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## THE APPLICATION OF THE ICF CY MODEL IN SPECIFIC LEARNING DIFFICULTIES: A CASE STUDY

*Background:* The International Classification of Functioning, Disability and Health for children and adolescents (ICF CY) has been proposed as a possible framework for evaluating assessment and rehabilitation practice in children with Specific Learning Difficulties (SpLDs).

*Aim:* The aim of this case report is to describe an evaluative and diagnostic process based on the ICF CY framework for a SpLD patient to show its applicability to this kind of developmental problem.

*Method:* A 10-year-old boy with difficulties in reading and writing was assessed both traditionally administering a set of cognitive and language test batteries and, innovatively, with the ICF CY checklist aimed to estimate the functioning profile of the child.

*Results:* The reasons for implementing the recent ICF CY as a framework to assess SpLD in children and to set the goals of interventions were supported. Whereas traditional assessment gives a validated parameter to evaluate the cognitive level and specific difficulties in reading and writing, ICF CY enhances the traditional diagnosis embracing both impairment and social factors to consider when selecting appropriate goals to bring about change in the lives and in the school experiences of children with SpLD, and it gives important cues to teachers, rehabilitators and therapists.

*Conclusion:* ICF CY gives caregivers the opportunities to work together not only to provide direct intervention with the child, but also to work in partnership with the child's family, friends, school and society.

*Key words:* ICF CY, specific learning disabilities, assessment, intervention

### Introduction

In this paper, the development of the International Classification of Functioning, Disability and Health for children and adolescents (ICF CY) [World Health Organization (WHO) 2007] is described outlining its relationships to the changing paradigms of disability, explicating its components and proposing its application

as a conceptual framework for clinical and educational assessment intervention in the field of Specific Learning Difficulties (SpLDs) in children.

ICF CY is a derived version of the International Classification of Functioning, Disability and Health for the adult population (WHO, 2001), designed to record characteristics of the developing child and the influence of the surrounding environments (WHO, 2007).

ICF CY belongs to the “family” of international classifications developed by the World Health Organization (WHO) for application to various aspects of health in children and adolescents (Lollar et al., 2000). It provides a common and standard language and a framework for the description of health and health-related states to facilitate the documentation and measurement of health and disability in child and youth populations (WHO, 2007).

It addresses functioning from a “whole-of-person” perspective and is based on a taxonomy in which the person can be described in terms of body system, functional activity, social role and participation, and environmental factors.

The “ICF Family”, which includes the ICF (specific for the adult population) and the ICF CY, is thus a biopsychosocial model of functioning in its continuum, encompassing both health and health conditions.

## Structure of the ICF

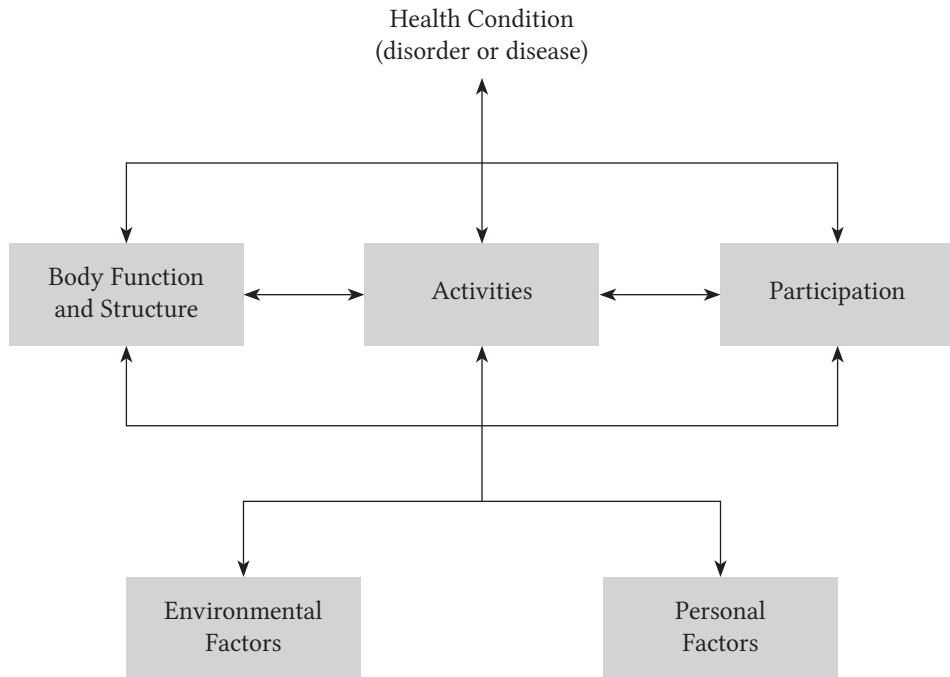
### Parts and Components

The structure of the ICF CY is described in the manuals as being hierarchical and nested in a stem–branch–leaf arrangement. The ICF CY, as well as the ICF, is divided into two parts: (1) Functioning and Disability and (2) Contextual Factors. These parts are further subdivided into components. Functioning and Disability contains two components: Body Systems (Function and Structure) and Activities/Participation. Contextual Factors also contains two components (Environmental and Personal). These components are defined as follows (WHO, 2001; WHO, 2007):

- Body functions: Physiological functions of body systems (including psychological functions);
- Body structure: Anatomical parts of the body, such as organs, limbs and their components;
- Activity: The execution of a task or action by an individual;
- Participation: Involvement in a life situation;
- Environmental factors: Physical, social and attitudinal environments in which people live and conduct their lives;
- Personal factors: The particular background of an individual’s life and living, they comprise features of the individual that are not part of a health condition or health state.

The structure of ICF CY is presented in Figure 1.

Figure 1. Overview of the International Classification of Functioning, Disability and Health (ICF, ICF CY)



It is intended to illustrate the interaction among the components. The background of the ICF thus contrasts with its original version, the International Classification of Impairments, Disabilities and Handicaps (ICIDH: WHO, 1980), which was predominantly a medical model of diseases and disabilities. Yet, the ICF represents more than an update of the ICIDH. In addition to the shift of the conceptual model underpinning the taxonomy (including the introduction of Contextual Factors), two major differences from the ICIDH comprise (1) the use of neutral language and (2) the combining of Disabilities and Handicaps into a single component (Activities/Participation). In terms of nomenclature, the ICF CY, as well as the ICF, adopts a neutral language, in contrast to the ICIDH in which only the negative aspects of experience were described. Thus, Body Function replaces Impairments, Activities replaces Disabilities, and Participation replaces Handicaps. Moreover, the ICF CY allows both ends of the health continuum to be described. The positive poles are as labeled above (Body Function, Activities and Participation); the negative corollaries are Impairments, Activity Limitations, Participation Restrictions respectively. Similarly, Contextual Factors can be described from both positive and negative perspectives by use of the terms “facilitators” and “barriers/hindrances” respectively (Tate, 2008).

## Domains and Categories

It is at the domain and category levels that clinicians and researchers need to have a good knowledge of the ICF CY.

The domains of the ICF are arranged in a hierarchy (Chapter – or first level, second, third and fourth level domains) respecting a logic order of specificity. Both the components Body Functions and Body Structures, which are organized according to the body systems (e.g., nervous system) are divided into 8 domains. Each domain of Functions corresponds to one of the Structures (e.g., Mental Functions correspond to Structures of the Nervous System; Hearing Functions correspond to Structures of the inner ear etc.). The component Activities/Participation contains a single set of 9 domains, addressing both individual and social aspects of functioning (e.g., school education, interpersonal interactions and relationships). Within the contextual part of the ICF, the Environmental Factors component contains 5 domains, referring to physical, social and attitudinal environments.

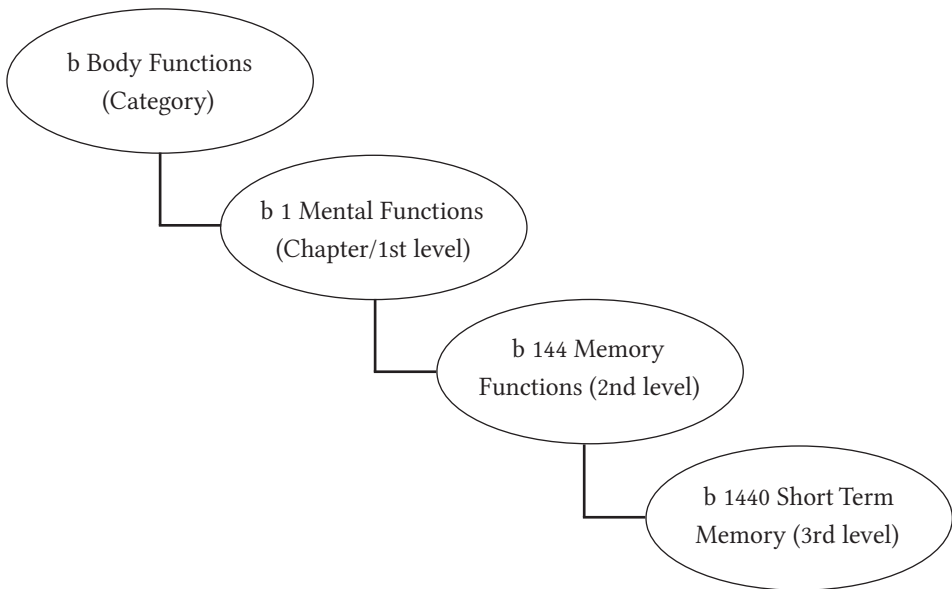
The ICF CY manual provides a listing of the 1,685 fourth-level categories, representing a richer version than the ICF that contains 1,445, and it provides a common language and terminology for recording problems manifested in infancy, childhood and adolescence specifically (WHO, 2007).

Additionally, each of the categories is assigned a code, using alphanumeric notation: commencing with ‘b’ for body functions, ‘s’ for structure, ‘d’ for domain (referring to domains of the Activities/Participation component, which alternatively can be referred to as ‘a’ and ‘p’ respectively if the user so desires) and ‘e’ for environment.

The first digit represents the domain number, the next two digits represent the (second level) category number. Two additional digits are applied for category subdivision at the third and fourth levels. Figure 2 presents an example of a fourth-level category subdivision for the component of Body Function.

In addition to category codes, the ICF CY uses qualifiers, without which “the codes have no inherent meaning” (WHO, 2007, p. 222). The qualifiers are numeric descriptors which appear following a point after the code (and there can be more than one qualifier). The first qualifier is generic, and refers to the extent of the problem (e.g., degree of severity). The second and third qualifiers can be used for body structures to designate the nature of the impairment (e.g., partial absence) and the location of the impairment (e.g., more than one body region), respectively. Two qualifiers are used for Activity Limitation and Participation Restriction, which refer to the environments in which the assessment occurs. The first qualifier refers to performance (e.g., what a person actually does in the current or usual environment, including performance with the use of assistive devices or personal help); the second capacity qualifier is rated “without assistance” in order to describe the individual’s true ability which is not enhanced by an assistive device or personal assistance (WHO, 2001; WHO, 2007). Both qualifiers use the generic list. Environ-

Figure 2. Examples for different levels of the category 'body functions' of the ICF/ICF CY



mental Factors also uses the same set of generic qualifiers to describe the extent of the barriers; facilitators use the same set of codes with a + sign preceding the qualifier.

### Applying the ICF CY in Clinical Practice and Research

The use of the ICF CY in clinical practice allows precise description of patient status and characteristics, which allows comparison among different services and centers, both locally and worldwide. An illustrative case of a SpLD child is presented using the ICF.

### Specific Learning Difficulties (SpLD)

From a medical and psychological point of view, SpLD represents a disorder in one or more of the basic psychological processes involved in understanding or using language (spoken or written) that may manifest itself in an imperfect ability to listen, speak, read, think, write, spell, or do mathematical calculations (Leong, 1999; Snowling, 2005). We can find different specific terms which label these difficulties: Dyslexia (difficulty with written language, particularly with reading and spelling), Dysorthographia (disorder of learning characterized by an important and durable defect of assimilation of grammatical rules), Dyscalculia (difficulty in learning or comprehending arithmetic and calculations) and Dysgraphia (deficiency in the ability to write) (Macintyre & Macintyre, 2004).

Table 1. SpLD according to the ICD 10

ICD 10	Description
Specific reading disorder (F81.0)	The main feature is a specific and significant impairment in the development of reading skills that is not solely accounted for by mental age, visual acuity problems, or inadequate schooling. Reading comprehension skill, reading word recognition, oral reading skill, and performance of tasks requiring reading may all be affected. Spelling difficulties are frequently associated with specific reading disorder and often remain into adolescence even after some progress in reading has been made. Specific developmental disorders of reading are commonly preceded by a history of disorders in speech or language development. Associated emotional and behavioral disturbances are common during the school age period.
Specific spelling disorder (F81.1)	The main feature is a specific and significant impairment in the development of spelling skills in the absence of a history of specific reading disorder, which is not solely accounted for by low mental age, visual acuity problems, or inadequate schooling. The ability to spell orally and to write out words correctly are both affected.
Specific disorder of arithmetical skills (F81.2)	Involves a specific impairment in arithmetical skills that is not solely explicable on the basis of general mental retardation or of inadequate schooling. The deficit concerns mastery of basic computational skills of addition, subtraction, multiplication, and division rather than of the more abstract mathematical skills involved in algebra, trigonometry, geometry, or calculus.
Mixed disorder of scholastic skills (F81.3)	An ill-defined residual category of disorders in which both arithmetical and reading or spelling skills are significantly impaired, but in which the disorder is not solely explicable in terms of general mental retardation or of inadequate schooling. It should be used for disorders meeting the criteria for both F81.2 and either F81.0 or F81.1.
Other disorders of scholastic skills (F81.8)	Developmental expressive writing disorder
Developmental disorder of scholastic skills, unspecified (F81.9)	Knowledge acquisition disability NOS (no other specified) Learning: – disability NOS – disorder NOS

The tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), from which the ICDIH is derived, defines the SpLD of scholastic skills as presented in Table 1 (ICD 10, 1995). ICD-10 gives users an etiological framework for the classification, by diagnosis, of diseases, disorders and other health conditions.

Interestingly, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), published by the American Psychiatric Association, makes no reference to Dyslexia, Dysorthographia or Dyscalculia. They are general learning disorders. It

does, however, include conditions called “reading disorder”, “expressive language disorder”, and “disorder of written expression”, all of which might fall under the umbrella of learning disabilities (Willcutt & Pennington, 2000).

### **The integration of the ICF and the ICF CY to read the complexity of SpLD**

The traditional systems of ICD and DSM represent an important resource for clinicians and psychologists who work in health services with children with SpLD. They are the primary reference for diagnosis and they permit to make a comparison among children data and among specific impairments (Gillberg, 2007). However the new clinical trends in childhood research also suggest integrating the categorical classification of ICD and DSM with information of the ICF and, in particular, the ICF CY, in order to draw up a more complete profile of competences and impairments in the specific life context of the child (Berger, 2005, Darzins et al., 2006). Two important risks in using ICD and DSM are an oversimplified judgment in clinical diagnosis and the incapacity to keep in consideration the complexity of clinical elements (Berger, 2005).

### **What is the “complexity” in the diagnosis?**

“Complexity” can refer to multiple factors associated with the child, the circumstances, the service provider and context, all impacting on service processes and outcomes (Berger, 2005). In the case of SpLD, “complexity” might include severity, co-occurring conditions, parental problems, cultural background, treatment options, and clinician variables and social context (particular skills, availability of appointments, clinic rooms) (Stackhouse & Wells, 1993). Furthermore, important elements of “complexity” may not be known for some time, if at all, after clinician involvement: a history of exclusion and poor social participation may not emerge until the individual feels confident to speak (Berger, 2005). “Complexity” in this latter sense is important because of its potential impact on resources required and effectiveness. Indexing “complexity” would enable more relevant characterization of resource usage or requirements.

In this direction, the ICF CY can become a support to the traditional diagnosis, it can be an important integrative solution with ICD-10 and DSM-IV in clinical work with SpLDs (Simeonsson et al., 2006). The ICF CY provides a conceptual model and a system for coding individual health conditions and their functional consequences, with implications for assessment, treatment, outcomes, research and management (WHO, 2002).

The functional approach embodied in the ICF/ICF CY articulates a view that includes but goes beyond diagnosis and recognizes the importance of taking account of the impact of dysfunctions on the individual and his/her adaptability to and participation in their family and life contexts. The ICD-10 and ICF/ICF CY are complementary, and users are encouraged to use them together to create a broader and more meaningful picture of the health status of individuals and populations.

Information on impairments (provided by ICD-10) and information about health and health-related outcomes (provided by the ICF/ICF CY) can be combined in summary measures of population health (Rauch et al., 2008).

### **ICF and SpLD: A Literature Review**

Literature in this field is recent since the first publication of the ICF dates to 2001 and of ICF CY to 2007. Most of the papers come from Anglophone studies where SpLDs are more frequent than in other countries (Paulesu et al., 2001) and where research about the ICF/ICF CY context has already developed many studies for several years (Travis et al., 2008). Some of these works were published before the endorsement of the ICF CY and so they refer to the pediatric population using the ICF's manual for adults.

SpLDs have been evaluated in the frame of the ICF underlying the functioning perspective of these disorders and the role of environmental factors such as the importance of participation. However, in these papers, no particular instruments or scales of the ICF/ICF CY were used.

Bishop's works are particularly comprehensive and noteworthy (Bishop & Snowling, 2004, Bishop, 2004; Bishop & Adams, 1990). She recently embraced the WHO's multi-level conceptual framework of human functioning and disability as a means for describing SpLD in a broader context (Bishop, 2004). In this framework, she recognized that SpLD can be viewed from different conceptual levels depending upon one's particular focus (e.g., improving functioning in the classroom versus describing the mechanisms that underlie a disorder). She has described SpLD in terms of body functions (physiological systems), activities (execution of tasks and actions) and participation (involvement in life situations). She also identified contextual factors that can interact with and modify the individual's experience of a health condition or a disorder, including the personal characteristics of the individual (e.g., temperament and coping style) and the surrounding physical, social and attitudinal environment. Bishop underlined that in the ICF framework body functions and structures, activities, participation and contextual factors are inter-related and mutually influence one another.

The utility of the framework relies in its focus on the functional implications of health conditions in the context that is relevant to people's daily life. For children, this includes the school setting (Conti-Ramsden, 2009; Humphrey, 2003). Of importance for developmental disabilities such as SpLD, the brain and psychological functions are covered in the body functions (domain b). Hence, deficits in language or cognitive processing would be considered impairments of body functions. Limitations that children with SpLD might experience in executing activities and participating in life situations (domain d) could include problems in automation of reading (such as in dyslexia), problems understanding vocabulary necessary for reading comprehension, problems in writing correctly or in misspelling a word (such as in dysorthographia), problems in the area of calculating (dyscalculia) or difficulty



in accessing peer groups for academic and social events (e.g., in Attention-Deficit/Hyperactivity Disorder – ADHD).

From this point of view, teachers and parents represent important environmental factors (domain e) which can help children with these difficulties; they can support them with good attitudes and help them using media services and system devices (environmental factors as well) for rehabilitation (Bishop, 2004; Humphrey, 2003; Lollar, 2008).

Another interesting work comes from a couple of studies by a Canadian group (Campbell & Skarakis-Doyle, 2007, Doyle, 2008). The authors focused their attention on the effects of SpLD and the ICF levels.

Increasing evidence suggests that there are some possible short/long-term effects of SpLD (Shaywitz, 1999). The impact of SpLDs may include loss of potential educational and/or social domains (domain d), that is, at the level of Activity and Participation (Campbell & Skarakis-Doyle, 2007). In addition, children with SpLDs may present a comorbidity with emotional, affective and attention problems, that is, at the level of Body Function (McLeod, 2004). For this reason the Canadian group linked SpLD profiles with the ICF codes giving an overview of these disabilities in the social context where these children live. It is important to underline that the ICF CY classifies health and health-related states. The unit of classification are categories within health and health-related domains. In the ICF CY persons are not the units of classification; that is, the ICF CY does not classify people, but describes the situation of each person within an array of health or health-related domains. The description is always made within the context of environmental and personal factors (WHO, 2001). The main categories found in the Canadian work were as follows:

#### Activity and Participation Level (domain d)

– Chapter 8: Education (this chapter is about carrying out the tasks and actions required to engage in education, work and employment); Chapter 1: Applying knowledge (this chapter is about learning, applying the knowledge that is learned, thinking, solving problems and making decisions); Chapter 7: Interpersonal interactions and relationships (this chapter is about carrying out the actions and tasks required for basic and complex interactions with people in a contextually and socially appropriate manner).

Having a SpLD as a child can impact on educational outcomes in both the short and long term (Felsenfeld et al., 1992; Nathan et al., 2004). Children with SpLD can present some problems at the Education level (categories of domain d chapter 1, code d820 “School education”): they sometimes require more school-based remedial assistance than their typically developing peers, achieve lower grades (Felsenfeld et al., 1992) and are unlikely to be identified by their teachers as high achievers (McLeod, 2004). Adults who had a SpLD as a child have been reported as completing fewer years of education than their typically developing peers (Felsenfeld et al.,

1992, Nathan, Stackhouse et al., 2004). A considerable body of literature suggests that children with SpLD, (deficit coordination disorder), DCD, and ADHD are at risk for significant academic problems at the level of Interpersonal interactions and relationship (domain d chapter 7) (Beitchman et al., 2001; Zentall, 1993). From an educational point of view, that is, at the level of “applying knowledge” in the ICF language (domain d chapter 1): (Bishop & Adams, 1990; Snowling, 2005), children with SpLD sometimes have comorbidity with other difficulties and impairments. They may have difficulty with mathematics, with reading comprehension, attention deficits and other cognitive problems (Campbell & Skarakis-Doyle, 2007; Skarakis-Doyle & Doyle, 2008).

– Chapter 7: Interpersonal interactions and relationships (see above); Chapter 9: Community, social and civic life (this chapter is about the actions and tasks required to engage in organized social life outside the family, in community, social and recreational areas of life).

SpLD can also impact children socially (Brinton & Fujiki, 1993; Hart et al., 2004; Botting & Conti-Ramsden 2003). The level of activity and participation are the frequent reports of deficits in the area of social competence (McLeod, 2004), such as the Interpersonal interactions and relationship (domain d chapter 7) (Skarakis-Doyle & Doyle, 2008). For example, children with SpLD, DCD and ADHD are sometimes reticent and withdrawn more than their typically developing peers (Brinton & Fujiki, 1993; McLeod, 2004). Recently, children with SpLDs have been reported to be withdrawn in the playground and spend less time interacting with their peers when compared to typically developing children (Humphrey, 2002; Botting & Conti-Ramsden, 2004). All these elements indicate some difficulties at the level of Participation in hobby and free-time (domain d chapter 9, code d920 “Recreation and leisure”) (Campbell & Skarakis-Doyle, 2007; Skarakis-Doyle & Doyle, 2008).

#### Environmental Factors Level (domain e)

– Chapter 3: Support and relationships (this chapter is about practical physical or emotional support, nurturing, protection, assistance and relationships to other persons, in all the aspects of their daily activities); chapter 4: Attitudes (this chapter is about the attitudes that are the observable consequences of customs, practices, values and norms and these attitudes influence individual behavior and social life at all levels, from interpersonal relationships to community relationships). The repercussions of such social problems may include fewer reciprocal friendships, peer rejection, and peer victimization (Botting & Conti-Ramsden, 2004). Consequences in the relationship with friends (domain e chapter 3, code e320: “Friends”) and peers (domain e chapter 3, code e325: “Peers”) (Campbell & Skarakis-Doyle, 2007; Skarakis-Doyle & Doyle, 2008).

To date, no studies have directly examined the social impact of SpLD on children; however, indirect studies of children with speech and communication impairment suggest that this impact may be similar for children with SpLD. Indirect studies have

asked children and adults about their impressions of people with speech impairment. They indicate that children, adolescents and adults with speech impairment may be perceived negatively by their peers because of their scholastic difficulties (Botting & Conti-Ramsden, 2004). Peers and schoolfellows often do not have positive attitudes towards these children (domain e chapter 4, code e420: "Individual attitudes of friends" and domain e chapter 4, code e425: "Individual attitudes of acquaintances and peers") (Campbell & Skarakis-Doyle, 2007; Skarakis-Doyle & Doyle, 2008).

#### Body Functions Level (domain b)

– Chapter 1: Mental functions (This chapter is about both global mental functions, such as consciousness, energy and drive, and specific mental functions, such as memory, language and calculation.)

Anxiety-related symptoms such as lack of concentration, lack of interest and attention (domain b chapter 1, code b140: "Attention functions"), distraction, emotional distress (domain b chapter 1, code b152: "Emotional functions"), tension, working memory problems (domain b chapter 1, code b144: "Memory functions"), fear of rejection, insecurity, aggressiveness (domain b chapter 1, code b126: "Temperament and personality functions"), withdrawal and psychosomatic complaints (domain b, chapter 1, code b122: "Global psychosocial functions") were common findings in the case studies of children and adolescents with dyslexia and other specific learning difficulties who have taken part in various research designs in the 20th century (Humphrey, 2002; Achenbach et al., 2007).

Recently, it was reported that people of all ages with SpLD have a lower self-concept and self-esteem (code b126: "Temperament and personality functions", code b152: "Emotional functions") (Campbell, & Skarakis-Doyle, 2007; Skarakis-Doyle & Doyle, 2008). For example, parents reported that the psychosocial consequences associated with SpLDs include feelings of failure and incompetence, low self-esteem and self-efficacy (code b126: "Temperament and personality functions") and exclusion from social participation (Blosser, 2002; Botting & Conti Ramsden, 2004).

Using the ICF CY framework, we can specify better the profile of children according to three levels of functioning. At the body functions we find specific aspects of cognitive processing that can be compromised, such as processing speed, working memory or executive functioning. At the activities and participation level, these children have been found to be vulnerable to problems in academic and social functioning. Finally, at the level of environmental factors, these children can meet difficulties because of bad support and bad attitudes of friends and peers (Travis et al., 2008).

The ICF CY can provide a shared conceptual framework and language for professionals from different disciplinary backgrounds (Bjorck-Akesson et al., 2003). This has important implications for enriching the diagnosis, for planning a rehabilitation treatment and for service delivery (Campbell & Skarakis-Doyle, 2007; Skarakis-Doyle & Doyle, 2008).

## Objective

The aim of this paper is to verify if this new classification system is a profitable instrument to support the evaluation of a SpLD in a pediatric case. In order to pursue this objective, two fundamental criteria were followed:

- 1) Using the ICF CY and not the ICF as a precise frame of reference for children (much more common in the literature research about adults and children)
- 2) Using the ICF CY checklist as a specific tool of this classification system to elicit and record information on the functioning and disability of a child.

## The Clinical Case

From the description of the actual background, a clinic profile of a SpLD boy attending primary school will be discussed. The case was evaluated at the Neuropsychiatric Department for Children at a university-hospital in northern Italy which had activated an international specialization traineeship in SpLDs.

From the diagnosis and the general information obtained by psycho-diagnostic examinations, a functional profile based on the ICF CY was assessed in order to enrich and clarify the clinical evaluation of the boy.

## Case Description

L. is a boy attending primary school (Grade 4). He is 10 years old. At school he shows some learning difficulties: his mother lists quite severe problems with reading and writing. He also has some comprehension problems that set back his learning. He often has difficulties in organizing and carrying out his duties at school and at home, because he is very slow in reading. He makes a lot of orthographic mistakes and shows diminished attention and concentration.

From the medical case history, the physician's anamnesis and the steps of language development appear normal.

From two separate interviews with teachers and with the mother, the following data were collected:

- L. is often very careless and is always losing things (like pencils, rubber, glue).
- L. often spends his time alone. The relationships with friends and schoolfellows are not always positive. L. has moderate difficulty with socializing with his fellow pupils and to be accepted by them and, for this reason, he feels left out from the other children's activities.
- At home, L. has moderate problems in doing homework. The mother has a full-time job and she cannot be with her son to do homework. She said that L. is "as slow as a snail" and he often loses motivation and he does not finish his work.
- His mother mentions the presence of tics (especially eye tics, blinking) from the beginning of his scholastic career. These tics are not frequent.

- L. has a very good relationship with his granny and especially with his grandfather, and he often goes on holidays with them.

## Method

L. was evaluated with the main standardized and validated tests and scales usually employed to assess the cognitive and language level according to age and school years.

After the cognitive and language assessment, the ICF CY Checklist was administered in order to draw up a functional profile of the boy. The ICF CY Checklist is a practical tool to elicit and record information about the functioning and disability of an individual. Information can be summarized for case records (for example, in clinical practice or social intervention) (WHO, 2007). It enabled the clinic to obtain a profile of the problems experienced by the patient being evaluated. The ICF CY Checklist is a questionnaire filled out by a health professional. It consists of four sections: Body Functions, Body Structures, Activities and Participation, and Environmental Factors. The checklist was filled in during the interviews by two researchers trained in the ICF CY and belonging to the MURINET Project (Multi-disciplinary Research Network on Health and Disability in Europe for ICF and ICF CY, -Sixth EU Framework Programme-) ([www.murinet.eu](http://www.murinet.eu)). The time to fill in the list was approximately 20 minutes by each researcher. Results were discussed and compared. To resolve the few disagreements between the two researchers concerning the selected categories, a third person trained in the ICF CY was consulted.

## Results

Table 2 shows the clinical evaluation, the standardized tests used and the results obtained.

### The Functioning Profile with the ICF CY checklist

According to the ICF CY model, the impairment profile of L. involves the Body Functions area (b), the area of Activity and Participation (d) and, finally, the area of Environmental Factors (e). The section on body structures was not related with the clinical profile of this case.

#### *Impairments in Area b: Body Functions*

L. shows some difficulties in the area of emotional functions (b152). He is often sad and dislikes school. L. has moderate problems in the area of attention functions (b140) because he loses concentration (b140) and for this reason he has some problems in tasks requiring basic cognitive functions (b163).

This situation is determined by specific difficulties in reading and writing (b162). L. seems to show his disappointment with school with some tics (b765) which started to appear at the beginning of the school year.

Table 2. Summary of the score and results of L. from the cognitive and language assessment according to the validated norms for each test (years and/or school attendance are considered)

ASSESSMENT	TEST	NAME	SCORE	AVERAGE
Cognitive Assessment:	<b>PM47</b>	Raven's Progressive Colored Matrices (Raven 2003)	26 correct answers = 50th percentile score	Satisfactory result
Attention assessment	<b>CPT</b>	Conners Continuous Performance Test (Conners, 2002)	The attention performance presents a normal standard result	The attention performance presents a normal standard result
Visual-perception assessment	<b>VMI</b>	Developmental Test of Visual Motor Integration (Beery & Buktenica, 2000)	Score: 15 correct answers; z score = -0.33	Normal Performance
Language assessment	<b>Boston Naming Test</b>	Boston Naming Test (Segal, 1983)	33 correct answers on 36; z score = 0.12	Normal Performance
	<b>Token Test</b>	Token Test (McNeil & Malcolm Ray, 1978)	raw score 33 z score = -1.6	Mild difficulty on the level of expressive language
Reading and Orthography assessment	<b>Standardized reading and spelling tests</b>	Standardized reading and spelling tests (for Italian pediatric population) (Job, Tressoldi, Sartori 1995; Cornoldi & Colpo, 1998)	- Reading rapidity: under 2 standard deviation - Reading accuracy: < 5th percentile	- Unsatisfactory results in reading and accuracy - Unsatisfactory results in orthography

Table 3. Summary of codes and explanation

Body Functions (impairments)	Activity (activity limitations)	Participation (participation restrictions)	Environmental Factors
Intellectual Functions (b117)	Reading (d166)	Moving into education programs (d810-d839)	Education services and systems (e585)
Energy level (b1300)	Writing (d170)	Attending to and adjusting to school (d820)	Special education services and system (e5851-e5852)
Inattention (b140)	Spelling (d145)	Succeeding in education (d830)	Health services and systems (e5800)
Poor memory (b144)	Calculating (d172)	Extracurricular activities (d810-d839)	
Emotional control (b125)	Communication (d3)	Family relationships (d760)	
Mental language Function (b167)	Managing one's own behavior (d2303)	Peer relationships (d7504)	
Organization (b1641)	Handling stress (d2401)	School and Teachers relationships (d820)	

### *Impairments in Area d: Activity and Participation*

L. shows severe problems in learning and applying knowledge (area d1), in particular, he has activity limitations in reading performance (d140), in writing (d145) and calculating activities (d150).

These limitations interfere with his daily routine (d230). Together with these limitations, L. presents moderate participation restrictions, especially with friends (d7500). He often feels alone, he is not well integrated during the classroom activities (d820), he does not often play football with his schoolfellows, limiting his time spent on recreation and leisure (d920).

### *Impairments in Area e: Environmental Factors*

The scholastic context is different. L. has a good relationship with teachers (e330) but not with all fellow pupils (e325) and friends (e320). L. does not receive good support also from friends (e325) and peers (e320); they show an attitude of exclusion and not integration (e425) during free-time activities. For this reason, he spends a lot of time alone.

Using the coding system of the ICF CY, a lot of information collected from different people's points of view can be summarized and classified around the clinical



situation. In this way, the ICF CY codes facilitate communication processes among the operators (from clinicians/psychologists to the speech therapist and from family members to teachers) and summarize the difficulties of the boy in all his life contexts.

Table 3 gives an overview of the ICF CY profile using the main four components: Body Function, Body Structures, Activity and Participation, and Environmental Factors.

## Discussion

Even if the purpose of this paper is not to draw up a diagnosis, the clinical case presents criteria for a SpLD in reading and in orthography. The cognitive level of L. appears normal. He also presents normal performance in attention (by and at the visual perception level). From the language assessment, he seems to have mild difficulty on the level of expressive language but this hypothesis has to be explained in more detail with other examinations. L. presents difficulties in reading and in orthographic competence. In fact, L. obtains unsatisfactory results in reading for rapidity (under the 5th percentile) and accuracy (all scores are 2 standard deviations under the average of the population). He also has severe orthographic problems. L. makes a lot of orthographic mistakes. He seems to have an impairment in orthographic competence. In any case, supplementary evaluations about the kind of writing mistakes (phonological mistakes, phonetic mistakes, spelling mistakes) have to be requested in order to diagnose the specific difficulty in a better way.

From the diagnosis, obviously, we need to find a linkage with the other operators. What it is important for this clinical case is to consider that a specific compromised cognitive processing ability reflects on the level of body functions, on functioning and participation. To providing an organizational structure for the observed commonalities, the ICF CY supports the collaborative process by providing operators with a common language and conceptual framework that is necessary for successful cross-disciplinary communication.

The ICF checklist qualifies the functional level in the “Body Functions” section and “performance” and “capacity” related to the “Activities and Participation” section that emerges as an important source of information to describe and identify targets of clinical treatment providing a good description of the symptomatology and functioning of this patient with a SpLD.

## Conclusion

The ICF CY offers a clinical tool reflecting the paradigm shift from a purely medical model to an integrated biopsychosocial model of human functioning and disability (WHO, 2007). It is a valuable tool in research about disability because disability is considered together with dimensions of impairments at the body and body part level, person level activity limitations, and societal level restrictions of



participation. The ICF CY can be an essential basis for the standardization of data concerning all aspects of human functioning and disability in the pediatric population because it takes into account two issues of relevance: a) the dimensions of childhood disability include not only etiology (in scientific and policy contexts, definitions of childhood disability are often characterized by overlap of diagnoses or etiological factors), but also health conditions, disorders, impairments, activity limitations as well as participation restrictions (Lollar, Simeonsson & Nanda, 2000); b) children's environments change dramatically across the stages of infancy, early childhood, middle childhood and adolescence and each of these changes influences the child's interaction through stimulation and feedback. The influence of the environment on the child's performance and functioning is thus particularly important to document in this phase of the life-span and, in this perspective, the ICF CY is a helpful instrument (Bjorck-Akesson et al., 2003).

As the literature shows, children with SpLD experience limitations in functioning at the activity and participation level of the ICF CY (Campbell & Skarakis-Doyle, 2007; Skarakis-Doyle & Doyle, 2008). These social difficulties extend beyond classroom interactions to affect children's participation in all aspects of school life (Brinton & Fujiki, 1993, McLeod, 2004). Indeed, the literature recognizes that the problems these children face in their social life are multifaceted and complex (Berger, 2005). A multidimensional approach, like the ICF CY, is important for achieving effective intervention.

In the ICF CY frame, the knowledge of all components becomes essential. In order to help a child with a SpLD, we need to know the level of impairments at the level of body functions (e.g., attentional problems, memory deficits, the different components of mental language functions [b1]) as well the difficulties experienced at the level of activity and participation (relationship with school [d820], the capacity for reading, writing and calculating [d1]) and all the environmental factors that can be used for support (like family, friends, teachers, rehabilitators [e3]) and for rehabilitation (like specific technological instruments [e1], all the services offered by the health system [e5]).

One potential limitation of the present study is that it was carried out in only one clinical case. However, the study deliberately focused on one case in order to obtain as systematic an understanding as possible of the functioning of the patient based on one rich documentation. It would be interesting in future research to examine the applicability of the ICF classification to a wider sample in order to generalize the results and the outcomes obtained by several checklists of different SpLD profiles. This requires more resources and a wider knowledge of the ICF/ICF CY frame among operators.

### **Direct implications to implement the use of ICF CY in the community**

The ICF CY can be used to identify useful profiles of an individual's functioning, disability and health, which the literature suggests may enhance health care service provision.

The cause and effect of dyslexia are of concern and interest to doctors and research scientists. When we consider SpLDs with the traditional manuals, all these issues become clear and relevant. The DSM-IV makes no reference to dyslexia. It does, however, include conditions called “reading disorder,” “expressive language disorder” and “disorder of written expression” — all of which might fall under the umbrella of dyslexia.

If we consider an individual with a diagnosis of SpLD according to the ICD 10 (WHO, 1992), this person may experience a number of characteristic symptoms within the six areas of impairment (Table 1), ranging from a specific difficulty in oral reading skills to an algebra skill or from a specific difficulty in spelling competence to a generic mixed disorder in school performance. The functional implications of these symptoms may be quite different and neither may be true of someone with the diagnosis (Table 2). Possible combinations of all these diagnostic specifications of SpLD highlight the fact that diagnostic information alone is of limited value without clear descriptions of the functional impact of such a diagnosis. The ICF CY provides health care systems with a common language to enhance diagnostic information with standard descriptions of health and health-related states and has the potential to revolutionize the way stakeholders in health care delivery systems think about and classify health (Stucki et al., 2002).

In sum, the ICF CY facilitates collaborative service delivery by: (1) providing a unified terminology and a common framework for collaborative teams; (2) organizing commonalities across children with developmental language and learning problems; (3) situating commonalities along a continuum of ability. In turn, knowledge of the commonalities at each level of functioning informs service delivery in the school setting by signifying what features of developmental disabilities can be treated universally, commonly, and selectively within a continuum of approaches to intervention. SpLD may be viewed within a broader context in which different operators (such as clinicians, rehabilitators, teachers and researchers) with a common frame of reference can integrate information derived from the medical contexts to the school frame and counseling activity.

## Competing Interests

The authors declare that they have no competing interests.

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