Connections between neuroscience and philosophy

The results of these two types of analysis have led to the need for a closer connection between the studies in neuroscience, which is currently focusing on parameters of behavior, towards which until a few years ago there was absolutely no attention, such as consciousness, intentionality, the self, descriptions in first person, mind-body relationship.

The connection between these two areas of research is now considered inevitable by all researchers who deal with human activities, among which the researcher on patient recovery should be included. It is not hard to observe that also this has received a different reception by supporters of the two settings.

In particular, it has found no resonance among the physiotherapy enthusiasts, who, apart from the already analyzed difficulties in keeping track of progresses in physiological sciences, have never felt the need, specifically because of the setting of their proposals, to refer to disciplines that provided a strict quantification of neither of the results obtained nor the means to obtain them.

D. Studies relating to plasticity of the central nervous system.

The most interesting thing for the rehabilitator is the fact that these plastic changes, in order to be activated, require not so much stimulation, as the activation of cognitive processes (Recanzone, 2000). The simple peripheral stimulation or the activation of rough muscle contractions that only have negligible effects.

The same question should be central to the rehabilitator who works in the treatment of orthopedic injuries, since it is getting increasingly clear that plastic modifications in the central nervous system appear also in case of peripheral lesions.

It is now proven that the central nervous system, at least in some specific areas, increasingly numerous, presents undifferentiated cells which are in certain situations intended to move toward the cerebral cortex, maturing and assuming a functional role.

Although it is untimely to draw conclusions or even simple hypotheses on the meaning and ability to influence the destination of these cells, their evidence is however to be evaluated as extremely interesting for anyone who has to deal with recovery after injury to the central nervous system, regardless of even their actual migration to the proximity of the ischemic locus.

We should hypothesize, however, at least in analogy with other situations related to the plasticity of the central nervous system (Recanzone, 2000), that experience made through exercise should not be extraneous to the ability of undifferentiated cells to take on an effective role within structures responsible of specific functions.

The task of recovery researches would therefore be to identify the best way to ensure that these cells enter brain's most appropriate context, in the most useful way.

3.2

What are the basics of real or supposed effectiveness of merely "peripheral" exercises, which means conducted taking into account just physical elements and without connotations linked to the conscious experience of the subject, with regards to modifications that must be sought on the level of central nervous system, of which the possibility has been highlighted.

3.3 The need to address the problem of the relationship between what is physical and what is mental

The concept of rehabilitation must be based on the possibility to affect the physical biological balance of the system of man through the evocation of mental activities. Practically, this possibility is actually admitted, although with different emphasis, by everybody (physiotherapists and rehabilitators).

None of the researchers of the two disciplines in fact denies the importance of mental elements that the ones, rather roughly, identify as "will" and "motivation", while the others try to define through more complex connotations.

It is necessary anyway that within recovery sciences adequate discussion is committed to the problem of how body and mind "interact", if interaction it is, between them.

The recovery researcher interest should be addressed, instead, to the interpretation of how the activation of "mental" processes can result in the induction of planned physical modifications on both a level of the central nervous system and of organization of behavior and muscle contractions.

3.4 The problem of the interaction of the body with outside world and the objects that form it

The recovery of any function can not avoid reference to the interaction of the human body with the world, since the activity of the living system is expressed with regards to it and the objects it contains.

4.1

On this cultural premises the distinction between the two disciplines, physiotherapy and rehabilitation, is outlining in an increasingly clear way, so that now it no longer appears possible to locate them within the same branch of knowledge. Although both address patients with pathologies of the motor system, the basic knowledge and basic sciences to which they refer differ, as well as means used and results that are proposed.

Prof. Carlo Perfetti