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Full Length Article

## Towards an ecologically grounded functional practice in rehabilitation

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## ABSTRACT

According to the International Classification of Functioning, Disability and Health, effective rehabilitation requires interventions that go beyond minimizing pathological conditions and associated symptoms. The scope of practice must include promoting an individual's activity within relevant contexts. We argue that best practice requires decisions that are not only evidence-based but also theory-based. Perception and action theories are essential for interpreting evidence and clinical phenomena as well as for developing new interventions. It is our contention that rehabilitation goals can best be achieved if inspired by the ecological approach to perception and action, an approach that focuses on the dynamics of interacting constraints of performer, task and environment. This contrasts with organism-limited motor control theories that have important influence in clinical practice. Parallels between such theories and the medical model of care highlight their fundamental inconsistency with the current understanding of functioning. We contend that incorporating ecological principles into rehabilitation research and practice can help advance our understanding of the complexity of action and provide better grounding for the development of effective functional practice. Implications and initial suggestions for an ecologically grounded functional practice are outlined.

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## 1. Introduction

In 1996 Human Movement Science published a special issue on the relevance of dynamical and ecological approaches to rehabilitation. The special issue aimed to bring dynamically and ecologically inspired research together and bridge the gap

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between these theoretical approaches and rehabilitation practice (Wagenaar & van Emmerik, 1996). By then, few attempts had been made to link dynamical and ecological perspectives to rehabilitation. Accounts were young and caution seemed needed. The state of the art then did not allow conclusions as to the fruitfulness of the approaches to clinical practice (van Wieringen, 1994).

Today, after 20 years, theoretical and applied clinical research based on dynamical and ecological approaches has flourished. The field of rehabilitation has also matured in its understanding of human functioning and disability, as is reflected by the development and wide recognition of the International Classification of Functioning, Disability and Health (World Health Organization, 2001, 2007). According to the ICF, effective rehabilitation requires going beyond minimization of pathological conditions and associated symptoms. It requires promotion of an individual's activity within relevant contexts.

As researchers and instructors in rehabilitation clinical courses, we contend, however, that the changes in clinical practice in the face of these developments have been modest and insufficient. ICF pushes an understanding of functioning that lies at the interface of an individual with his or her environmental context. It is our view that a great barrier to the reform of clinical practice demanded by the ICF is the continued credence in organism-limited theories of perception and action and motor control. ICF-inspired clinical change would have to draw on theories that recognize the fundamental constitutive role of individual x environment interactions in the explanation of perceptual-motor processes supporting task performance. The Ecological Approach to Perception and action is one such theory. In this paper, we aim to bring to light the deep conceptual connections between ecological theory and the ICF. We contend that knowledge of how principles of perception and action relate to human functioning can effectively translate to basic and applied research that will set the stage for evolution in clinical practice.

In this effort, we are indebted to the pioneering work of Burton & Davis (Burton & Davis, 1992, 1996; Davis & Burton, 1991). Originally directed to adapted physical education, their model of practice called "Ecological Task Analysis" provided the inspiration for many of the applications of ecological and dynamical theories to rehabilitation.

## 2. The need for functional therapeutics

Joseph, age 13, has hemiplegic cerebral palsy; his rehabilitation program focused on training repetitive discrete movements of his affected hand and on maintaining fingers' range of motion, but has not resulted in better performance in his favorite video game.

The realization that rehabilitation interventions all too frequently fail at helping clients achieve their functional goals promoted a shift in the understanding of functioning and disability summarized in the ICF (World Health Organization, 2001, 2007). As exemplified by the rehabilitation case of Joseph, improvements at one level of functioning (e.g., discrete movements and range of motion) might not transfer immediately to other levels (e.g., the concrete activity of playing videogames). The ICF encourages researchers and clinicians to develop interventions that are more effective in promoting improvements across levels of human functioning. We will call a therapeutic model that focuses on such promotion "functional therapeutics". Its main aim is to improve engagement in functional tasks, and such aim cannot be achieved by considering the individual or the organism in isolation from its context. A growing body of evidence indicates that traditional treatment approaches grounded in neurophysiologic (individual/organism-limited) theories are not effective in improving function and urge clinicians to move towards activity-based therapy (Damiano, 2007; Dobren, 1994; Durand & Vachon, 2003; Kollen et al., 2009; Kwakkel, Kollen, & Wagenaar, 1999; Macedo & Maher, 2009; Mayston, 2008; Van der Lee et al., 1999; Van Peppen et al., 2004).

The move towards functional therapeutics can be fostered by perception-action theory. The *ecological approach to perception and action* pioneered by James J. Gibson (Gibson, 1960, 1979; Michaels & Carello, 1981; Shaw, Turvey, & Mace, 1982; Turvey & Shaw, 1995, 1999; Turvey, Shaw, Reed, & Mace, 1981) is inherently consistent with the current conceptions of functioning and disablement processes underwritten by ICF. One fundamental principle of the ecological approach is that of the *organism-environment mutuality*. According to this principle, organisms (e.g., individual patients) and environments are not separate or logically distinct entities—the organism-environment system (not just the organism) is the proper, irreducible unit of analysis for understanding functional (or dysfunctional) behavior (Gibson, 1979; Holt, Wagenaar, & Saltzman, 2010; Michaels & Carello, 1981; Turvey & Shaw, 1995, 1999) (see Fig. 1).

Our contention is that a conception of organism-environment mutuality is, in fact, entailed by the ICF. In the following section, a brief historical overview of the development of the current ICF model is provided and its congruence with ecological principles is highlighted.

## 3. An evolving understanding of human functioning—from "mechanism to "system

Over the years, models of human disablement and functioning have evolved from a mechanistic to a systemic view. Accounts of both physiological and psychological function from the 18th through the mid-20th centuries were largely indifferent to the role of the environment and thus assumed that explanations of typical or altered behavior could be legitimately attributed to the workings of body structures or to their malfunctioning due to pathology. The absence of pathology (or injury) affecting organs, tissues, cells or molecular processes within the body could thus be equated with normal functioning at the level of behavior. Analogously, abnormal functioning (or disablement) at the level of behavior was attributed solely to

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