Executive Capacities and Their Assessment with the McCloskey Executive Functions Scales (MEFS)

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Although awareness of *executive functions* is increasing, the general metaphorical comparison of executive functions to the Chief Executive Officer (CEO) of the brain represents an oversimplification of the concept that can lead to inadequate assessment efforts and a reduction in the construct's clinical utility.

To avoid oversimplification and maintain greater consistency with current conceptions, it is better to view executive functions as constituting the multi-tiered management structure of a multinational mind corporation, with each manager responsible for its separate contribution to the whole while working—ideally—in a collaborative manner with the other managers to ensure the desired outcomes of this corporation of the mind. Consistent with the multinational mind corporation metaphor, the inner workings of this corporation reflect the following:

1. There is likely to be a CEO with an overall vision of the corporation's future and knowledge of the corporation's past.
2. The CEO is not fully aware of all that is happening day-to-day at all of the other levels of management below it.
3. Each successive level of management below the CEO also is not aware of all aspects of management at other levels above and below it.
4. Most levels of management are responsible only for managing other levels of management (i.e., directing other directors).
5. Only the lowest level of management interacts on a day-to-day basis with the workers who function in a way that expresses the nature of the services or the products of the corporation.

The Holarchical Model of Executive Capacities (HMEC)

The HMEC is based on conceptual and empirical work from multiple disciplines in an attempt to integrate research in neuroscience with various psychological theories and perspectives. The HMEC accounts for the overlapping, multidimensional nature of executive capacity development and use and the problems associated with developmental lags at one or more levels. Readers interested in learning more about the HMEC are encouraged to read *Assessment and Intervention for Executive Function Difficulties* (McCloskey et al., 2009) and *Essentials of Executive Functions Assessment* (McCloskey & Perkins, 2012).

Self-Regulation

The *self-regulation* tier is comprised of a large number of executive functions capacities (first line managers) responsible for cueing, directing, coordinating, and integrating functioning within the domains of perception, emotion, cognition, and action. The neural networks engaged by the use of these executive capacities are responsible for the self-regulated control of day-to-day functioning. The HMEC, explicitly identifies 31 self-regulation capacities that are grouped into 7 Clusters as shown in the table below.

Cluster	Executive Capacities
Attention	Perceive, Focus, Sustain
Engagement	Energize, Initiate, Inhibit, Stop, Interrupt, Flexible, Shift
Optimization	Monitor, Modulate, Correct, Balance
Efficiency	Sense Time, Pace, Use Routines, Sequence
Memory	Hold/Manipulate, Store/Retrieve
Inquiry	Estimate Time, Gauge, Anticipate, Analyze, Compare
Solution	Generate, Associate, Organize, Plan, Decide, Prioritize

Executive capacity difficulties with the greatest impact in early elementary school years are represented in the Attention, Engagement, Optimization, and Efficiency clusters. The impact of executive difficulties with the Memory, Inquiry, and Solution clusters becomes much more apparent in middle and high school years as the complexity and level of abstraction of learning and academic production increase.

In keeping with the management structure metaphor, the self-regulation tier represents the first level of management that directly supervises the workers, i.e., supervises the remaining parts of the neural networks routed throughout the brain that carry out the commands of the self-regulation managers. Each of the 31 self-regulation capacities can be thought of as being housed in its own office within the pre-frontal cortex.

Executive Skills and Executive Functions

To realize the clinical utility of the HMEC, it is helpful to think of each of the 31 self-regulation executive capacities as having two managers within the same office: the executive functions manager and the executive skills manager. The job of the executive functions manager is to maintain awareness of the environment in order to signal when the executive capacity should be activated. The job of the executive skills manager is to know the other parts of the brain that need to be activated in order to perceive, feel, think, or act effectively. For example, in the case of planning, the executive function manager's job is to know when to activate the planning neural network and signal the executive skills manager. The job of the executive skills manager is to activate the other parts of the neural network in order of operation so that planning occurs.

Conceptualizing a distinction between executive functions and executive skills is necessary to explain the double dissociation that can be observed in clinical situations; some individuals are aware of when they should be planning but have no idea how to make a plan whereas some individuals know how to plan but are not aware of when they should be using their planning skills. In worst case scenarios, both the function and the skills manager are ineffective: The child is unaware of the need to cue for self-regulation, and even when cued by another person, the child is unable to direct the self-regulation of perceptions, feelings, thoughts, and actions.

The distinction between executive functions and executive skills is important when attempting to plan and implement an intervention because interventions will depend on which manager is performing ineffectively. Interventions for executive skills deficits focus on helping the child learn how to self-regulate. Interventions for executive functions deficits focus on increasing awareness of when to self-regulate. It is also important to recognize the executive function and executive skill deficits both lead to a

lack of adequate production or appropriate behavior in academic settings and therefore represent producing difficulties rather than learning difficulties.

Note that these 31 self-regulation capacities are distinct from one another and effectiveness with each one can vary greatly (i.e., the managers in each self-regulation office may vary greatly in terms of their level of competence). For example, a child might be very effective at inhibiting impulsive responding but be very poor at shifting from one activity to another.

Arenas of Involvement

The concept of *Arenas of Involvement* helps to increase understanding of the full range of variability in engagement of self-regulation capacities. Executive control can vary greatly depending on whether a person is attempting to exert control of self in relation to his or her own internal states (i.e., control within the Intrapersonal Arena); control of self in relation to others (i.e., control of self within the Interpersonal Arena); control of self in relation to the environment(i.e., control of self in the Environment Arena); or control of self in relation to how information is processed, stored, and used to read, write and calculate (i.e., control of self in the Academic Arena).

Arenas of involvement are dissociable; a person may experience self-regulation difficulties in one or more of the arenas while demonstrating very effective self-regulation in one of more of the other arenas. Dissociation of specific self-regulation capacities also can be evidenced within a single arena of involvement and for a single domain of functioning. An individual might effectively use some self-regulation capacities within the interpersonal arena while being very poor with the use of other self-regulation capacities within that same arena. Assessment of executive capacities should take into account the arenas within which difficulties may be occurring.

Second Tier Executive Capacities

The second tier of the HMEC specifies executive capacities that extend beyond basic self-regulation. Consistent with the management structure metaphor, two "departments" are distinguished at this next level of supervision: Self-Realization and Self-Determination. At this tier, executive capacities are involved only in managing other managers; they do not directly supervise perceptions, feelings, thoughts, or actions. Instead, they supervise the Self-Regulation managers.

Self-realization represents an overarching awareness that transcends but includes the moment-to-moment awareness that is being used to self-regulate throughout the day. The executive capacities involved at this level include (a) an awareness of the capacity for self-regulation and how to influence it, (b) an awareness of the fact that others persons can self-regulate, (c) an awareness of how one's own self-regulation (or lack of it) affects others, and (d) a capacity for self-analysis to identify specific self-regulation strengths and weaknesses.

Self-analysis can be used to develop a sense of personal strengths and weaknesses and how they impact daily functioning. Note however that the Self-Analysis manager is separate from the Awareness of Self and Awareness of Others managers. It is possible to engage in self-analysis that has no apparent impact on self-awareness or awareness of others. When all three Self-Realization managers work as a coordinated management team, it is possible to increase awareness of when to engage in specific types of self-regulation and increase awareness of when it is necessary to improve self-regulation capacities.

No self-determined goal or self-desired outcome is necessary for effective lower-tier, daily self-regulation to occur. Consequently, it is possible for a person to engage in day-to-day self-regulation without ever engaging in any act of self-determination. Self-Determination involves the generation of personal goals for the future and the generation of plans that would enable the accomplishment of these goals. Self-Determination also involves the evaluation of the adequacy of self-regulation efforts in moving toward or achieving self-selected goals and/or carrying out self-selected plans. Long-term goal development reflects an appreciation of the potential benefits of ignoring or refusing immediate rewards (immediate gratification) while working toward greater rewards likely to be derived at a much later point in time (delayed gratification).

Assessing Executive Capacities with the McCloskey Executive Functions Scales (MEFS)

Assessing teacher and parent perceptions about the use of executive capacities greatly enhances the assessment of a student referred for learning, behavioral, or social-emotional concerns. Many aspects of executive functioning cannot be assessed directly in a one-to-one testing situation; therefore, input from teachers and parents is critical.

Although executive function rating scales have been in use since the mid-1990s, the scales have focused on a narrow group of core executive functions. Additionally, rating scales typically only assess for executive function deficits; they do not enable the rater to identify a full range of executive capacity strengths as well as deficits and do not make the important distinction between executive functions and executive skills.

The MEFS represents an advance in the assessment of executive capacities for several reasons: (a) the MEFS is based on a comprehensive model of executive functions that encompasses aspects of self-regulation, self-realization, and self-determination; (b) the MEFS assesses a broad range of executive skills and functions; and (c) the MEFs offers a uniquely designed, full range of rating options that enable the identification of executive skill deficits (does not know how to do this), executive function deficits (does not know when to do this), and executive function strengths (knows when and how to do this). As noted earlier, executive skill deficits are best addressed through strategy instruction whereas executive function deficits are best addressed by increasing awareness of situations in which the executive capacity should be used.

The McCloskey Executive Functions Scale (MEFS) is an internet, web-based rating scale designed to assess teacher and parent perceptions about students' use of executive functions. The rating scale can be used with children ages 5 through 18 years. The main function of the MEFS is to facilitate the identification of executive function (EF) strengths, executive function deficits, and executive skill deficits in children referred for a psychological evaluation. It is also suitable for screening and measuring response to interventions. The MEFS consists of 110 items that assess multiple aspects of Self-Regulation, Self-Realization, and Self-Determination. The items describe aspects of either academic or self/social functioning that can readily be observed by classroom teachers or parents allowing them to be grouped by Academic Arena and Self/Social Arena so that self-regulation strengths and weaknesses can be identified within the different arenas of involvement. Most raters can complete the scale in 12 to 15 minutes. The ratings are compiled to generate a report that includes a brief narrative and several score tables with Standard or *T* scores. The MEFS teacher and parent forms have been standardized and are available from Schoolhouse Educational Services at www.SchoolhouseEducationalServices.com.

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