

**Université de Montréal**

**Perception of experts on criteria for the assessment of the  
« dysexecutive syndrome » in everyday activities**

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**Mémoire présenté à la Faculté des études supérieures**

**en vue de l'obtention du grade de**

**Maître ès sciences (M.Sc.)**

**en Sciences biomédicales**

**Juin, 2001**

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Université de Montréal  
Faculté des études supérieures

Ce mémoire intitulé :

Perception of experts on criteria for the assessment of the  
"dysexecutive syndrome" in everyday activities

présenté par

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## ABSTRACT

Traditional evaluation approaches have limited sensitivity in detecting the impact of executive dysfunction on everyday activities. Though numerous brain disorders may cause a “dysexecutive syndrome”, advancement in the field is constrained by a multitude of factors such as a poorly defined theoretical construct, and the absence of a prototypical measure. The purpose of this research was to identify criteria needed to improve the sensitivity of assessments of activities of daily living (ADL) to detect the impact of the “dysexecutive syndrome” on everyday activities. To attain this goal, two preliminary objectives were considered, that is (1) to better understand the concept of executive functions and (2) to better comprehend the manifestations associated with a “dysexecutive syndrome” in everyday activities.

This study addressed these issues in the following manner. Literature on executive functions and their underlying cerebral mechanisms, including theoretical models, case studies, and assessments was analysed. From this, new perspectives were gained on the manifestation of the “dysexecutive syndrome” in everyday activities and on the operationalisation of theoretical models in related assessments. Alternately, a qualitative methodology, “The Fourth Generation Evaluation” (Guba & Lincoln, 1989), complemented the investigation. Two special respondents (occupational therapist and neuropsychologist) with clinical and research expertise in the field of executive functions and everyday activities were interviewed individually and then participated in a negotiation session. And finally, expert opinions were confronted, through a second review of the literature, with notable authors in the field.



Experts concluded that a central feature of executive functions is their important role in allowing for the adaptation of the individual to changes in his or her environment. Essential to this process are goal formulation and self-monitoring and several underlying capacities such as inhibition. This conception of executive functions is supported, according to expert opinions, by select theoretical models and a series of case studies of individuals with a “dysexecutive syndrome”. The range of complex behavioural and cognitive disturbances present in these individuals greatly impairs competency in everyday activities that extend from personal care, to both home and community management. Improving the sensitivity of ADL assessments to these difficulties would require, according to expert opinions, the use of an individualised approach (for the selection of tasks considered novel and complex for the individual) accompanied by an in-depth qualitative analysis of the causes of errors in performance (supported by a strong theoretical model and normative studies). The approach should be non-structured, and the evaluation should ideally be completed in a natural context. Though the inherent complexity involved in developing an assessment that meets these criteria was clearly identified, continued investigations are essential to the attainment of a better understanding of the impact of these deficits on occupation and to the development of more appropriate clinical interventions within the field of rehabilitation.

The uniqueness of this study is its integration of the perspectives of two appropriate disciplines around the complex problem of executive functions and everyday activities. This consideration of the different paradigms of two respective disciplines mutually contributed to the attainment of a greater understanding, the emergence of a new perspective on the problem and new avenues for future investigations.

## RÉSUMÉ

Même si beaucoup d'auteurs mentionnent l'importance des fonctions exécutives pour une vie autonome dans la communauté, très peu d'études ont considéré les manifestations d'un trouble de ces fonctions, "syndrome dysexécutif", dans les activités de la vie quotidienne. Quelques études de cas révèlent que la présence d'un tel syndrome peut affecter la personne dans une variété d'activités de la vie de tous les jours telles que s'habiller, se nourrir seule ou faire seule ses courses. Les difficultés rencontrées se retrouvent particulièrement au niveau de la prise d'initiative, de la capacité à maintenir son plan d'action orienté vers un but, à planifier et à évaluer le résultat final.

Plusieurs auteurs mentionnent la difficulté d'évaluer ce syndrome car il est susceptible de se manifester particulièrement dans des tâches complexes et nouvelles. Étant donné la capacité d'adaptation de l'être humain, une tâche n'est généralement nouvelle et complexe qu'une seule fois. La fidélité test-retest, dans ce contexte, a tendance à être pauvre car dès qu'un individu est exposé une deuxième fois à un même test, ce dernier n'est plus aussi exigeant au niveau des fonctions exécutives et par conséquent la performance est améliorée. De plus, une tâche nouvelle et complexe pour un individu peut être familière et routinière pour un autre. D'autre part, les fonctions exécutives sont particulièrement mises en évidence dans un contexte d'évaluation non structuré. Par définition, un contexte non structuré ne fournit pas de stimuli externes pour que l'individu agisse. Puisque de façon générale la plupart des tests classiques mesurant ce concept débute par une consigne spécifique et une incitation à l'action en fonction d'un but prédéterminé, la sensibilité de ces tests aux fonctions exécutives est remise en question par plusieurs auteurs. L'utilisation du contexte naturel pour faire l'évaluation est de plus en plus mentionnée dans la littérature. En effet,

certaines études démontrent que les tests classiques ont une certaine limite quant à la prédiction de l'indépendance dans les activités de la vie quotidienne. Différentes démarches d'évaluation sont proposées pour remédier à cette capacité de prédiction limitée des tests classiques comme par exemple l'utilisation de tâches de la vie quotidienne effectuées dans un contexte naturel et non-structuré.

Basé sur ces critères, une analyse détaillée de deux évaluations a été faite, soit le *Profil des AVQ* (Dutil, Forget, & Gaudreault, 1991) et le *Multiple Errands Test* (Shallice & Burgess, 1991) sous l'appellation française de Test des Errances Multiples (TEM). Le Profil des AVQ a comme but d'évaluer l'indépendance de la personne dans ses activités quotidiennes. Celle-ci est déterminée suite à une analyse de tâche basée sur quatre opérations reliées aux fonctions exécutives soit la capacité de formuler un but, de planifier, de régler la performance et d'assurer la qualité de la tâche. L'approche d'évaluation préconisée est peu structurée pour le sujet, et les tâches utilisées pour la mise en situation sont autant des tâches routinières, que non familières et complexes. L'évaluation se déroule idéalement dans un contexte naturel soit le domicile, une banque, un autobus, etc. Pour mieux comprendre et interpréter les comportements de la personne reliés aux fonctions exécutives, le Modèle du fonctionnement cérébral de Luria a été retenu. Cet auteur décrit un système de hiérarchisation des fonctions mentales (trois unités) en considérant le lobe frontal comme une structure de haute intégration. L'unité trois a comme but principal la régulation des fonctions exécutives. Aucune étude avec l'outil n'a encore été réalisée pour démontrer sa sensibilité à mesurer spécifiquement les manifestations d'un trouble des fonctions exécutives dans les activités de la vie quotidienne.

Le *Test des Errances Multiples* (TEM) est une épreuve destinée à évaluer l'ensemble des fonctions exécutives. Ce test a été conçu selon le cadre théorique de Norman et Shallice (1980)(Système attentionnel superviseur-Contention Scheduling/ Supervisory System Framework). Ces auteurs

décrivent deux processus de contrôle attentionnel qualitativement distincts: le *Contention Scheduling* et le *Supervisory System*. Ces deux niveaux agissent selon le degré de nouveauté de la tâche. Le niveau supérieur serait mis en jeu lorsque les actions ne sont pas routinières pour la personne. Tout comme le *Profil des AVQ*, cet instrument tend vers une approche peu structurée. Des tâches familières et simples et non familières et complexes sont à la base de l'évaluation qui se déroule dans un milieu non familier pour le sujet, soit un centre commercial. Une étude visant à déterminer la sensibilité de cet instrument aux fonctions exécutives a démontré une sensibilité plus élevée lors de l'utilisation de tâches de la vie quotidienne que les tests frontaux classiques (Le Thiec, et al., 1999). Le peu d'études supportant ces résultats ne permettent pas toutefois de conclure sur le potentiel de cet instrument comme mesure étalon du "syndrome dysexécutif" dans les activités de la vie de tous les jours.

Le but de cette étude est donc de générer de nouvelles connaissances à l'égard des caractéristiques d'un instrument de mesure sensible aux manifestations du "syndrome dysexécutif". Pour atteindre ce but, deux objectifs préalables ont été considérés, soit : (1) de mieux comprendre le concept des fonctions exécutives et (2) de mieux saisir les manifestations d'un trouble de ces fonctions dans les activités quotidiennes.

Une méthodologie de type qualitative, "*The Fourth Generation Evaluation*" (Guba & Lincoln, 1989), a été privilégiée dans cette étude. Cette méthodologie a été utilisée parce que le construit théorique à l'étude (fonctions exécutives) demeure encore très peu défini et qu'aucune mesure étalon existe. Comme les paradigmes pour comprendre une problématique peuvent différer entre les disciplines, deux experts provenant de deux disciplines distinctes, soit une ergothérapeute et un neuropsychologue, ont été sélectionnés et interviewés séparément. Suite à l'analyse des entrevues, une rencontre de négociation entre les deux experts a été faite dans le but d'approfondir la compréhension de ce concept.

Les résultats ont permis de mettre en évidence la complémentarité des deux disciplines pour mieux comprendre ce concept. Selon un expert (neuropsychologue), les fonctions exécutives réfèrent à la capacité d'adaptation de l'individu à des situations nouvelles et complexes. De plus, les causes sous-jacentes à ce problème peuvent être liées à des déficits d'inhibition et d'autocorrection. Pour un autre expert (ergothérapeute), l'incapacité à formuler des objectifs est un aspect majeur de ce concept. Pour mieux cibler les manifestations de ce syndrome dans les activités quotidiennes, des histoires de cas ont été utilisées par l'ergothérapeute. L'interprétation donnée par l'ergothérapeute sur les types d'erreurs a été corroborée dans la majorité des cas par le neuropsychologue.

Pour permettre une évaluation des activités de la vie quotidienne sensible à ce trouble des fonctions exécutives, certains critères ont été dégagés par les deux experts à savoir le type de tâches que l'on doit utiliser (nouvelles et complexes) et le contexte où doit se dérouler l'évaluation. L'évaluation doit également considérer toutes les séquences et opérations reliées à la réalisation de la tâche (de l'analyse des besoins de faire à la tâche, à l'initier, à exécuter le plan d'action et à la vérification du résultat). De plus, pour mieux interpréter les résultats, il est mentionné l'importance de comparer les résultats avec des études faites auprès d'une population sans lésion cérébrale et l'utilisation d'un modèle théorique du fonctionnement cérébral. En dernier lieu, une analyse raffinée des erreurs faites par le sujet lors de la réalisation de la tâche et l'utilisation de marqueurs permettraient de mieux comprendre les troubles reliées à ces fonctions.

En conclusion, la présente étude peut être considérée comme un pas vers l'amélioration de la sensibilité des instruments de mesures actuellement utilisés auprès des personnes ayant un "syndrome dysexécutif". Cette recherche tient sa valeur du fait qu'elle permettra éventuellement d'améliorer la qualité des services offerts à ces personnes.

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## ACKNOWLEDGEMENTS

I wish to express my deepest gratitude to my director, Élisabeth Dutil. It was her belief in occupational therapy and her respect for the contribution of clinicians to the continued advancement of our profession that motivated me to pursue graduate studies. Through our previous collaborations on various research projects germinated the idea for this master's study, that has finally born fruit. The quality of her scientific guidance provided in the most empathetic fashion surpassed all my expectations. Thank-you for the numerous corrections of my work that stimulated my thinking and helped me outdo myself more frequently than I thought possible. I would also like to express my deepest thanks to my co-director, Ron Levy, for his generosity and availability. His wisdom helped keep my project realistic and in perspective through the years.

I thank the *Réseau Provincial de recherche en adaptation- réadaptation (REPAR)* and the *Faculté des études supérieures of Université de Montréal* for their generous financial support. Thanks are also extended to the *Centre for Interdisciplinary Research in Rehabilitation (CRIR), site de l'Institut de réadaptation de Montréal* for their technical support. I thank Claudine Auger and Constant Rainville for contributing their ideas and insights throughout this project. I also thank the two experts who generously shared their time, experience, and reflections. Thank-you to Sheilah Fishman for proof reading these chapters and for her insightful comments.

And finally, my heartfelt thanks goes to my family, in particular, to my husband Alain, to whom I wish to dedicate this dissertation. I thank him for having patiently accompanied me through this great adventure. I thank my mother who offered me her continual love and support. I also thank my children, Elysa and Nicolas for their love that helped me maintain my enthusiasm towards my studies, and inspired me to assume all of my roles to the best of my abilities.

## CHAPTER 1: INTRODUCTION

It has been shown that the presence of a "dysexecutive syndrome" can have an impact of considerable importance on a person's ability to resume previous life roles and responsibilities. Executive functions are defined by certain authors as those cognitive processes responsible for the formulation of goals or the identification of needs, the planning and organising of the steps necessary to the execution of the activity, execution of the action plan, and correction of errors (Lezak, 1989). Presence of executive dysfunction, or the "dysexecutive syndrome", has been reported in a wide variety of conditions, which include traumatic brain injury (Schwartz, Reed, Montgomery, Palmer, & Mayer, 1991; Shallice & Burgess, 1991), multiple sclerosis (Arnett et al., 1997; Grigsby, Kravcisin, Ayarbe, & Busenbark, 1993; Mahler, 1992), Alzheimer's (Collette, Van der Linden, & Salmon, 1999; Perry & Hodges, 1999), schizophrenia (Evans, Chua, McKenna, & Wilson, 1997), Parkinson's disease (Dujardin, Degreef, Rogelet, Defebvre, & Destee, 1999; Zalla et al., 1998) and obsessive compulsive disorder (Veale, Sahakian, Owen, & Marks, 1996). Some studies have also shown that executive functions are an important determinant of functional status in everyday activities in community dwelling older persons (Grigsby, Kaye, Baxter, Shetterly, & Hamman, 1998).

Understanding the pathological behaviours associated with a "dysexecutive syndrome" is one of primary concern for rehabilitation professionals, as the range of complex behavioural and cognitive disturbances present in these individuals, in fact, suggests poor outcome and difficult management (Burgess, 1997). Recent studies have particularly focused on the cerebral mechanisms underlying the "dysexecutive syndrome", but few have looked at this syndrome from the perspective of its impact on a person's life roles and responsibilities. Rabbitt (1997) nevertheless suggests that failure to meet complex everyday demands is a more sensitive diagnostic indicator of

general loss of executive competence than are many of the currently used clinical measures of executive functions.

The inherent complexity involved in the evaluation of executive functions has been repeatedly underlined in the literature as the evaluation should allow for observation of the individual in non-structured, complex and non routine situations (Burgess, 1997; Rabbitt, 1997). Traditional neuropsychological tests have been shown to present certain limitations with regards to their sensitivity and ecological validity (Eslinger & Damasio, 1985; Goldstein, Bernard, Fenwick, Burgess, & McNeil, 1993; Le Thiec et al., 1999; Shallice & Burgess, 1991). A marked dissociation has in fact been reported between performance on standard neuropsychological tests and everyday behaviour (Eslinger & Damasio, 1985; Shallice & Burgess, 1991). Related pathological behaviours can in fact go unnoticed, both in most traditional frontal lobe tests (Dutil et al., 1996; Lezak, 1995; Shallice & Burgess, 1991) and in most ADL measures (Bottari & Dutil, 2000), even though such deficits can severely limit social reintegration. As a consequence, presence of the "dysexecutive syndrome", and its related secondary impact on previous life roles and responsibilities, is currently clinically underappreciated.

The essence of occupational therapy is the study of human occupation (Kielhofner, 1997). Efforts to comprehend the underlying causes of impaired occupational performance have been evident in recent years, as several ADL evaluations have been developed, which consider the impact of underlying physical and cognitive abilities. Such assessments include the Arnadottir OT-ADL Neurobehavioral Evaluation (A-ONE) (Arnadottir, 1990), the Assessment of Motor and Process Skills (AMPS) (Fisher, 1995) and the ADL Profile (Dutil et al., 1991). However, few of these evaluations have been developed with the intent of being sensitive to disorders of executive functions. As executive functions are necessary for adequate social reintegration, occupational therapists need to better understand these concepts if they are to provide the rehabilitation team with an accurate

picture of the impact of these impairments on the client's everyday activities. As in many other disciplines, the Model of Human Occupation (CAOT, 1997) underlines the importance of considering the interaction between performance components and the environment during task analysis and interpretation of functional status.

The purpose of this research was to identify criteria needed to improve the sensitivity of ADL assessments to detect the impact of the "dysexecutive syndrome" on everyday activities. To attain this goal, two preliminary objectives were considered, that is (1) to better understand the concept of executive functions and (2) to better comprehend manifestations associated with a "dysexecutive syndrome" in everyday activities.

Though extensive research studies can be found on executive functions, advancement in the field is constrained by a multitude of factors such as: poorly defined theoretical construct, complex research methodology, absence of a prototypical measure, uncertain validity of available evaluations of executive functions, and poor ability of tests to predict real life performance (Burgess, 1997; Rabbitt, 1997; Wilson, Evans, Alderman, Burgess, & Emslie, 1997). This complexity motivated the use of an exploratory research design using a constructivist methodology called "The Fourth Generation Evaluation" (Guba & Lincoln, 1989). This methodology proposes that the core task of the researcher is to orchestrate, among stakeholders (service providers, beneficiaries,...), a comparison and contrast of divergent views, with the idea of achieving a higher synthesis of them all. Expert opinions will be obtained from two experts in the fields of neuropsychology and occupational therapy. This will be followed by an inter-expert negotiation. As all individuals are necessarily limited in their perspective of a problem by the paradigm to which their discipline adheres, it is thought that the inter-expert negotiation will be a particularly valuable step in generating new understandings which bridge the paradigms of both disciplines.

The value of the present research lies in the methodology used, that is "The Fourth Generation Evaluation". This research design will facilitate a greater understanding of the concepts under study from the shared perspective of experts in the fields of neuropsychology and occupational therapy. The originality of this research stems from its perspective on the problem. Though previous research has tended to focus on the association between psychological tests of executive functions and the ability of these tests to predict either real world functioning or cerebral impairment, this research will approach the question from the perspective of everyday activities and the extent to which evaluations of everyday activities are sensitive to the "dysexecutive syndrome".

Research findings will contribute to the advancement of science by further exploring the possible manifestations of the "dysexecutive syndrome" in everyday activities. It will also suggest ways of improving currently used ADL evaluations, and measures of the "dysexecutive syndrome" in everyday activities, so as to optimise their sensitivity to problems caused by this syndrome. It is equally expected, that in improving ADL evaluations one will contribute to the improvement of the intervention process, as the needs of these individuals will be more adequately identified. This will in turn directly impact the outcome of rehabilitation services in a positive manner.

## CHAPTER 2: LITERATURE REVIEW

The literature review consists of four sections. The first section will review two complementary theoretical models, which have significantly contributed to our current understanding of the interrelation between executive functions and everyday activities. The second section will look at the definition of executive functions which has been partially derived from the theoretical models presented in the first section. Some manifestations of executive dysfunction, or of the "dysexecutive syndrome", in everyday activities, will be reviewed in the third section. Finally, the fourth section will review characteristics of assessments of the "dysexecutive syndrome" in everyday activities. As the definition of executive functions is derived from an understanding of related theoretical models, the models will be presented first, followed by the definitions.

### 2.1 Theoretical models

A certain number of theoretical models in the literature define executive functions such as the "*Temporal integration of behaviour*" (Fuster, 1997) and the "*Behavioral Anatomical Theory*" (also referred to as the "Hierarchy of Brain Functions") (Stuss & Benson, 1986). Other models not only define executive functions but also look at the relation between these cognitive processes and everyday activities. Such models include "*Managerial units and structured event complexes*" (Grafman, Sirigu, Spector, & Hendler, 1993), *Luria's Model of Cerebral Functioning* (Luria, 1973), and the *Supervisory System / Contention Scheduling Framework* (Norman & Shallice, 1980; Shallice, 1982; Shallice & Burgess, 1996; Shallice & Burgess, 1991). To have completed an in-depth analysis of all of these models, this dissertation would have had to be limited to such an analysis. As the subject



of interest extends beyond theoretical models, only two will be presented in this dissertation. The models reviewed were selected based on the following criteria: recognised and valued in the literature, applied to task analysis, and operationalised within an assessment of the “dysexecutive syndrome” in everyday activities.

The first model to be reviewed is *Luria's Model of Cerebral Functioning* (Luria, 1973) and the second is the *Supervisory System / Contention Scheduling Framework* (Norman & Shallice, 1980; Shallice, 1982; Shallice & Burgess, 1996; Shallice & Burgess, 1991).

### **2.1.1 Luria's Model Of Cerebral Functioning**

*Luria's Model of Cerebral Functioning* rests upon the hypothesis that the brain is a complex functional system comprised of groups of concertedly working brain structures, each making its own specific contribution to the functioning of the system as a whole. A lesion of any one of the components will differentially impact the output of the system and produce particular manifestations in the person's behaviour. This system is hierarchical in nature and is comprised of three basic interdependent units.

Luria (1973) states that man's mental processes in general, and his conscious activity in particular, necessarily involve the activation of all three units. The first unit is responsible for the regulation of cortical tone or waking and mental states. The cerebral areas, which comprise this unit, are mainly located in the brain stem, the diencephalon, and the medial regions of the cortex. The second unit is responsible for receiving, analysing and storing visual, auditory, vestibular and general sensory information. The cerebral areas which comprise this unit are the occipital (visual), temporal (auditory) and parietal (general sensory) regions. They are the lateral regions of the neocortex on the convex surfaces of the hemispheres, occupying the posterorolandic zones. The third unit is responsible for the programming,

regulation and verification of activity. The main cerebral area which comprises this unit is the prefrontal cortex (Luria, 1966). However, extensive two-way communications between the prefrontal cortex, the lower structures of the brain stem and diencephalon, as well as with virtually all other parts of the cerebral cortex, supports the notion of a system rather than of a localised function. The prefrontal cortex both influences and is influenced by the first and second units of the brain and depends on the integrity of these structures to attain selective goal directed behaviour (Luria, 1966; Luria, 1973).

Through his extensive research on individuals with massive frontal lobe lesions, Luria (1966, 1973) provided a scientific analysis of the manifestations of such lesions in everyday activities and a new insight into the important role of this region of the brain in man's conscious goal directed activity. The results of his studies are particularly reflected in his conception of the role of the third functional unit of the brain, i.e. programming, regulation and verification of activity. Luria described the function of this unit as follows:

"Man not only reacts passively to incoming information, but creates intentions, forms plans and programmes of his action, inspects their performances, and regulates his behaviour so that it conforms to these plans and programmes. Finally, he verifies his conscious activity, comparing the effects of his actions with the original intentions and correcting any mistakes he has made" (Luria, 1973, p.80)

A unit which has a particularly important role with regards to selective goal directed behaviour is the first unit. This unit is responsible for the regulation of cortical tone or waking and mental states. In conjunction with the third functional unit, this unit can adjust the level of cortical tone available for use according to the demands placed upon it. The level of required cortical tone varies according to the level of activity of the individual. For instance, the fulfilment of a plan or the achievement of a goal requires an increase in the level of cortical tone (from its baseline level). The presence of a goal is therefore one of the possible sources of activation for the first functional unit. Plans and intentions, originating from within the prefrontal cortex, are transmitted, through descending fibres, to the reticular formation, modulating

its work and making the most complex forms of conscious activity possible (Luria, 1973).

*Luria's Model of Cerebral Functioning* provides the general framework within which man's higher cognitive processes can be understood. However, many now consider this model too general in so far as it remains difficult, on the basis of this model, to identify the specific deficits underlying an observed pathological behaviour (Seron, Van der Linden, & Andrés, 1999). A more recent model, *the Contention Scheduling/ Supervisory System Framework*, is proposed as a refinement of Luria's third functional unit responsible for the programming, regulation, and verification of activity.

### **2.1.2 Contention Scheduling / Supervisory System Framework**

The *Model of Attention and the Control of Action*, more recently termed the *Contention Scheduling / Supervisory System Framework*, is an information processing model which was proposed by Norman and Shallice (1980), later revised by Shallice (1982), and again by Shallice and Burgess (1991; 1996). Through this model, the authors attempt to explain the discrepancies in recent research findings where individuals with prefrontal lesions perform normally on classical tests of frontal lobe function though deficits in their social functioning persist (Shallice & Burgess, 1991). The model, thus, provides a framework for a more precise and less intuitive selection of tasks for the purpose of evaluating individuals with frontal lobe deficits. It also attempts to identify the common nature of the different frontal lobe deficits underlying inappropriate behaviours and difficulties in daily activities observed in individuals with prefrontal cortex damage (Godbout & Doyon, 1995).

The model presents two qualitatively distinct processes involved in the control of everyday actions: *Contention Scheduling* and the *Supervisory*

*System. Contention Scheduling* acts on simple problems (routine) or on more complex problems for which the system already knows the answer (routine). The *Supervisory System* acts on non-routine or novel activities which include the resolution of complex problems and situations requiring new learning. In normal individuals, the function of the *Supervisory System* is to inhibit routine automatic responses to the environment in order to allow novel responses to occur. Impairment of this system causes a decrease of inhibitory abilities, which explains the intrusion of irrelevant actions. For example, a glance at a mirror triggers hair brushing in the midst of tooth brushing (Schwartz, Mayer, Fitzpatrick DeSalme, & Montgomery, 1993). This model predicts that *Contention Scheduling* can be impaired independently of the *Supervisory System*. This implies that performance on non-routine tasks can be impaired independently of performance on routine tasks. An important hypothesis of this model is that only novel tasks are sensitive to the *Supervisory System* (Shallice, 1982). The model thus predicts no impairments in routine activities secondary to frontal lobe lesions, as such automatic activities, under the control of *Contention Scheduling*, can continue to be performed normally.

Equally important, the *Supervisory System* is hypothesised to consist of at least three complementary component processes, i.e. (1) plan formulation/modification, (2) marker creation and triggering, and (3) evaluation of goals and plans (Shallice & Burgess, 1991). The process of plan formulation/modification concerns the creation of provisional plans prior to task execution and on-going modifications during task performance according to opportunities or difficulties that occur. This is partially based on the work of Suchman (1987) and Ellis (1989) (cited in Shallice & Burgess, 1991) who argued that in normal human activity, plans formed prior to task execution do not correspond to completely worked out courses of action. Planning, linked to an individual's intention to perform a certain act at a later time, is hypothesised to operate through the creation and triggering of markers. Markers are defined as messages which, when activated, trigger the initiation of certain behaviours at a certain time or interrupt an ongoing behaviour and

replace it with another. For example, in the *Multiple Errands Test* (Shallice & Burgess, 1991), which is based on this model, the individual is instructed prior to task execution that a shop must not be entered other than to buy something. To correctly execute this instruction, the authors hypothesise that the individual must initially create a marker containing this information. On approaching the shops, or upon thinking of doing so, the marker should be triggered to allow for the correct execution of the plan. The third component process, evaluation of goals and plans, is deemed to be of particular importance in the execution of novel tasks. It is significant since a task which has never been executed, cannot be known to be efficient (Shallice & Burgess, 1996). This process does not occur at a fixed moment in time but is rather seen as an ongoing process. In fact, Burgess (1997) mentions at least three evaluation stages while coping with a novel situation: assessment of the provisional plan, assessment if planned activity is still appropriate subsequent to initiation of behaviour, and assessment of the result subsequent to the completion of the activity. It is deemed that any unsatisfactory response or error is identified by this process. This leads directly to plan modification, application of correction procedures and, when necessary, the task is started anew.

In conclusion, both of these theoretical models have made significant and complementary contributions to our understanding of executive functions. Luria's model provides the general framework regarding cerebral organisation and specifies the importance of the third functional brain unit (working interdependently with the first and second brain units) for the planning, programming and verification of activity. The significance attributed by Luria to scrupulously made observations of everyday activities (i.e. feeding, cooking, working, etc) in people with localised cerebral lesions, is one of its strengths in relation to the present study. The multidimensional and systemic perspective on complex mental processes presented in his model is particularly relevant to the study of everyday activities that require the activation of practically all cognitive processes. Luria's model clearly

outlines the rationale for the study of the impact of cognitive deficits on everyday activities.

The *Supervisory System / Contention Scheduling* framework has contributed to further specifying the role of the third functional unit. Shallice and collaborators (1980; 1986; 1991) outlined specific situations which require the activation of executive processes for optimal performance. Such situations involve planning or decision making, error correction or trouble shooting, novel sequences of actions or not well learned responses, dangerous or technically difficult situations, as well as the overcoming of strong habitual responses. In essence, these authors hypothesise that the *Supervisory System* is involved in the control of non-routine or novel actions as opposed to routine or automatic actions. This hypothesis is generally accepted in the literature. However, clinical evidence indicates that certain individuals with frontal lobe damage have problems not only with novel tasks but also with everyday tasks (Godbout & Doyon, 1995; Humphreys & Forde, 1998; Schwartz, Mayer, FitzpatrickDeSalme, & Montgomery, 1993; Schwartz et al., 1998; Schwartz et al., 1991; Sirigu et al., 1996). Schwartz et al. (1991), propose that in the case of familiar actions "problems only emerge when distracting stimuli are present or when the event is not well defined". Though these authors have not directly challenged the hypotheses underlying the *Supervisory System / Contention Scheduling Framework*, they do address the possibility that deficits related to executive functions may be manifested in routine as well as in novel or non-routine situations.

These two models will provide the theoretical framework for the remainder of this dissertation. Indeed, to better understand the contribution of these models in the analysis of the manifestations of a "dysexecutive syndrome" in everyday activities, the following sections will explore, in greater detail, two principal elements: the definition of executive functions and the characteristics of assessments theoretically sensitive to the pathological behaviours related to the "dysexecutive syndrome".

## 2.2 Definitions

This section is divided into two parts. The first part will present the definition of executive functions and the second part will present the definition and certain characteristics ascribed to a “dysexecutive syndrome”.

### 2.2.1 Executive functions

Based on Luria's investigations, the term "executive functions" was proposed by Lezak in reference to those processes responsible for the formulation of goals, task planning, task regulation, verification of activity, and error correction, i.e. the third functional unit of Luria's *Model of Cerebral Functioning* (Lezak, 1982; Lezak, 1989; Lezak, 1993; Luria, 1966; Luria, 1973).

However, this one entity is, to this day, attributed a much wider variety of functions. Indeed, executive functions are generally regarded as being involved in problem solving, inhibition (Collette et al., 1999; Dujardin et al., 1999), planning (Shallice, 1982; Sirigu et al., 1995a) initiation of activity (Burgess & Shallice, 1996), cognitive estimation (Shallice & Evans, 1978; Taylor & O'Carroll, 1995), prospective memory (Cockburn, 1995), concept formation (Burgess & Shallice, 1996), analysing sequential links in the action domain (Crozier et al., 1999) and temporal ordering (Arnett et al., 1997). The common factor underlying these diverse activities is thought to be that they all involve the performance of activities that have not been automated by the person, i.e. activities which are not routine and require adaptation.

Throughout his many publications, Luria referred to the consequences of frontal lobe lesions in terms of impaired **selective, goal-directed actions**, impaired **intentional behaviour**, and / or impaired **voluntary actions** (Luria, 1966; Luria, 1973). Though later research pertaining to executive functions

was significantly influenced by his work, his own use of the term "executive" differed from its current definition, as was proposed by Lezak. In fact, Luria (1973) stated that "a frontal lobe lesion, although producing no primary defect in the structure of the **executive** (operative) component of the motor act, nevertheless disturbs the structure of a programmed, goal-directed activity, and thus makes voluntary movement and purposive action impossible" (p.251). Though his findings regarding the role of the prefrontal cortex provide the basis to our understanding of those psychological processes that constitute executive functions, it is Lezak (1982) who proposed the current terminology.

Executive functions can be defined as the psychological processes responsible for the formulation of goals, or the identification of needs, the planning and organising of the steps necessary to the execution of the activity, execution of the action plan, and correction of errors. In continuity with this definition, executive functions can be separated into four distinguishable components: (1) goal formulation; (2) planning; (3) regulated performance, and (4) controlling performance quality (Lezak, 1982). This definition also corresponds to the following definition of an "executive". An "executive" is "an individual or group constituting the agency that controls or directs an organisation". It equally refers to "one who holds a position of administrative or managerial responsibility" (Webster's New Collegiate Dictionary, 1979).

The first component, goal formulation, "refers to the complex process of determining what one needs or wants and conceptualising some kind of future realisation of that need or want" (Lezak, 1995, p.651). The second component, planning, is "the identification and organisation of the steps and elements (e.g. skills, material, other persons) needed to carry out an intention or achieve a goal" (Lezak, 1995, p.653). Regulated performance refers to the "translation of an intention or plan into productive, self-serving activity (which) requires the actor to initiate, maintain, switch, and stop sequences of complex behaviour in an orderly and integrated manner" (Lezak, 1983).



Concerning the fourth component, "a performance is as effective as the performer's ability to monitor, self-correct, and regulate the intensity, tempo, and other qualitative aspects of delivery" (Lezak, 1983). These four components are based upon Luria's description of the role of the third functional brain unit, i.e. the unit for the programming, regulation, and verification of activity, in relation to the two other units.

The planning component, in particular, has more recently received a significant amount of attention (Goel, Grafman, Tajik, Gana, & Danto, 1997; Karnath, Wallesch, & Zimmermann, 1991; Shallice, 1982; Sirigu et al., 1995b). Several definitions are proposed and several perceptions have been put forth regarding the inherent qualities of planning abilities. Schwartz and collaborators (1991) propose that, in routine everyday activities, the execution or carrying out of goal directed activity is closely coupled with planning and, that in fact, the action plan is elaborated concurrently with action, rather than prior to action. It is proposed that action plans are developed progressively subsequent to exploratory activities directed by task-relevant intentions. Shallice & Burgess (1991) equally suggest that action plans are not completely formulated prior to task execution but that a certain amount of on-line planning occurs. However, this concept of planning, as an ongoing process, lacks unanimity in the literature. Goel & Grafman (1995), for example, argue that the term "planning" refers to the charting of a course from point A to point B without "bumping" into the world. These authors suggest that the "planning" must be done in some modelling space, and that execution basically begins once the planning component is complete. These authors, thus, propose two distinct processes. One process consists of "planning" per se and the second process consists of following through or executing the plan of action.

Though most authors would agree that the term executive functions remains a poorly defined theoretical construct, a summarised definition may be proposed. Consistent with the two theoretical models presented above, it

would seem that executive functions may be defined as those psychological processes responsible for the formulation of goals, planning, task regulation, and correction of errors. In addition, these processes are also required to allow the individual to adapt to novel or non-routine situations (Shallice & Burgess, 1991). Indeed, Burgess (1997) states that "current consensus regards the executive system as a process or set of processes whose primary purpose is to facilitate adaptation to novel situations" (p.83).

### **2.2.2 The "dysexecutive syndrome"**

A deficit in executive functions has been referred to in different ways in the literature. A formerly used term was "frontal lobe syndrome" (Stuss & Benson, 1986), whereas a more recent terminology is "dysexecutive syndrome" (Baddeley, Della Salla, Papagno, & Spinnler, 1997; Baddeley & Wilson, 1988; Burgess, 1997; Burgess, Alderman, Evans, Emslie, & Wilson, 1998; Evans et al., 1997; Rabbitt, 1997; Wilson et al., 1997) or "executive dysfunction" (Collette et al., 1999; Dugbartey, Rosenbaum, Sanchez, & Townes, 1999; Marson & Harrell, 1999). The present section will look at the principal features of these syndromes. This will be followed by a brief presentation of the factors which support the use of the current terminology.

As early as 1939, Rylander described the functioning of individuals with frontal lobe damage as "well able to work along routine lines (but) cannot learn to master new types of tasks" (p.22). Luria (1966) characterised the principal features of a "frontal lobe syndrome" (or more precisely of the syndrome due to a lesion of the convex divisions of the prefrontal region) as: 1) difficulty in the formation of a preliminary synthesis (i.e. omission of, or fragmentary preliminary observations of, the conditions of the task to be accomplished; impulsive attempts to resolve the task); 2) disturbance of voluntary movement and action (ex: loss of spontaneous activity or frontal apraxia); 3) disturbance in selective goal-directed activity (i.e. inability to inhibit irrelevant stimuli, inert stereotypes or the perseveration of previously

executed motor acts), and 4) lack of continuous comparison between the plan of action and the results actually attained (i.e. unable to take account of the mistakes and cannot correct errors).

The pattern of deficits observed secondary to frontal lobe lesions typically varies greatly from one patient to another (Baddeley, 1996; Fuster, 1997; Stuss & Benson, 1986) ranging from grossly disoriented to no appreciable disturbance upon careful examination (Luria, 1966). Differences in the nature and severity of the observed behavioural disturbances can be attributed to the specific nature and extent of the lesion (Luria, 1966) and may in fact constitute a “continuum of executive impairments” (Schwartz et al., 1993).

The term “frontal lobe syndrome” was replaced by the more functionally focused term of “dysexecutive syndrome” (Baddeley, 1986) to remove the implied association between the principal features presented above and lesions of the frontal lobes. In fact, deficits typically equated with a “frontal lobe syndrome” can be present in the absence of frontal lobe lesions (Kaufman, 1974 cited in Baddeley & Della Salla, 1996) (Robbins, 1996). Equivalence can therefore not be assumed between executive functions and the prefrontal cortex (Robbins, 1996). Authors such as Rogers and collaborators (1998) invoke a frontostriatal hypothesis to executive functions. This hypothesis suggests that the interchange of information between a number of “functional loops” linking the frontal cortex, basal ganglia structures, and motor cortex may be responsible for the mediation of a range of tasks that tap so-called “executive functions” (Parent & Hazarati cited in Rogers et al, 1998). This hypothesis is consistent with *Luria's Model of Cerebral Functioning*. The term “dysexecutive syndrome” is now currently used in the literature (Baddeley & Wilson, 1988; Burgess et al., 1998; Evans et al., 1997; Wilson et al., 1997) when referring to individuals who show problems with executive control (Burgess, 1997).

Depending on the theory to which one adheres, the definitions of a "dysexecutive syndrome" may vary. Fuster (1997), for example, defines the "dysexecutive syndrome" as a deficit in the integration of new and complex behaviour in the temporal domain. This definition concurs with his underlying theoretical model entitled the "*Temporal integration of behaviour*" (Fuster, 1980). These deficits can result from impairments in one or several of the following underlying cognitive functions: attention and interference control, working memory, and planning. Fuster(1997) proposes that "trouble in any or all of them can lead, more or less directly, to inabilities in decision making and in initiating and organising behaviour". He also states the "dysexecutive syndrome" can co-exist with an intact intellectual quotient (IQ).

The information presented above was necessarily a simplification of the features of a "dysexecutive syndrome". In fact, an important problem, with "executive functions", was highlighted by Burgess (1997) as he states that "executive functions" has in essence more of a theoretical rather than an operational definition. If "executive functions" were to have an operational definition, we would most likely be able to say exactly what happens when the functions are deficient. For example, dyscalculia has an operational definition. Individuals with dyscalculia cannot do one specific thing, i.e. calculate. The problem with not having an operational definition is that it is not possible to identify exactly what someone with a deficit in these functions will have trouble with. In fact, Burgess (1997) states that many individuals with a "dysexecutive syndrome" can in fact perform any number of putatively "executive" tasks. Burgess (1997) even suggests that most patients with a "dysexecutive syndrome" overlap with the normal distribution on measures of "executive functions". Future studies are required to further explore these processes.

In conclusion, though certain definitions of executive functions and of the "dysexecutive syndrome" have been presented, the terminology contains certain ambiguities. In fact, the definitions held by various authors may vary depending on the theoretical models to which they adhere. As one of the

intents of this dissertation is to better understand the manifestations of a “dysexecutive syndrome” in everyday activities, exploring the definitions of these concepts will be an intrinsic part of this study.

## **2.3 Manifestations of the "dysexecutive syndrome" in everyday activities**

This section describes the manifestations, observed in everyday activities, that have been related to a “dysexecutive syndrome”. These manifestations cover a wide array of behavioural disturbances which have been described as: frontal apraxia (Luria, 1966), Action Disorganisation Syndrome (Schwartz et al., 1993; Schwartz et al., 1991), task inefficiency (Schwartz et al., 1993), Strategy Application Disorder (Goldstein et al., 1993; Shallice & Burgess, 1991), and Environmental Dependency Syndrome (Lhermitte, 1986). This is followed by a detailed look at the various types of errors observed in certain case studies of individuals with circumscribed lesions to the prefrontal cortex.

Luria (1966;1973) identified one of the most serious manifestations of massive frontal lobe lesions, “**frontal apraxia**”. A frequently cited example relates the performance of an individual asked to perform an action (ex: lighting a candle) that had elements in common with a more familiar action (ex: lighting a cigarette). In this instance, the individual could not retain the plan of the action and was easily distracted by the more established actions. “Having lit the candle, he would put it into his mouth, or perform the habitual movements of smoking a cigarette with it, or break it and throw it away (as he usually did with a match) (Luria, 1966, p.238). An individual with this condition loses the ability to subordinate his movements to the intention expressed in speech. It is presumably caused by a gross disintegration of the preliminary synthesis of intended actions. “Frontal apraxia” also results from a disturbance in the verification of activity, i.e. where the intention of the action must be compared to the effect. This leads to a disintegration of

organised programs, and the replacement of a rational, goal-directed action with the echopraxic repetition of movements or by inert stereotypes which have lost their rational, goal-directed character. In everyday activities, “frontal apraxia” may cause an inability to perform even the most routine of activities such as feeding, personal hygiene and dressing.

Schwartz et al. (1991; 1993) labelled a similar manifestation, observed in the early stages of recovery following a traumatic brain injury, “**Action Disorganisation Syndrome**”. Attributed to this syndrome, and to the underlying impairments in the realm of executive functions, are the significant difficulties observed with regards to the execution of everyday tasks. “Errors of action” are characterised by incoherence or fragmentation of the action planning system and a tendency to use objects in novel and bizarre ways (Schwartz et al., 1993). Though the individual retains the theoretical knowledge of how to perform a task (in contrast to ideational apraxia), he is unable to apply this knowledge to effectively plan and execute it (Schwartz et al., 1993). “Errors of action” may, for example, consist of repeatedly wetting an already wet toothbrush (perseverative error), attempting to pour milk into one’s coffee before opening the milk container (sequential error), or buttering one’s toast with a spoon (substitution error). In terms of the *Supervisory System / Contention Scheduling Framework*, it is hypothesised that, in these instances, both the *Supervisory System* and *Contention Scheduling* systems are impaired. This could explain why executive impairments, under certain conditions, extend beyond novel tasks into the realm of everyday activities (Schwartz et al., 1993). The principle causal mechanism underlying these impairments is hypothesised to involve the on-line planning of action where the ability to assemble or activate the components of the action plan or to sustain that activation is affected (Schwartz et al., 1993).

In this same study, the authors present *task inefficiency* during the execution of basic everyday activities as another manifestation which may be related to a “dysexecutive syndrome” (Schwartz et al., 1993). In this

instance, prefrontal lesions, thought to compromise the *Supervisory System*, cause an impairment in the system's ability to inhibit irrelevant actions or routine automatic responses to the environment. Consequentially, irrelevant actions that are not inhibited by the *Supervisory System* are said to intrude into the ongoing task leading to task execution inefficiency. This type of error can be differentiated from the incoherence of the behaviours observed secondary to more extensive lesions which include both *Contention Scheduling* (situated more posteriorly) and the *Supervisory System*. An example of "errors of action" related to *task inefficiency* includes proceeding to brush one's hair in the midst of brushing one's teeth subsequent to a glance at the mirror (Schwartz et al., 1993). In this instance, a temporary distraction to an environmental stimulus triggered an automatic response in the absence of an intention to perform the act.

In relation to the example cited above, a study by Reason (1984) contributes pertinent results. In this study, sixty-three undergraduates were asked to note in a diary whenever their actions deviated from their intention, otherwise called "**slips of action**". The purpose of this study was to explore the role of attention in the guidance of routine behaviour. His studies showed that in certain instances, such as when an individual is pre-occupied or distracted, an automatic or frequently executed action, but presently unintended, is performed upon sight of a given object in the environment. The following "action lapse" will be used to illustrate this point.

"I have two mirrors on my dressing table. One I use for making up and brushing my hair, the other for inserting and removing my contact lenses. On this occasion, I intended to brush my hair, but sat down in front of the wrong mirror, and removed my contact lenses instead" (Reason, 1984, p. 539).

A proposed explanation of this behaviour, based on the *Supervisory System / Contention Scheduling* Framework, is the non intervention of the *Supervisory System* (responsible for novel or non-routine actions), allowing *Contention Scheduling* (responsible for routine actions) to act on its own initiative. Reason (1984) suggests that many "slips of action" can be explained by a

failure of the intention system's attempts to revive and activate the stored intention at the appropriate time. Errors of the type noted in task inefficiency possess similar qualities to the errors reported in this normal population.

In another study, with individuals having sustained a traumatic brain injury, the authors hypothesised that in certain individuals, injury to the prefrontal structures causes an inability to reactivate, after a delay, previously generated intentions, when they are not directly signalled by the stimulus situation (Goldstein et al., 1993; Shallice & Burgess, 1991). This is referred to as a "**Strategy Application Disorder**". In this study, the errors of certain individuals with impairments limited to the Supervisory System, i.e. whose other cognitive functions were essentially intact, were analysed. The errors performed on certain tasks were suggestive of impairments in their ability to create and trigger markers at appropriate times. This implies the inability to interrupt ongoing behaviour in order to produce a specifically relevant action. Errors were grouped into three categories: (1) plan formulation or modification; (2) marker creation or triggering, and (3) evaluation and goal articulation. Examples of the errors observed included: neglected to pay for item in shop, thought he had finished the test when he had not, and went to the post office before all preliminary information had been obtained. These general findings were corroborated by Goldstein and collaborators (1993) in a case study involving an individual with a circumscribed left frontal lobectomy. Albeit intact neuropsychological test performances, this individual was impaired on a test of "strategy application" requiring goal articulation, plan specification, self-monitoring, and evaluation of outcomes, as well as the establishment of mental "markers" to trigger specific behaviour.

Another study, on individuals with resections of cancerous growths circumscribed to the area of the left frontal pole, led to the identification of another manifestation, i.e. the "**Environmental Dependency Syndrome**" (Lhermitte, 1986). Individuals with this syndrome presented with, what may be seen as, a more severe form of *task inefficiency* (Schwartz et al., 1993)



or, more precisely, an increased dependence on external stimuli (Lhermitte, 1986). Reported in this research are two case studies where individuals, while being observed acting without direct instructions from an examiner in a natural context, reportedly responded to cues in both the physical and human environment as though the environment requested them to act in a certain manner. In fact, the sight of familiar objects elicited customarily performed actions, even in the face of restraining instructions. One such instance occurred outdoors by a flowerbed where upon following the examiner, one individual noticed two water bottles in the examiner's hands and proceeded to painstakingly water all the flowers on the assumption that this was what was expected. Lhermitte (1986) hypothesises that the cause of these abnormal behaviours can be attributed to an impairment in the inhibitory abilities of the frontal lobes. Subsequent to a resection of the frontal poles, the person responds automatically to cues in the environment irregardless of whether he or she intends to execute these behaviours. The impact of this syndrome is a marked loss of autonomy of the person in relation to his or her environment (Lhermitte, 1986).

In an effort to identify deficits pertaining to the "dysexecutive syndrome", research has focused in part on the scientific analysis of the behaviours of individuals with relatively isolated frontal lobe lesions. However, as the prefrontal cortex has extensive two-way communications with all other cortical and subcortical areas which it influences and is influenced by (Luria, 1966), one may question whether it is possible to isolate functions which are exclusively controlled by the prefrontal cortex. As was mentioned by Luria (1966) and reiterated by Burgess (1997), similar observed behaviours can have quite different causes. Burgess (1997) further states that, "in practice, the only patients who are likely to conform to the criteria of no peripheral impairment in the context of clear executive problems are those who have relatively isolated frontal lobe lesions (p.88)".

With the intent of analysing more specifically the deficits of individuals with a "dysexecutive syndrome" in the performance of everyday activities, case studies reported in the literature were examined. The following criteria guided the selection process: (1) primary research reports; (2) case studies of individuals with specified lesion sites of the prefrontal cortex, and (3) of equal importance, a description of the manifestation or impact of these lesions in everyday activities. As relatively few studies were found which corresponded to all three criteria, particularly that which considered lesion site exclusive to the prefrontal cortex, this one criteria was modified. Studies with subjects whose lesion sites were not necessarily limited to, but at least included the prefrontal cortex, would be considered for inclusion. Case studies which met all three modified criteria were then selected for further analysis.

Four categories of pathological behaviours, consistent with the principal features of the "frontal lobe syndrome" presented above, were identified: (1) disturbance of initiative (apathy); (2) non-selective goal-directed activity (vulnerable to interference); (3) planning deficits, and (4) a disorder in self-monitoring. The following section will review each of these categories along with the population of individuals who are reported to present such behaviours. Specific examples of their manifestation in everyday activities will be presented.

The first category of pathological behaviours observed in everyday activities secondary to lesions including the prefrontal cortex concerns **disturbances in initiative** i.e. loss of spontaneous activity (Table I). From the articles reviewed, individuals for whom these types of behaviours were noted, had any one of the following diagnoses: massive bilateral frontal lobe lesions such as bilateral tumours of the frontal lobes with increased intracranial pressure (Luria, 1966), massive hematomas of the frontal region with inflammatory or atrophic processes (Luria, 1966; Luria, 1973), or, either unilateral or bilateral resections of portions of the frontal lobes for the removal

of cancerous cells (Eslinger & Damasio, 1985; Lhermitte, 1986; Penfield & Evans, 1935). The most severely impaired individuals were described as being completely passive to the point where not even a state of hunger could arouse them to perform the task of feeding themselves. They undertook virtually no non-essential or novel activities. Pathological behaviours pertaining to disturbances of initiative have been reported in everyday tasks such as feeding oneself, personal hygiene, meal preparation, and domestic chores.

Table I:

Example of behaviours relating to a disturbance of initiative in everyday activities

Type of lesion	Behaviours observed
Massive bilateral frontal lobe lesions (Luria, 1966;1973)	<b>Feeding:</b> <ul style="list-style-type: none"> <li>▪ Not even a state of hunger can rouse them to take necessary action</li> <li>▪ To eat, bread or food must be put into their hands (to trigger act of eating)</li> </ul>
Head injury which includes frontal lobe lesions (Shallice & Burgess, 1991)	<b>Personal hygiene:</b> <ul style="list-style-type: none"> <li>▪ Must be told to shave, change clothes or undergarments</li> <li>▪ Only bathes if going somewhere important</li> </ul> <b>Domestic Chores:</b> <ul style="list-style-type: none"> <li>▪ Hardly ever spontaneously tackles any domestic chores</li> </ul>
Partial unilateral I resections of the frontal lobes (Penfield & Evans, 1935; Lhermitte, 1986)	<b>Meal preparation:</b> <ul style="list-style-type: none"> <li>▪ Prepares meal in normal fashion if told by her husband to prepare a meal</li> </ul>
Partial bilateral resections of the frontal lobes (Eslinger & Damasio, 1985)	<b>Personal hygiene:</b> <ul style="list-style-type: none"> <li>• Some days were consumed entirely by shaving and hair-washing.</li> </ul>

The second category of pathological behaviours observed in everyday activities secondary to lesions which include the prefrontal cortex is the occurrence of **non-selective type errors** (Table II). In this instance, selective goal-directed activities are replaced by irrelevant actions, inert stereotypes or the performance of previously executed motor acts (Luria, 1966). Individuals with such deficits have a decreased ability to inhibit irrelevant stimuli which causes a disturbance in the selectivity of the action.

Luria (1966) proposes that, at least in severe cases, non-selective goal-directed activity may be attributed to a pathological inertia of old associations (perseveration). In this instance, the individual may be observed continuing the execution of a previously performed motor act even though the task demands or the situation has changed. Non-selective type errors have been reported in individuals with massive frontal lobe lesions (Luria, 1966; Luria, 1973), partial unilateral resections of the frontal lobes (Lhermitte, 1986), head injuries with lesions extending to the frontal lobes (Shallice & Burgess, 1991), an individual with shrapnel inoperably lodged in the right frontal lobe (Lezak, 1989) and an individual with an intracerebral tumour of the frontal lobes (Luria, 1966). Pathological behaviours have been reported in a variety of activities. In one case an individual reportedly walked into a cupboard of which the door happened to be open and in his way. Another individual, upon discharge from the hospital, expressed the wish to go home but 10 km from home followed his companion and settled in a small town to work in a shoe factory (Luria, 1966).

Table II

Example of behaviours pertaining to non-selective goal-directed behaviours in everyday activities

Type of lesion	Behaviours observed
Massive bilateral frontal lobe lesions (Luria, 1966;1973)	<b>Meal preparation:</b> <ul style="list-style-type: none"> <li>▪ Cooked pieces of fibre in a sauce pan (looked like vermicelli which she intended to cook)</li> <li>▪ Sees dishes and washes them even though she had no prior intention of doing so</li> </ul>
Head injury which includes frontal lobe lesions (Shallice & Burgess, 1991)	<b>Feeding:</b> <ul style="list-style-type: none"> <li>▪ Stepped out of therapy room to get a coffee, was later found on the local golf course</li> </ul>
Partial unilateral resections of the frontal lobes (Lhermitte, 1986)	<b>Personal hygiene:</b> <ul style="list-style-type: none"> <li>▪ Sees electric shaver and shaves even though he had no prior intention of shaving</li> <li>▪ Sees make-up and puts it on even though she had no prior intention of doing so</li> </ul> <b>Dressing:</b> <ul style="list-style-type: none"> <li>▪ Sees undone bed, gets undressed and ready for sleep even though he had no prior intention of doing so and was not tired</li> </ul>
Shrapnel inoperably lodged in the right frontal lobe (Lezak, 1989)	<b>Shopping:</b> <ul style="list-style-type: none"> <li>• Bought expensive kitchen utensils from door to door salesman although his kitchen was well supplied</li> </ul>

The third category of pathological behaviours observed in everyday activities secondary to lesions, which include the prefrontal cortex, is that of **planning deficits**. With this deficit the plan of action has lost its regulating influence on the individual's behaviour as a whole (Luria, 1966). This problem is also referred to as that of sequencing deficits by certain authors. Luria (1966) defines sequencing deficits occurring secondary to frontal lobe lesions as the disintegration of actions, firmly established by previous experience, into a series of isolated fragments. In its most severe form, "frontal apaxia", it is presumably caused by a gross disintegration of the preliminary synthesis of intended actions and by disturbances of the process of comparisons between intention and effect. Individuals with a "dysexecutive syndrome" are thus more or less able to effectively complete those tasks which have been initiated (Fuster, 1997). Errors related to these deficits which have been observed in everyday activities have been reported in the following populations of individuals: partial unilateral resections of the frontal lobes (Penfield & Evans, 1935), head injuries where lesions extended to the frontal lobes (Shallice & Burgess, 1991), and partial bilateral resections of the frontal lobes (Eslinger & Damasio, 1985). Manifestations of planning errors have been reported in everyday activities such as: meal preparation, shopping, and leisure activities. Errors varied in severity and ranged from, the inability to determine the sequential actions to be performed in a self care task, to the inability to organise a shopping activity.

Table III

Example of behaviours pertaining to planning deficits in everyday activities

Type of lesion	Behaviours observed
Head injury which includes frontal lobe lesions (Shallice & Burgess, 1991)	<b>Shopping:</b> <ul style="list-style-type: none"> <li>▪ Buys one item at a time and returns to his car after every purchase.</li> </ul>
Partial unilateral I resections of the frontal lobes (Penfield & Evans, 1935)	<b>Meal preparation:</b> <ul style="list-style-type: none"> <li>▪ Had all day to prepare a meal, but when the appointed hour arrived, she was in the kitchen, the food was all there, one or two things were on the stove, but the salad was not ready, and the meat had not been started.</li> </ul>
Partial bilateral resections of the frontal lobes (Eslinger & Damasio, 1985)	<b>Going to the restaurant:</b> <ul style="list-style-type: none"> <li>• Takes hours to decide where to dine as he considers each restaurant's seating plan, particulars of menu, atmosphere and management. Drives to each restaurant to see how busy it is but even then cannot decide which to choose</li> </ul> <b>Shopping:</b> <ul style="list-style-type: none"> <li>• Purchasing small items required in-depth consideration of brands, prices, and the best method of purchase</li> </ul>

The final category of pathological behaviours observed in everyday activities secondary to lesions which include the prefrontal cortex concerns a disorder in **self-monitoring**. The absence of continuous comparison between the plan of action and the result is described as the most characteristic error subsequent to prefrontal lesions (Luria, 1966). Inherent in this deficit is the loss of an essential characteristic of a “self-regulating system”. This disorder was particularly reported in individuals with massive frontal lobe lesions. In one case, an individual was observed smoking a candle and showing no sign of dissatisfaction, no attempt to correct the action and no comparison between the effect of the completed action with its intention, which in this instance was to smoke a cigarette (Luria, 1966).

In summary, few authors have described specific impacts of the “dysexecutive syndrome” on everyday activities. It can be assumed that the manifestations covered in this section are only a small sample of the many

possible associated behaviours. To develop a better understanding of these manifestations as they occur in everyday activities, is a subject of major interest of this dissertation. The current study will therefore look at exploring this subject in greater detail.

Of equal interest, few authors offer detailed information regarding the specific evaluation methods used to obtain the information presented above. As occupational therapists are frequently called upon to evaluate the impact of various cognitive deficits on everyday activities, the following section will review the characteristics of current assessments used to identify the "dysexecutive syndrome" in everyday activities.

Reviewing assessments of the "dysexecutive syndrome" presupposes that these deficits can be isolated from deficits of other underlying cognitive functions such as attention and memory. Due to the hierarchical and interdependent nature of all cognitive processes, there is little evidence in the literature to suggest that this is in fact possible. Burgess (1997) proposes that only in the absence of impairments in all other peripheral systems can the "dysexecutive syndrome" be diagnosed. Without specific information on the functioning of these other systems, the cause of the observed behaviours cannot be defined. While conscious of these complexities and the limitations of the evaluation process, we will, nonetheless, in the following section, review the current literature pertaining to the assessment of the "dysexecutive syndrome" in everyday activities.

## 2.4 Assessment of the “dysexecutive syndrome” in everyday activities

This fourth section consists of two parts. In the first part, characteristics of instruments thought able to detect pathological behaviours associated with the “dysexecutive syndrome” will be presented. The inherent challenges involved in the development of valid and reliable assessments of this condition will be outlined as well. In the second part, a review of two assessments will be presented.

### 2.4.1 Characteristics of instruments thought able to detect pathological behaviours associated with the “dysexecutive syndrome”

As no prototypical measure of the “dysexecutive syndrome” in everyday activities was found in the literature, this section will review indicators of sensitivity to the “dysexecutive syndrome”. Evaluations purported to be sensitive to this syndrome require, according to certain authors, four main characteristics: (1) **task complexity** (Baddeley & Della Sala, 1996; Baddeley, Bressi, Della Sala, Logie, & Spinnler, 1991; Burgess, 1997; Luria, 1966; Luria, 1973; Rabbitt, 1997); (2) a **non-structured approach** (Le Thiec et al., 1999; Lezak, 1982; Lezak, 1989; Lezak, 1993; Shallice & Burgess, 1991), and (3) a **natural context** (Le Thiec et al., 1999; Lhermitte, 1986; Schwartz et al., 1991). A fourth required characteristic, **task novelty**, emanates from the hypothesis that “executive functions” are necessary to facilitate the individual’s adaptation to novel situations (Duncan, 1995; Fuster, 1997; Luria, 1966; Rabbitt, 1997; Rogers et al., 1998; Rylander, 1939; Schneider & Shiffrin, 1977; Shallice, 1982; Shallice & Burgess, 1996; Shiffrin & Schneider, 1977; Wilson et al., 1997).

We will begin by examining the first required characteristic of evaluations of “executive functions”, **task complexity**. Complex cognitive tasks are tasks



that take place over longer periods of time that imply multiple operations (Shallice & Burgess, 1991). They can equally be defined as tasks which require the resolution of a problem for which the person does not have an automatic response or that requires the choice of a solution amongst many possibilities (Luria, 1973). Of the studies reviewed, Luria (1966) first proposed that, in any form of purposeful activity, making the conditions more complex allows the deficits of an individual with a "frontal lobe syndrome" to stand out with special clarity. In fact, deficits related to milder lesions of the frontal lobes may only become apparent when the execution of more complex tasks involving serial operations is required. Fuster (1997) states, that in cases of minor prefrontal damage, deficits in temporally integrating behaviour remain concealed as long as the cognitive functions that mediate sequential behaviour remain unchallenged. Certain authors insist however that the task must be more than complex, for even highly complex tasks rapidly become automated by practice (Fuster, 1997; Rabbitt, 1997). Once the task has become automated by the individual, it is no longer represented in the prefrontal cortex and no longer requires the activation of executive functions for successful performance. For example, skilled drivers have the ability to negotiate heavy traffic while carrying on in-depth conversations. This suggests that this particular task is no longer considered complex for these drivers (Rabbitt, 1997). Complexity must, therefore, be considered in conjunction with novelty, since what is seemingly represented in the prefrontal cortex are the novel structures of complex action. In summary, for a task to require the activation of executive functions it should be both novel and complex for the individual.

**Task complexity** has equally been paralleled with *open ended multiple sub-goal situations* (Shallice & Burgess, 1991). Everyday activities require the person to: (1) organise or plan behaviour over prolonged time periods; (2) set priorities in the face of competing tasks; (3) tackle tasks that have no clear correct solution, and (4) schedule many different activities over the time available. The testing situation should present similar challenges. A multiple

sub-goal situation attempts to tap into these different facets of daily living activities by recreating the same cognitive demands for evaluation purposes.

**Task complexity** has also been discussed in terms of *dual task performance* (Baddeley & Della Sala, 1996; Baddeley et al., 1991). In a study which investigated patients suffering from dementia of the Alzheimer type, Baddeley (1991) demonstrated that the deterioration in performance of Alzheimer patients is a function of whether single or dual task performance is required, and is not dependent on simple level of task difficulty. Baddeley and Della Salla (1996) demonstrated that in individuals with known frontal lobe lesions, dual task performance is associated with observed behavioural problems.

Of equal importance but less frequently reported in the literature is a second recommended characteristic of evaluations sensitive to the “dysexecutive syndrome”, a **non-structured approach**. Certain studies have in fact shown that the evaluation approach should ideally allow for the observation of individuals acting on their own behalf and not simply responding to an examiner’s instructions regarding what to do, how, and when. Shallice & Burgess (1991) identify certain limitations to currently used measures of executive functioning which they say generally involve a single task, are strongly initiated by the examiner, take place over a relatively short time interval, and where successful trial completion is clearly identified by the examiner. Certain studies have shown that a more *open ended multiple subgoal situation* is more sensitive to the deficits of individuals having sustained a traumatic brain injury as noted in their real world functioning, an inherently non structured situation (Le Thiec et al., 1999; Shallice & Burgess, 1991). This type of approach is said to permit the observation of some of the most important facets of executive functions. Lezak (1982) in fact proposes that “the more open-ended and unstructured the task, the more likely will impairments in programming become evident (p.290)”.

Goel and collaborators (1997) argue that real world situations are invariably *ill-structured problems*, a term with a similar definition to **non structured**. An example of such a problem is a situation where someone is asked to design a toy aeroplane without any specifications regarding the start state (e.g.. should it be made of wood, steel, cardboard etc), the goal state (e.g. size, colour, should it fly?etc.), or the transformation process ( e.g. how should it be made? By folding paper? Cutting cardboard? etc.). Before an *ill-structured problem* can be solved it must first be structured. Their results indicate that individuals with frontal lobe lesions spend a significant amount of time trying to structure the problem, leaving little time to actually attempt to solve the problem. They also present with a judgement impairment, whereby they have difficulty determining the correctness of their response (or a self-generated feedback measure) in a situation which lacks a right or wrong answer but necessarily has a better or worse answer. Individuals with frontal lobe lesions have been observed to rapidly determine that they have attained a correct solution, eventhough in reality, they have made incorrect responses (Goel et al., 1997).

A third recommended characteristic of evaluations sensitive to the “dysexecutive syndrome” is that the evaluation be completed in a **natural context**. A discrepancy has been repeatedly reported between classic frontal lobe tests and real world functioning, where individuals perform adequately on classical frontal lobe tests while continuing to experience significant difficulties in their everyday activities (Eslinger & Damasio, 1985; Le Thiec et al., 1999; Shallice & Burgess, 1991). Considering that behaviours as complex as executive deficits are most apparent in social, real world settings, the need for more ecologically valid tests has become an issue of high priority in the literature (Cripe, 1996; Goel et al., 1997; Johnstone & Frank, 1995; Wilson, Evans, Emslie, Alderman, & Burgess, 1998). As was discussed by Schwartz et al. (1991), everyday activities involve continuous interaction with the environment and studies pertaining to executive impairments should include systematic observations not only of the

person but also of the environmental context (ex: object availability and accessibility) and of its effect on the person's performance. In his review, Cripe (1996) proposes that new evaluations, more sensitive to the complex, interactive and dynamic qualities of real events would necessarily need to be developed.

"Executive functions" were previously defined as those processes whose primary purpose is to facilitate adaptation to novel situations (Burgess, 1997). Consistent with this definition, the fourth recommended characteristic of evaluations sensitive to the "dysexecutive syndrome" is **novelty**. Novel, as an adjective, is defined as "new and not resembling something formerly known or used" (Webster's New Collegiate Dictionary, 1979). In the context of executive functions, novel situations are situations whereby the individual must, for the first time, recognise, evaluate, and choose among a variety of alternative options (Rabbitt, 1997). These situations are said to require continuous decision making and are contexts for which automatic sequences of behaviour have not been previously established (Shiffrin & Schneider, 1977). This is in contrast to non-executive situations where previously identified and practised behaviours are executed without the need to propose and evaluate alternatives. Executive functions are, thus, "necessary to initiate new sequences of behaviour and also to interrupt other ongoing sequences of responses in order to do so" (Rabbitt, 1997, p.5). Reason (1984) also states that: "in a novel task, one needs to pay close and laboured attention to the consequences of one's actions in order to achieve one's ends (p.516). "

The role of the frontal lobes in facilitating an individual's adaptation to novel situations is not a new concept. As early as 1939, Rylander described the functioning of individuals with frontal lobe damage as "well able to work along routine lines (but) cannot learn to master new types of tasks" (p.22). Several more recent studies have in fact demonstrated that the prefrontal cortex is most active when considering novel and complex tasks (Fuster, 1997).

Rogers and collaborators (1998) state that “the prefrontal cortex makes its greatest impact on cognition early in practice when the novelty of the situation requires the deployment of rule-induction and problem-solving processes (p.837)”. Their results further suggest that both the right and left frontal cortex participate in the global organisation of behaviour when individuals are faced with new and untried combinations of task conditions.

As was stated in the introduction to this section, the evaluation of the “dysexecutive syndrome” poses many challenges. The issue of task selection must address the challenge of finding a task which is complex for an individual as even complex tasks can quickly become automated (Rabbitt, 1997). The use of a non-structured approach directly opposes traditional testing practices where the evaluator requests the subject to complete specific tasks, in a specific fashion etc. (Lezak, 1989). Evaluations in a natural context pose a different sort of challenge in that many find this type of evaluation too time consuming and the influence of external unpredictable events render interpretation difficult. And finally, task novelty poses a particular challenge in that as tasks can only be novel once, tests tend to lack test / retest reliability (Rabbitt, 1997).

Though no prototypical measure of the “dysexecutive syndrome” in everyday activities was found in the literature, two assessments that met preliminary inclusion criteria will be presented in the following section. These two assessments, one developed primarily by occupational therapists and the other by neuropsychologists, will be examined in continuity with the information presented in this section.

## 2.4.2 Review of two assessments

Several studies have underlined the inherent difficulties involved in the evaluation of executive functions (Burgess, 1997; Rabbitt, 1997). Indeed, certain classical tests of executive functions have been shown to present an uncertain validity and a poor ability to predict real life performance (Eslinger & Damasio, 1985; Le Thiec et al., 1999; Shallice & Burgess, 1991), and few ADL assessments consider the impact of executive functions on the performance of everyday activities (Bottari & Dutil, 2000). The interest of this section is to consider evaluations that are a cross-over between these two areas, i.e. executive functions and everyday activities.

This section thus describes the two assessments that met inclusion criteria based on concepts relevant to this study, i.e. based on a theoretical model of cerebral functioning, use of tasks of everyday activities in a natural context, task analysis based on a formal definition of the concept of executive functions, and sufficient information available in the literature for an in-depth analysis. The two assessments, which met these criteria, are: the *ADL Profile* (Dutil et al., 1996) and the *Multiple Errands Test* (Shallice & Burgess, 1991).

### *ADL Profile*

The *ADL Profile* (Dutil et al., 1991; Dutil, Forget, Vanier, & Gaudreault, 1990; Dutil et al., 1996) considers three domains of everyday activities, i.e. personal care and home and community management. For each domain pertinent activities, according to expert opinions, were identified. Twenty-six everyday tasks are thus grouped into 10 activities (personal hygiene, dressing, feeding, health & safety, meal preparation, house cleaning, transportation & mobility, service utilisation, financial management, and time management). This assessment was developed to measure independence

in everyday activities with particular consideration given to the impact of executive functions. Its validity with regards to the evaluation of the “dysexecutive syndrome” is however unknown. Three sources of information are considered in the assessment procedure; direct task observation in the person’s **natural context** (which can in certain instances be an institution if that is what the person considers as his /her dwelling), and two semi-structured interviews (one with the individual and another with a significant other). For the purpose of the present discussion, emphasis will be placed upon the first part of the evaluation, i.e. direct task observation.

The first part of the *ADL Profile*, direct task observation or task analysis, is based on *Luria’s model of cerebral functioning* (1973; 1978). The evaluation procedure encourages the person to complete, where possible, all aspects of a task i.e. goal formulation, planning, execution, and correction of errors, with as little support or assistance from the evaluator. Accordingly, the recommended evaluation approach is one which favours the provision of only **minimal structure** by the evaluator in terms of task selection, planning, execution, etc. Observations occur within a more or less structured approach. For example, the therapist may simply ask the person to do what he or she would normally do, pertaining to everyday activities, while she observes. Ideally this allows for an open-ended and multiple subgoal situation. Alternately, she may formulate a general goal (ex: for the task of preparing a hot meal the therapist gives an initial instruction along the lines of “You must prepare and serve a hot meal and drink for one person”). In this instance, the more specific goal formulation and planning of the activity (such as the type of meal which will be prepared, whether all of the necessary food and cooking utensils are available or whether they must be bought, and amount of time required for the execution of the selected meal ) must be elaborated by the individual. Tasks thus selected by the evaluator may consist of both routine and familiar tasks as well as **non-routine** and **complex tasks**.

Through the integration of activities from the domestic and community management dimensions, the *ADL Profile* incorporates tasks that have often been shown to be **complex and non-routine** for individuals with a traumatic brain injury. Tasks with a higher level of complexity include activities such as financial planning and the use of public services (Dutil, Vanier, & Lambert, 1995). The semi-structured interview provides pertinent information regarding an individual's habits and experiences pertaining to the 26 tasks prior to the accident, actual functioning in the absence of the evaluator (i.e. the ability to initiate tasks in response to personal needs as they arise over a 24 hour period), recent changes in living arrangements as well as the individual's and a significant other's perceptions regarding the strengths and weaknesses pertaining to functioning in everyday activities (need for greater initiative, level of satisfaction with current level of functioning, and the resultant handicap situation). All of this information contributes to the final interpretation of the results.

This minimally structured approach also prescribes when and how assistance (whether verbal or physical) is to be given by the therapist. To this end, the administration guide instructs the therapist how to offer assistance in a graded fashion with the particular intent of restraining the therapist from completing various aspects of the tasks. Therapists are instructed not to pre-select tasks presumed compatible with the person's abilities, not to prepare the materials necessary for completion prior to initiation of the activity nor to identify or correct errors for the person during task performance except of course when the person's security is at risk.

The framework which supports task analysis stems from *Luria's model of cerebral functioning* (Luria, 1966; Luria, 1973). The administration protocol offers guidelines to classify errors according to the four related components of "executive functions" which are goal formulation, planning, task regulation, and correction of errors. Consistent with its stated purpose of measuring level of independence in everyday activities, tasks are rated on a four point



ordinal scale on the basis of level of independence: (3) independent without difficulty executing any of the operations nor the task in a reasonable time and in an acceptable manner (2) independent with difficulty executing any one operation, all of the operations or the task as a whole (1v) verbal assistance is required for the task to be completed within a reasonable time frame and in an acceptable manner (1p) physical assistance is required for the task to be completed within a reasonable time frame and in an acceptable manner (1vp) both verbal and physical assistance are required for the task to be completed within a reasonable time frame and in an acceptable manner (0) dependant for the execution of any one operation, all of the operations or the task as a whole. The person is unable to complete the components of the task in a reasonable time frame or in an acceptable manner, with or without verbal and physical assistance. Interpretation of the findings includes a process whereby the results obtained during task observation are analysed in conjunction with information obtained from the interviews.

A series of studies conducted since 1992, principally with persons who sustained a traumatic brain injury, have confirmed various aspects of the validity and reliability of the *ADL Profile*. In a first study by Rousseau, Dutil and Lambert (1994), it was shown that the task score is reproducible between trained therapists (kappa: 0.23 to 0.72). Inter-rater reliability is lower for the operations' score (kappa:0.10 to 0.62). This finding is explained by the limited training provided to the evaluators regarding executive functions. Results of another study (Dutil, Lambert, Rousseau, 1994) indicated very good stability of the test upon repeated measurements (kappa: 0.45 to 0.93) as well as very good homogeneity and internal consistency among the 21 tasks selected to represent everyday activities (Cronbach's alpha: 0.82-0.93).

A trait validity study regarding the concept of **independence** compared the *ADL Profile* (personal hygiene) to the *Functional Independence Measure*

(Gervais, Dutil & Bourbonnais, 1995). The relation between the two instruments (Kendal's tau c: 0.40 to 0.73) indicated that the *ADL Profile* can be used as a measure of independence in self care.

The concept of **everyday activities**, defined along an environmental continuum (i.e. self care, domestic and community management) and organised in activities, tasks and operations was also studied (factorial validity). Preliminary findings suggest that the 21 tasks of the observational assessment can be subdivided according to three factors. More automatic and routine activities, such as self-care converge under one factor and seemingly more complex tasks are linked to two separate factors (Dutil, Rousseau, Vanier, Lambert, Gaudreault, Auger, Labelle, 1994).

To better interpret the results of two financial planning tasks (paying a check by mail and preparing a budget), a normative study was completed on 183 subjects (79 men and 104 women, between 16 and 75 years of age) (Dutil, Auger, Gaudreault, Bellemare, Lambert, 1992). This study provided valuable information for the comparison of errors observed in subjects with and without cerebral lesions.

### *Multiple Errands Test*

The *Multiple Errands Test* (Shallice & Burgess, 1991) consists of an **open-ended multiple sub goal situation**, otherwise known as a Strategy Application Disorder task. It was developed to evaluate the "dysexecutive syndrome" and has been shown in some studies to be more sensitive than more traditional frontal lobe tests (Le Thiec et al., 1999). Though it has not yet been sufficiently studied to be considered a prototypical measure of the "dysexecutive syndrome" in everyday activities, it provides very valuable indicators for such an assessment. It consists of a series of eight tasks to be completed by the subject within an unfamiliar shopping precinct. Six of these are simple shopping subtasks (ex: buy a brown loaf of bread, buy a packet of throat pastilles) and one is a more complex task ( i.e. answering four

questions which require a certain amount of information gathering from newspapers, shops, etc.). The remaining task involves being at a particular place 15 minutes into the evaluation. The execution of this test requires that the subject carry out a set of unrelated subtasks by following information given in relevant written instructions. Instructions define the tasks to be performed as well as when they should be carried out. Also included are certain simple rules which the subject must obey during task execution.

The *Multiple Errands Test* (Shallice & Burgess, 1991) is based upon the *Contention Scheduling / Supervisory System Framework* (Norman & Shallice, 1980; Shallice, 1982; Shallice & Burgess, 1996). The goal is to evaluate executive functions (i.e. to situate the level of dysfunction within the *Supervisory System* and to hypothesise on the presence of a *Supervisory System* dysfunction) in a more naturalistic setting. This model provides the framework for task selection and task or error analysis. In accordance with the definition by Burgess (1997) of executive functions as being “those psychological processes which allow for the adaptation of the individual to **novel situations** (p.83)”, task selection includes at least one task that is considered novel and complex (i.e. answering four questions for which the information can be obtained from newspapers or from observation of all the shops in the shopping precinct where the evaluation is taking place) and the tasks are executed in an unfamiliar shopping area. The individual must also co-ordinate and execute many tasks simultaneously which contributes to **task complexity** (dual task performance). Included in the evaluation as well is a task requiring the individual to create a marker and to trigger it at a later date (i.e. required to be at a certain location 15 minutes into the evaluation). The authors hypothesise that the *Supervisory System* controls this marker creation and triggering process. The sensitivity of the test to a deficit in the *Supervisory System* remains tenuous, according to the authors, as the test was also difficult for some of the normal control subjects.

Errors or lapses which occur during task execution are categorised according to hypothesised subsystems of the *Supervisory System* which are (1) plan formulation or modification; (2) marker creation or triggering, and (3) evaluation and goal articulation. Errors are identified in terms of inefficiencies, rule breaks, interpretation failures, task failures and total errors. The results of a study done by Shallice & Burgess (1991) suggest that although the *Multiple Errands Test* (considered to involve the execution of non routine tasks) involves all three subsystems and that errors appear to occur from a failure of one or another of them, it is not possible to be precise about which process was impaired (Shallice & Burgess, 1991). It has also been noted that overlaps between the three subsystems may exist, not only within the *Multiple Errands Test* but even more evidently within everyday life behaviour where categorising the lapses is even more difficult as a longer period of time is involved (Shallice & Burgess, 1991). A study by Le Thiec and collaborators (1999) weighted the scores obtained on each of these error categories according to their difference from an ideal strategy developed by the authors. The weighting of the scores aimed to more accurately reflect the degree of severity of the error.

The evaluation favours the use of a **minimally structured approach** such that the individual is not directly guided to initiate each sub-component of the task (though he has been given prior instructions regarding each of the required components that should be executed). Furthermore, the examiner does not provide a clear delimitation of what constitutes a correct response which is congruent with one of the proposed characteristics of a non-structured approach (Lezak, 1982).

Two follow-up studies have been reported on the *Multiple Errands Test* (Goldstein et al., 1993; Le Thiec et al., 1999). The results obtained from both of these studies, as well as from the original study by Shallice & Burgess (1991), suggest that the *Multiple Errands Test* is more sensitive to the "dysexecutive syndrome" than classical "frontal lobe" tests for individuals with

a traumatic brain injury in a post-rehabilitation phase. Le Thiec and collaborators (1999) also suggest that the *Multiple Errands Test* demonstrates a better appreciation of the handicap situation though little conclusive evidence for this is offered.

In conclusion, two assessments that met preliminary inclusion criteria have been presented, i.e. the *ADL Profile* and the *Multiple Errands Test*. As no prototypical measure of the "dysexecutive syndrome" in everyday activities was found in the literature, these assessments were analysed on the basis of indicators of sensitivity to the "dysexecutive syndrome", the definition of executive functions, and the theoretical models upon which they are based.

It is thought that the *ADL Profile* could be adapted to more specifically address the previously stated characteristics, i.e. complex and novel tasks for the individual, natural context, and a non-structured approach. These characteristics, issued exclusively from the neuropsychological literature in reference to the evaluation of the "dysexecutive syndrome", may not completely reflect all the necessary variables of an evaluation which is interested in evaluating the impact of the "dysexecutive syndrome" and not only its presence or absence. This issue will be addressed in the present study.

The focus of the *Multiple Errands Test* is limited to determining the presence or absence of the "dysexecutive syndrome" and not to examine the impact of this syndrome on everyday activities. This assessment which only covers a small range of tasks in a community setting, does not give sufficient information to determine the impact of the "dysexecutive syndrome" on everyday activities. The final research question will, thus, be to identify the ideal characteristics of a comprehensive evaluation of the impact of the "dysexecutive syndrome" on everyday activities.

### *Conclusion*

Recent studies have either focused on the cerebral mechanisms underlying the “dysexecutive syndrome” or on individual behavioural acts, but few have looked at this syndrome from the perspective of its impact on a person’s life roles and responsibilities. The purpose of this research is to identify criteria needed to improve the sensitivity of ADL assessments to detect the impact of the “dysexecutive syndrome” on everyday activities. To attain this goal, two preliminary objectives were considered, that is (1) to better understand the concept of executive functions and (2) to better comprehend manifestations associated with a “dysexecutive syndrome” in everyday activities.

The presence of a poorly defined theoretical construct, the absence of a golden standard, the uncertain validity of currently available evaluations of executive functions, and the poor ability of tests to predict real life performance, motivated the use of a constructivist approach in the present study.

## **CHAPTER 3 : METHODOLOGY**

The purpose of this research is to identify criteria needed to improve the sensitivity of ADL assessments to detect the impact of the “dysexecutive syndrome” on everyday activities. To attain this goal, two preliminary objectives were considered, that is (1) to better understand the concept of executive functions and (2) to better comprehend manifestations associated with a “dysexecutive syndrome” in everyday activities. A constructivist methodology was selected in this study as there exists a limited amount of theoretical knowledge on the subject.

### **3.1 Research approach**

An exploratory research design using a constructivist methodology called “The Fourth Generation Evaluation” (Guba & Lincoln, 1989) was perceived as being the most appropriate. This methodology proposes that the core task of the researcher is to orchestrate, among stakeholders (service providers, beneficiaries,...), a comparison and contrast of divergent views, with the idea of co-constructing a consensus synthesis. The researcher assumes a position of facilitator in an effort to allow the active participation of stakeholders.

The process, the hermeneutic dialectic circle (Guba & Lincoln, 1989), can be described as follows. The first stakeholder (R1) is interviewed by the researcher. In this interview, the person is invited to freely express all of his or her views on the subject in question. A construction of the views expressed thus far in the research process (C1) is then completed by the researcher. The second stakeholder (R2) is then interviewed by the researcher. The second stakeholder has an opportunity to express his or her

personal views on the issue as well as a commentary on the construction (C1) of the views expressed thus far in the research process. The process is repeated with every stakeholder. Time and resources allowing, once all stakeholders have been interviewed, the “circle” can start again with the first stakeholder commenting on the construction thus far (Cn) and can be repeated until there is a general consensus, though this goal may only rarely be attained. To help stakeholders better understand the views of other stakeholders, the researcher can also introduce outside information. The richness of the process stems from the exploration of divergent views amongst all stakeholders.

As will be presented below, only the general guidelines of “The Fourth Generation Evaluation” were applied in the present study. The main interest of this approach lay in the negotiation process amongst all concerned i.e. the researcher and the stakeholders. In our case, the stakeholders were experts in neuropsychology and occupational therapy.

## **3.2 Selection of experts**

### *Selection criteria*

The number of respondents in the study should be based on a principle of saturation whereby increasing the number of respondents does not add any new information (Poupart et al., 1997; Van der Maren, 1996). Saturation was not a goal in this study as the number of experts was a priori chosen to be very small. This decision was based on several factors such as the very restricted number of individuals possessing the required expertise living in the vicinity of the researcher, the highly theoretical nature of the subject, the complexity of the required data analysis, and the necessity for the researcher to analyse theoretical data pertaining to a discipline other than her own (neuropsychology). As the study was completed in the context of a master’s



project, absence of financial resources prevented the selection of experts living far or those who would require some sort of financial compensation.

Use of a small sample is also acceptable in the context of “elite interviewing”, as was used in this study. An elite interview is considered as “ a specialised treatment of interviewing that focuses on a particular type of respondent. Elites are considered to be the influential, the prominent, and the well-informed people in an organisation or community” (Marshall & Rossman, 1989, p. 94). They are selected for interviews on the basis of their expertise in areas relevant to the research. At home in the realm of ideas, theories and generalisations, they contribute great insight and meaning to the interview process.

The participants selected for the study had to be two special respondents, one a neuropsychologist and the other an occupational therapist, with expertise in areas relevant to the research, i.e. executive functions and everyday activities. These representatives from two appropriate disciplines should possess the requisite vast experience in the evaluation and rating of individuals with a “dysexecutive syndrome”, above average ability to interpret their behaviours, an in-depth understanding both of related theoretical models and of the operationalisation of these models within an evaluation, extensive experience in related research projects and thus contribute to the goals of the present study.

#### *Recruitment of experts*

A simple nomination and selection process was used to identify these experts. The research director supplied information on the existence of local experts and assisted in obtaining cooperation where necessary. As the difficulties in accessing “elites” is often seen as a disadvantage to this research approach, the research director’s assistance in making initial contacts with these experts was essential to recruitment success. The two

experts who accepted to participate in the research study signed consent forms and an ethical certificate was obtained (annex A).

### *Sample Profile*

Two experts accepted to participate in the research study. The occupational therapist has worked for several years as a clinician with neurological clients. She also worked for five years as a research assistant on validity and reliability studies of the *ADL Profile*. Within the context of this project, she evaluated and rated over 60 severe traumatic brain injury patients on each of the 26 tasks of everyday activities within their home and community. As the rating of each task was based on Lezak's (1989) formal definition of executive functions and *Luria's model of cerebral functioning*, she has demonstrated an understanding of related theoretical models and of their operationalisation within an evaluation. She also participated in a normative study where she evaluated and rated 183 individuals on two financial planning tasks with this same basis for task analysis. And finally, she was research assistant for a cerebral lesion localisation study for 20 severe traumatic brain injury patients and has co-authored a series of articles pertaining to the ADL evaluation of traumatically brain injured individuals.

The neuropsychologist who participated in this study has completed his post-doctoral studies. He is a full time researcher and assistant professor. He has been participating in research projects related to executive functions for the last 7 years. His studies have concerned individuals with various cerebral lesions such as Alzheimer's, traumatic brain injury and stroke. In the context of his research work, he has evaluated and rated over 100 individuals using a variety of executive function tests which he has either developed or modified for the specific needs of various clientele. The majority of these tests take place within a natural context and make use of tasks of everyday activities. He has published a series of articles on related theoretical models and the operationalisation of these models within

evaluation approaches. The main theme of his ongoing research work is the evaluation of executive processes.

### **3.3 Research design**

In the following section, the three main steps in the research design will be presented that is: (1) individual interviews; (2) data constitution, reduction and analysis, and (3) inter-expert negotiation.

#### **3.3.1 Individual interviews:**

The first phase of the research project consisted of initiating a contract and individual open interviews with each expert. The following sections describe in detail the steps in the formation of expert opinions.

##### *Initiating a contract*

As this phase of the research process has been shown to be of critical importance to the outcome of this kind of study (Guba & Lincoln, 1989), and as the Fourth Generation Evaluation is not a widely known methodology, initiating the contract was a multi-step process. The first step involved a series of informal conversations with each expert. Topics which were discussed included the purpose of the present study, a brief description of the methodology, expectations placed on the participants, guarantee to respect confidentiality and anonymity, technical specifications (participants, tentative schedule of project), the experts related experience, and interest in collaborating in the study. This was followed by other informal discussions to initiate an exchange on the subject of interest. Upon reception of the expert's acceptance to participate in the research study, a letter was mailed out summarising the details of the research methodology (annex B). This

included the tasks to be completed by each expert, and a series of articles deemed highly relevant to the constructs under study.

In keeping with the theoretical nature of the study and wishing to increase the information available to all participants (to ensure a high level of sophistication of the final construction), eight articles were pre-selected for the experts as preliminary readings. These articles, that they may or may not have previously consulted, were proposed with the thought they they may indirectly allow for the consideration of opinions formulated by a vaster pool of experts. These articles were selected subsequent to a review of the literature pertaining to executive functions and activities of daily living. As the use of different search engines (such as MEDLINE, CINAHL and PSYCINFO) using both “executive functions” and “activities of daily living” as key words gave limited results, pertinent articles were identified from reference lists found in pre-selected articles. Our literature review also comprised references used by experts such as Luria, Shallice, Burgess, Lhermitte, Schwartz and, Lezak.

The selected articles were mainly written by renowned authors (as confirmed by the Science Citation Index, 1999) and retained principally for their scientific contribution to our three research questions. Specific selection criteria included the following: primary source research reports, scientific value of the research, peer reviewed journals, presentation of a frequently cited theoretical model or current reflection on the research and evaluation methodology related to executive functions by an authority in the field.

The following table briefly summarises the articles presented to the experts as preliminary readings.

Table IV  
Description of preliminary readings for experts

Author and Year	Journal or Book	Title of article	Main ideas
Luria (1973)	<u>The Working Brain: An Introduction to Neuropsychology</u> chapter 2, pgs. 43-101	The Three Principal Functional Units	The author presents his <b>theoretical model</b> entitled " <b>The Model of Cerebral Functioning</b> " as well as its rationale.
Luria (1978)	<u>Les fonctions corticales supérieures de l'homme</u> Deuxième partie, chapitre 5, pgs: 261-350	<i>Perturbations des fonctions corticales supérieures en présence de lésions des lobes frontaux</i>	The author presents his research findings, as well as an extensive literature review, regarding the <b>manifestations of frontal lobe lesions</b> .
Shallice (1982)	<u>Philosophical Transactions of the Royal Society of London</u> , 298, 199-209	Specific impairments of planning	The author presents his <b>theoretical model</b> developed by himself and Norman, D.A. (1980). This model predicts that performance on non-routine tasks can be impaired independently of performance on routine tasks.
Lhermitte (1986)	<u>Annals of Neurology</u> , vol. 19 9 ( 4): 335-343.	Human Autonomy and the Frontal lobes. Part II: Patient behaviour in complex social situations: The "Environmental Dependency syndrome".	The authors present two case studies of individuals who had <b>left frontal lobectomies</b> . The manifestations of these lesions as observed in real life settings that is a garden, a gift shop, etc. are identified as the "Environmental Dependency Syndrome".
Shallice & Burgess (1991)	<u>Brain</u> , 114, 727-741.	Deficits in strategy application following frontal lobe damage in man	The authors present three case studies of individuals who sustained head injuries with evidence of lesions in the frontal regions. The <b>discrepancy between neuropsychological test results and real world functioning</b> observed in these individuals prompted the authors to propose two new tests that is the Six Elements Test and the Multiple Errands Test. The latter takes place in a natural setting that is a commercial centre.
Schwartz, et al. (1993)	<u>Journal of Head Trauma Rehabilitation</u> , 8(1): 59-72.	Cognitive theory and the study of everyday action disorders after brain damage	The authors present a theoretical explanation for the difficulties experienced by individuals with a traumatic brain injury in the execution of <b>simple tasks of everyday activities</b> .
Rabbitt (1997)	<u>Methodology of Frontal and Executive Function</u> Chapter 1, pgs 1-38	Introduction: Methodologies and Models in the Study of Executive Functions	In this recently published book chapter, the author offers a critique of current <b>definitions of executive functions</b> and of certain related theoretical models. The challenges associated with related research methodologies are equally presented.

Author and Year	Journal or Book	Title of article	Main ideas
Burgess (1997)	<u>Methodology of Frontal and Executive Function</u> Chapter 4, Pgs 81-116	Theory and Methodology in Executive Function Research	In this recently published book chapter, the author reviews the <b>nature, definition and fractionation of executive functions</b> . Emphasis is equally placed on the problems associated with measurement of behaviour in novel situations.
Humphreys & Forde, (1998)	<u>Cognitive Neuropsychology</u> , 15 (6/7/8), 771-811.	Disordered Action Schema and Action Disorganisation Syndrome	The authors look at how the <b>performance of everyday tasks is disrupted following damage involving the frontal lobes</b> . Findings are reported regarding the performance of three individuals with lesions including the frontal lobe on <b>relatively simple everyday tasks</b> .

Each expert was invited to read the articles, particularly those with which he was least familiar, and to use them as a basis for reflection. Irrespective of the quality of the articles, experts were invited to remain critical of the issues and results presented in these readings to not limit their own ideas. The experts were equally informed that other articles could be provided if desired.

*Open ended individual interviews:*

Interviews were used to gather information. Interviews are recommended when one wishes to obtain information on the opinions and perceptions of individuals with regards to the problem under study (Lessard-Hébert, Goyette, & Boutin, 1996; Van der Maren, 1995-1996). They are also a core element in the "Fourth Generation Evaluation". In preparation for these interviews, the experts were given a copy of the interview guide a few days prior to the interview. The interview guide was developed with a consultant expert neuropsychologist and the research director and consisted of the three following questions: (1) *What are "executive functions"?*, (2) *How are "executive functions" manifested in everyday activities?*, and (3) *What would be the characteristics of a comprehensive ADL evaluation tool if we wish it to consider the impact of executive functions on everyday activities?*. The use of an interview guide had a dual purpose: preparation of the experts and facilitation of the cross-case analysis. Experts were instructed that they

should by no means limit themselves to the interview guide but rather use it as a starting point for their reflection process.

The interviews took the form of conversational style interviews where both the expert and the interviewer were free to exchange ideas and views with the perspective of creating a learning experience for both the expert and the interviewer. Each of these interviews lasted between two and a half to three hours and was completed within a three-week period. Interviews were conducted by the researcher and, to respect the language of the experts, took place in French. The setting in which the interviews were conducted was a quiet office of the expert's choosing.

As this particular study was limited to only two experts, the format or hermeneutic circle of the "Fourth Generation Evaluation" described earlier, was slightly modified. That is the experts were not asked to comment on the views of the other expert until a later time, i.e. the follow-up interview and the negotiation session. Follow-up interviews, completed with each expert, served to identify issues of disagreement or subjects requiring further discussion within the inter-expert negotiation session.

These interviews were also complemented with a series of informal discussions that were not taped nor transcribed but served to further the research process. Informal discussions generally took place over the phone.

### **3.3.2 Data constitution, reduction and analysis**

This next section presents a detailed description of the procedures applied in constituting, reducing and analysing the data. The analysis was based on a framework presented by Van der Maren (1999). The steps used in the present study are summarised in Figure 1. This second stage of the research design took place over a period of eleven months.

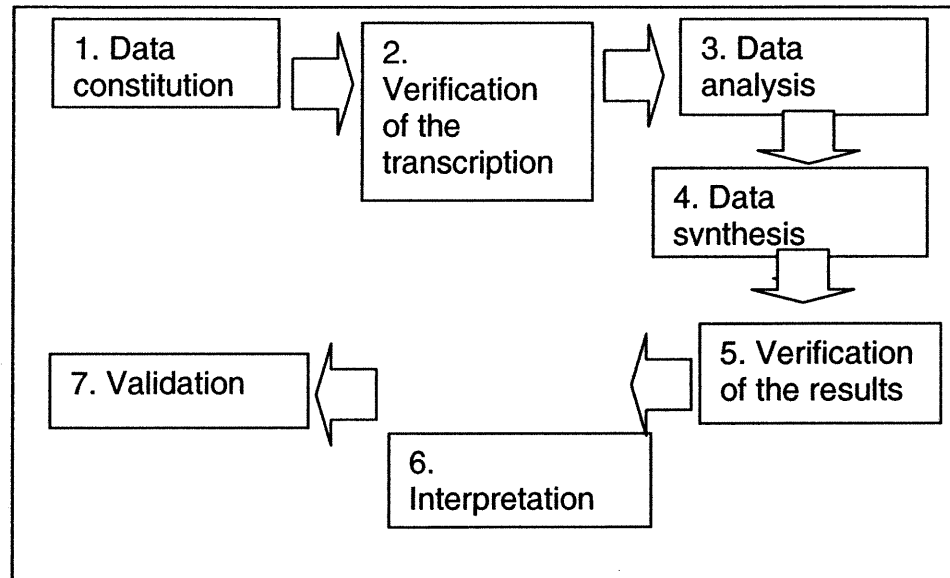


Figure 1 : Protocol for Data constitution and Analysis  
(adapted from Van der Maren, 1999, page 4)

*Data constitution and verification of the transcription*

Interviews were audio taped and integral transcriptions of the interviews were completed. According to Van der Maren (1995-1996) and Miles & Huberman (1984), the data should in this instance more reliably relate to reality and reduce researcher bias. The data collected was transformed into 252 pages of transcriptions. The transcription of each interview was then sent to each expert for review and verification. Each expert was informed that any and all changes were acceptable if these changes contributed to a clearer or better expression of their thoughts. Expert 1 made some major corrections, particularly in the first section of the interview as she felt that she had not been sufficiently clear in expressing her ideas. Expert 2 only made minor corrections. The corrections and other comments were integrated into a revised version of the transcript.

Repetitions, hesitations, incomplete ideas, and digressions were then removed to allow for an easier understanding of the expert opinions. One of the few digressions to be removed was information regarding the concept of intelligence. It was found that this concept was far too vast for it to be



considered within the present study. Transcripts were thus reduced to 197 pages of data (annex C). The research director reviewed the work and validated that important ideas were not lost in this process.

### *Data analysis*

Data analysis proceeded via a systematic analysis of the information. In contrast to frequently used methods which favour global analysis of the data, such as illustration of a preconceived theory, data analysis which proceeds via a systematic analysis of the information is a more ideal methodology which respects the criteria for a rigorous research (Van der Maren, 1998).

The first step of the analysis consisted in separating the many ideas expressed by the experts into smaller units of information. Each of these units consisted of a sentence or paragraph expressing an idea, which was related to one of the four research questions. Each of these units was then coded using “**open coding**”, i.e. the initial coding of the discourse and selection of units of analysis (Van der Maren, 1996). This coding was guided by an analysis framework based on the literature review. Categories used included: evaluation method, goal of instrument, definition of executive functions, case studies, theoretical models, and characteristics of comprehensive ADL evaluation. The coding was also a “**mixed coding**”, i.e. certain categories were identified prior to the coding process whereas others were identified as they appeared in the material (Van der Maren, 1996). This form of coding is proposed in exploratory research as opposed to verification research, where the coding list is fully predetermined prior to coding the data, and is much more highly recommended than heuristic coding which is not based on any operational model (Van der Maren, 1996). Each category was defined, mainly according to its dictionary definition, so as to ensure reliability of the coding process. Codes were first defined in French, the language spoken by our experts, and then translated and defined in English for the purpose of writing this dissertation. An example of these definitions can be found in annex D.

In the second step of the analysis, the researcher summarised the core ideas of the transcripts using shorthand. As an example, 82 pages of transcriptions of the inter-expert negotiation was reduced to four and a half pages. This condensation of ideas permitted a more comprehensive review of the data. This had the advantage of retaining large amounts of information in a reduced space and thus possibly reducing the amount of information lost when ideas are replaced with codes. This second step of the analysis equally served to more precisely identify the data content. An example of this analysis can be found in annex E.

### *Data synthesis*

Different methods of synthesising the data are possible and they include: reducing by counting, condensation by abstraction (which includes classifications, relations and reasons), and graphical representations (Van der Maren, 1998). According to Huberman & Miles (1984), this phase of organisation and presentation of the data is sometimes neglected though when well done it allows for (1) representation of the data in a limited visual space; (2) helps plan further analysis; (3) facilitates comparison of different combinations of the data, and (4) ensures their use in the final report.

In this study, data was synthesized using **condensation by abstraction**. More precisely, citations related to each individual code were grouped together and codes pertaining to the same category were equally grouped together (classification). For example: the following codes were grouped under the general category of *theoretical models which best operationalise executive functions and everyday activities : Luria' s Model of cerebral functioning, Model of Human Occupation, Canadian Occupational Performance Measure, and models pertaining to working memory and inhibition*. Classified under this same category were codes which described necessary characteristics of the required model. These

codes included: *error analysis (coding of errors, weighing of errors, internal/external cues, interpretation of errors, hierarchical)*. This served a dual purpose, i.e. (1) to facilitate a clearer comprehension of the results, and (2) to verify the coding (annex F). These were then validated with the research director. The research director thus read the synthesis and looked at the logic of the propositions. This was followed by discussions between the researcher and the director whereby consensus was reached on items of disagreement.

Data was also synthesised by looking for relations in the information provided. This was probably the most time consuming and difficult task in the research process. As an example, the following variables were grouped into a larger category of *variables which can **modify the status of a task from a routinised and automatic task to a task of executive functions for the person***. Codes which were identified as belonging to this general category included the following: *capacity for adaptation, degree of complexity of the task for the individual, elements of distraction, degree of novelty of the task for the individual, depressive state, inhibitory mechanisms, motivation, control processes, cognitive status, physical status and volition (choice, values and interest)*. The relation which was found between these different codes is that the variations in any one of them can either increase or decrease the degree to which a task will require executive functions for a specific individual. For example: a decrease in an individual's *inhibitory mechanisms* will modify the status of a *routine task* which will become a *task of executive functions* for the person.

These different variables *which can **modify the status of a task from a routinised and automatic task to a task of executive functions for the person*** were then grouped into two different categories: *internal phenomena* and *external phenomena*. Under the category of *internal phenomena* one finds: *capacity for adaptation, depressive state, inhibitory*

*mechanisms, motivation, control processes, cognitive status, physical status and volition (choice, values and interest).* Under the category of *external phenomena* one finds: *degree of complexity of the task for the individual, elements of distraction, and degree of novelty of the task for the individual.* We can then say that generally a **decrease in internal phenomena** (with the exception of depression) is related to an **increase in the degree to which a task will require executive functions** for the person. Alternately, we can also say that an **increase in external phenomena** is related to a **increase in the degree to which a task will require executive functions.**

Exploring these different relations between the codes greatly contributed to the understanding of the expert opinions.

#### *Verification of the results*

Verification refers to the many important strategies which can be used to validate not only the final interpretations or working hypotheses, but also the many steps which occurred in the analysis and synthesis of the data. In this study, verification of the results was done by the researcher on an ongoing basis by constantly returning to the literature to validate the analysis and synthesis. Through this dynamic process, certain opinions, originally obtained in the interviews, were eventually integrated into the literature review. For example, an opinion received from the neuropsychologist included the proposed use of **complex and novel tasks** for the assessment of executive functions. Information obtained in the literature on this topic was presented in section 2.4.1 of this dissertation, entitled *Characteristics of instruments able to detect pathological behaviours associated with the "dysexecutive syndrome"*. The verification of the results with the literature played an important role in validating the expert opinions obtained in this study with those of notable authors in the field.

Verification was also done by the research director on several occasions. In the final stage of the research process, called an inter-expert negotiation session, which will be presented below, the two experts in the study contributed significantly to the verification and clarification of the results.

#### *Validation*

Transcripts of the inter-expert negotiation session, which will be presented below, were completed. These transcripts did not include hesitations, repetitions, incomplete ideas, etc. The information obtained in these transcripts served to validate certain interpretations which had been completed prior in the analysis. For example: the category *typical errors which can be observed during everyday activities which may manifest a "dysexecutive syndrome"* was analysed in great detail. Several of the errors which had been drawn from the case studies presented by the occupational therapist during the initial interview were presented in a summary format during the inter-expert negotiation session. Each of these behaviours was analysed from the perspective of their relation to the "dysexecutive syndrome" by the neuropsychologist. This enhanced the credibility of the final interpretations.

### **3.3.3 Inter-expert negotiation:**

The last phase of the research process proposed by the "Fourth Generation Evaluation" is the negotiation session. In this study, the participants in the negotiation session were the two experts, the research director and the researcher. Inclusion of the research director is acceptable, according to Guba and Lincoln (1989), so long as the opinions expressed "receive no more weight than that to which they are entitled" (p.213). The first goal of this session was to present and validate the results which had been obtained, based on their discourse. The second goal was to obtain the opinions of

each expert on certain central ideas presented by the other expert. The third goal was to discuss divergent opinions.

In preparation for this session, each expert was asked to read the summary of the ideas of both interviews (C1) prepared by the researcher. Each expert was then interviewed in a follow-up interview to identify issues of disagreement between the two experts.

The purpose of the inter-expert negotiation session was then to share opinions on different issues (not attack or justify) and where possible to achieve consensus on issues where a disagreement was identified. The session took place in a quiet office and lasted three and a half-hours. In the first half-hour, the updated summaries of results were presented. This was followed by an open discussion where each item was reviewed. In the last part of the session, experts were invited to formulate together the goal of a comprehensive ADL evaluation sensitive to the "dysexecutive syndrome".

The discussions were audio taped and integral transcriptions of the discussions (excluding the summary presented by the researcher, digressions, and repetitions) were completed. The data collected was transformed into 83 pages of transcriptions. As these transcriptions were intended for verification purposes, the analysis was done more generally than in the previous instance. The end product took the form of a new joint construction, which superseded previous constructions by common consent. This review process was extremely valuable in advancing this project to a higher conceptual level.

In conclusion, the knowledge obtained in this study will mainly consist of those constructions about which there is relative consensus (or at least some movement toward consensus).

### 3.4 Criteria of quality

Traditional criteria of quality, applicable to the positivist paradigm or quantitative research, is not applicable to the constructivist paradigm or qualitative research. Though quantitative research refers to the validity and reliability of the data, Guba & Lincoln (1989) suggested that parallel qualitative research criteria are related to concepts of credibility, transferability, dependability and confirmability. The credibility criterion parallels the conventional criterion of internal validity and is an indicator of the degree of fit between the constructed realities of respondents and the reconstructions as represented by the researcher and attributed to the respondents. Techniques which are proposed to attain credibility include: triangulation of the data, prolonged engagement, peer debriefing, and member checks. These will be described below in relation to how they were applied within this research study.

The transferability criterion parallels the conventional criterion of external validity or generalizability. Transferability refers to the degree of similarity between the situation where the results were formalised and the environment wishing to apply the results of the research. It is important to note that in qualitative research, determining whether the results of a particular study are applicable within a different context is the responsibility of the person wishing to apply the results of the research and not the researcher who did the original study.

The dependability criterion parallels the conventional criterion of reliability. Dependability is concerned with the stability of the data over time or by the consistency of the observations provided by the different techniques or instruments used (Guba & Lincoln, 1989; Lessard-Hébert et al., 1996). In opposition to conventional research however, methodological changes and shifts in hypothesis or constructions are expected products of an exploratory

research and do not render the research results any less dependable. These changes must however be subject to inspection, so that outside reviewers can be in a position to judge the quality of the decisions that were made and the underlying causes of these changes (Guba & Lincoln, 1989). In relation to data analysis, consistency in the attribution of codes to different quotations is to be considered.

The confirmability criterion parallels the conventional criterion of objectivity. Like objectivity, confirmability is a measure of the degree to which the findings of the study are based on reality and are not a product of the researcher's imagination. This is defined by Van der Maren (1987) as the independence of the research process from the preconceived ideas, theories and hypotheses held by the researcher. There is a consensus amongst the authors reviewed that in qualitative research this does not imply a desire to eliminate all biases, but rather a need to explain them in order to help the reader place the research findings in the proper perspective. Allowing the reader to inspect the "raw data" of the research, i.e. the verbatim collected in the field, the analysis and the interpretations, is another means of attaining confirmability.

To ensure the credibility of the data presented in the current study, a series of techniques were used:

1. **Triangulation of the data:** For qualitative data collection methods to be considered rigorous, triangulation of the data is important. This process, probably originally called "multiple operationalism" by Campbell & Fiske (1959) (cited in Huberman & Miles, 1994 ), refers to the use of multiple sources and modes of evidence, preferably with different biases and strengths, to ensure that the biases reflected will be that of the trait or treatment and not that associated with the measure (Huberman & Miles, 1991). In this study, data was triangulated in the following manner. The propositions from renowned authors were selected from relevant articles



and confronted with those of professionals from two different disciplines, i.e. occupational therapy and neuropsychology. Further triangulation was obtained as the experts were selected from different settings, specialised with different clienteles, have experience working with different research projects, and are familiar with different theoretical models of the same phenomenon. By comparing and contrasting these different views, I was able to determine which segments of the data conformed with the literature and which segments suggested an alternative perspective. Both categories of segments were cross-validated with the literature, with the experts and with the research director.

2. **Prolonged engagement:** Meeting with the experts occurred on several occasions which included extensive discussions.
3. **Peer debriefing:** Extensive discussions were carried out with the research director regarding the findings, conclusions, tentative analyses and interpretations.
4. **Member checks:** Both experts were invited to comment on the themes and interpretations derived and constructed by the researcher from the verbatim. Additional information was provided by the experts in the form of verbatim modifications.

To optimise the transferability of the data presented in the current study, one basic technique was used. This technique is known as the “thick description”. The most salient features include the following: description of the background of both experts, detailed description of the articles presented as preliminary reading to the experts (Table IV), and detailed description of the data constitution, reduction and analysis which proceeded via a systematic analysis of the information.

To optimise the dependability of the data in relation to data analysis, several procedures were applied in this study to ensure consistency in the attribution of codes or reliability in the coding of the data. Rigorous coding guidelines, as proposed by Van der Maren (1998), were followed. Coding initially

involved term to term transcriptions without any interpretations. Operational definitions of the codes (glossary) were referred to prior to each coding to ensure consistency in the use of the codes. And finally, a written record of procedures, operations and decisions pertaining to the attribution of codes were maintained throughout the process. Analysis of the quality of the coding was then completed. The technique involved grouping all quotations with appropriate codes and verifying that all quotations were indeed well identified by the given codes. Further synthesis of the data by abstractions and relations also respected the criteria of rigorous research.

To optimise the confirmability of the data, results and interpretations were constantly verified with the experts, the research director and the literature. Also, exact citations obtained in the verbatims of the experts (and validated by the experts) are presented in association with the different themes and interpretations presented in the following chapter.

### *Conclusion*

The research approach used in the present study was a constructivist methodology called "The Fourth Generation Evaluation" (Guba & Lincoln, 1989). Individual interviews of two experts, one a neuropsychologist and the other an occupational therapist, were used to gather expert opinions. Integral transcripts were completed for each interview and analysed using a systematic analysis procedure as described by Van der Maren (1999). The final step in the research design was an inter-expert negotiation session, which was a valuable means of verifying the results and interpretations and also of bringing the final construction to a higher conceptual level. Criteria for rigorous research was applied throughout the study.

## CHAPTER 4: RESULTS

The goal of this study was, through the consultation of experts, to identify criteria needed to improve the sensitivity of ADL assessments to detect the impact of the “dysexecutive syndrome” on everyday activities. To attain this goal, two preliminary objectives were considered, that is (1) to better understand the concept of executive functions and (2) to better comprehend manifestations associated with a “dysexecutive syndrome” in everyday activities. This fourth chapter presents the results obtained subsequent to the analysis of the interviews with the two experts who participated in the research study and of the inter-expert negotiation. As all disciplines limit themselves within their own paradigms, it was very evident from the interviews that each expert had a completely different viewpoint on the issues. The results, as they are presented, reveal the sharing of more common perspectives which were obtained through the inter-expert negotiation. The strength of the methodology, particularly the inter-expert negotiation, in achieving this more interdisciplinary view of the problem was noteworthy. The results are presented in the form of themes that emerged from the research process.<sup>1</sup>

The different sections of this chapter represent the experts’ opinions regarding the three initial interview questions, i.e.: (1) What are executive functions?; (2) How do executive functions manifest themselves in everyday activities?; and (3) What would be the characteristics of a comprehensive ADL evaluation tool if we wish it to consider the impact of executive functions on everyday activities?

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<sup>1</sup> The verbalisations are presented verbatim in French so as to prevent the loss of the essence of the expert opinions. Certain segments were at times slightly modified with regards to syntax in order to facilitate their comprehension.

## 4.1 Definition of executive functions

As one purpose of this study was to explore the manifestations of the “dysexecutive syndrome” in everyday activities, this first section will present certain core concepts pertaining to the definition of executive functions, which were identified by the experts. The general definition of executive functions to which both experts adhere refers to those processes responsible for goal formulation, planning, performance regulation and verification of activity. However, their thoughts about these processes extend beyond these four basic components. Of the ideas presented by the experts, only those, which were sufficiently developed, both in terms of elements of definition and in terms of manifestations in everyday activities, will be presented. The first theme under which expert opinions are grouped is a term, which according to the neuropsychologist, summarises the role of executive functions, i.e. **adaptation**. The second theme serves to highlight the opinions of the occupational therapist concerning one particular component of executive functions, i.e. **goal formulation**. The last two themes reflect the opinions of the neuropsychologist on two specific capacities which underlie executive functions, i.e. **inhibition**, and **self-monitoring**.

**Adaptation** is defined as the act or process of adapting or adjusting to environmental conditions (Webster’s New Collegiate Dictionary, 1975). Processes of adaptation are particularly required in situations, that are novel and complex for the individual. According to the neuropsychologist, this is a central role of executive functions. Though this view of executive functions was not a familiar one for the occupational therapist, it was not contested in any manner.

The occupational therapist associates executive functions with intentional behaviour, i.e. the ability to formulate a goal or an intention. She proposes that an individual’s **goal formulation** is intimately intertwined with his

affective state. **Goal formulation** is defined as “the complex process of determining one’s needs or wants and conceptualising some kind of future realisation of that need or want” (Lezak, 1995, p.651). Affect is defined as “the conscious subjective aspect of an emotion considered apart from bodily changes” (Webster’s New Collegiate Dictionary, 1975). The occupational therapist highlights the interrelation between these two concepts as she describes the important impact of motivation, values, interests, and affective state on an individual’s ability to formulate a goal and initiate a task.

*Il faut qu’il ait le goût de s’organiser, le goût de fonctionner... les fonctions exécutives ça fait partie de ça... Mais à quelque part pour décider ça, il faut que je sois connecté avec ma motivation ou avec mes émotions que de vouloir comme par exemple téléphoner ma belle-sœur suite à sa chirurgie demain.*  
(occupational therapist)

As forming an intention is only one component of executive functions, the neuropsychologist does not attribute the same degree of importance to the role of affective state in executive functions.

*L’intention c’est la première chose...Mais à partir du moment où ça s’est fait, ça peut s’arrêter là. C’est pas pour autant qu’il va l’initier l’action, qu’il va arriver à sérier les événements, qu’il va pouvoir résister aux interférences de l’environnement.*  
(neuropsychologist)

Two main processes, identified by the neuropsychologist as underlying causes of deficits in executive functions are **inhibition**, and **self-monitoring**. **Inhibition** is defined as a psychological activity imposing a restraint upon another activity (Webster’s New Collegiate Dictionary, 1975), i.e. task execution must be controlled so as to remain congruent with the intended and planned action. Inhibitory processes keep task execution from being sidetracked to a task, which the person did not intend to be performing at that moment. According to the neuropsychologist, this is the main role of executive functions. Variables, which may contribute to the modification of a plan of action, include both internal and external elements of distraction. Internal elements of distraction may for example consist of strong habits which may override the novel activity, which the person is busy performing. External elements of distraction may for example consist of non- task related objects in the environment. Elements of distraction may cause a deviation in the actions, if the necessary processes fail to inhibit their impact on performance.

The second important feature highlighted by the neuropsychologist, in this study, is **self-monitoring (*auto-perception, auto-critique*)**. Luria (1966) states that one of the most characteristic errors attributable to individuals with a “dysexecutive syndrome” is their inability to take account of their mistakes, and their inability to correct errors.

In summary, executive functions, for the neuropsychologist, are cognitive processes, which allow us to **adapt** to changes in our environment. These processes include goal formulation, planning, performance regulation and error correction. One of the central components thought to underlie and allow for “goal-directed behaviour”, which was highlighted by the neuropsychologist, is **inhibition**.

For the occupational therapist, executive functions refer to those cognitive processes responsible for goal formulation, planning, performance regulation and error correction. The opinion most specifically highlighted by the occupational therapist is the difficulty involved in dissociating concepts such as motivation or affective state from **goal formulation**.

## **4.2 Manifestations of the "dysexecutive syndrome" in everyday activities**

As understanding the manifestations of the “dysexecutive syndrome” in everyday activities is a subject of interest of this dissertation, this section will present the perception of the experts on the subject. Clinical examples, presented below, were given by the occupational therapist to illustrate some of her opinions<sup>2</sup>. These examples were then used as the

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<sup>2</sup> These opinions emanate from her previous observations of individuals evaluated in their homes with the *ADL Profile*. Neither the complete results of the ADL evaluation nor details regarding specific brain lesions of these individuals were provided. These are therefore not included for review. Secondly, objective neuropsychological evaluations were not available. The comments and analysis brought by the neuropsychologist, to the observations made by the occupational therapist, are therefore exclusively based on descriptive information.

basis of discussions, in the inter-expert negotiation. In all cases, the neuropsychologist completed his comments with the opinion that a complete neuropsychological evaluation would be required to validate his preliminary impressions.

Clinical examples were drawn from five individuals: one with a frontal lobectomy, which had occurred several years earlier, three with severe head injuries and one with multiple sclerosis. The three individuals with severe head injuries were evaluated at least one year after their accidents. The manifestations, presented in this section, illustrate the central concepts of executive functions presented in the previous section.

The cognitive processes, which are referred to as executive functions, allow for the **adaptation** of an individual to changes in his or her environment. Processes of adaptation are particularly required in situations, which are novel and complex for the individual. A first example of manifestations of difficulties in this area was drawn from an individual with a frontal lobectomy. Well able to function within a routine, she was unable to modify her recipes to meet new requirements placed upon her by a recent diagnosis of high cholesterol.

*Quand tu lui dis fais un gâteau, elle est capable de trouver les ingrédients, elle est capable de cuisiner son gâteau, mais elle ne connaît rien que la recette qu'elle faisait il y a trente ans. **Incapable d'utiliser une nouvelle recette.***

(occupational therapist)

A second example relating to **loss of adaptation** was observed in an individual who sustained a severe traumatic brain injury. The following observations took place in the apartment where the individual was living on her own.

*Quand je lui ai demandé de préparer un repas chaud, elle n'arrivait pas à choisir quel repas. Ça lui a pris environ une demi-heure ou trois quart d'heure, parce qu'elle regardait le contenu de son réfrigérateur et puis elle avait un livre de recette et il fallait qu'elle trouve tout les éléments d'une recette dans son réfrigérateur avant de préparer un repas chaud...**Elle cherchait une recette pour laquelle elle avait tous les ingrédients dans son réfrigérateur...**Si elle n'avait pas cela elle ne passait pas à l'action. Elle ne pouvait pas s'adapter au fait qu'il n'y avait pas tous ces ingrédients-là ...Elle avait l'air fonctionnel, mais le temps qu'elle devait perdre chaque jour avec cette difficulté là à s'adapter à un changement, à être flexible face à une situation.*

(occupational therapist)

*Effectivement, on regarde le comportement recette pour laquelle elle avait tous les ingrédients dans son réfrigérateur, qui est une **perte de flexibilité**, qui est un trait de troubles de fonctions exécutives.*

(neuropsychologist)

Social adaptation is crucial for community reintegration. Subsequent to a traumatic brain injury, individuals are frequently reported to be socially inept. An example of this is the following observation pertaining to an individual who sustained a severe traumatic brain injury.

*Il y en avait un qui disait "ah oui, **j'ai quelque chose à dire mais je ne veux pas le dire**". Là, lui on voyait qu'il essayait de se contrôler, mais il n'y arrivait pas. Il finissait par dire qu'il me trouvait de son goût ou quelque chose comme cela. Il finissait par le dire et il savait qu'il ne devrait pas dire cela...Il faisait des avances à l'évaluateur alors qu'on est dans un contexte d'évaluation.*

(occupational therapist)

*Souvent les traumatisés crâniens (TCC) vont avoir une difficulté d'adaptation dans la vie parce que **socialement ils sont inadaptés**. C'est à dire qu'ils font des trucs comme cela...C'est un trouble de fonctions exécutives.*

(neuropsychologist)

More specifically related to the impairment of one aspect of executive functions, **goal formulation**, the following behavior was observed in the individual with a frontal lobectomy.

*Quand le but est formulé sur (l'horaire placé sur) le frigidaire, elle le fait. A ce moment-là, elle est capable de décider de ce qu'elle a à faire...il **faut que tu formules le but pour elle**. Elle ne peut pas dire aujourd'hui, qu'est-ce que je vais faire?*

(occupational therapist)

A second example of impaired goal formulation pertains to an individual with multiple sclerosis. With this example, the occupational therapist highlights the previously mentioned difficulty involved in differentiating motivation and affective state from goal formulation.

*Il se lève, il fait sa journée, et demain va être pareil comme hier. Il **n'a plus de buts, plus d'intérêts** à aller faire quelque chose. C'est pour cela que ça ressemble à une dépression.*

(occupational therapist)

The fact that a "dysexecutive syndrome" has the potential to be misdiagnosed as a depression, is an issue of concern for the occupational therapist. In her opinion, the absence of goals and interests to do things



can be reflective of either condition. Appropriate treatment does however require an appropriate distinction between the two possibilities.

*Ce qui me préoccupe, c'est comment démarquer les atteintes exécutives frontales versus une dépression qui fait que je n'ai plus de comportement intentionnel... Plusieurs de ces cas-là, se retrouvent avec des anti-dépresseurs... parce que la personne ne se prenait pas en main, n'avait plus d'intérêts dans ses d'activités, parce qu'elle n'avait pas de "intentional behaviour"... Je viens à me demander si une bonne évaluation, qui considère aussi l'hypothèse d'une atteinte des fonctions exécutives pourrait modifier ce traitement quand les anti-dépresseurs sont inefficaces.*

(occupational therapist)

On another level, the neuropsychologist proposes that two behaviors characterise the "dysexecutive syndrome", i.e. **loss of inhibition**, and **loss of self-monitoring**. **Loss of inhibition**, as was stated above, refers to a loss of the ability to keep the task from being sidetracked, from the original plan or intention, by either internal or external elements of distraction. The mere presence of a planned task being replaced by an unplanned task is not in and of itself pathological, as many normal individuals are at times distracted. What becomes a sign of a pathological state, according to the neuropsychologist, is the frequency at which these errors occur. The following example pertains to an individual who had a severe head injury.

*Elle faisait une sauce à spaghetti et elle ne venait pas à bout de couper ses piments parce qu'elle n'arrêtait pas d'être en train de porter attention à autre chose en même temps... C'était un marqueur important que la personne était tout le temps... en train de perdre son objectif de vue, à tout moment, pendant la tâche. Tu sais, elle commençait à couper ses piments, et là il avait un piment qui tombait à terre. Elle se mettait à laver le plancher...Elle n'était pas capable de garder son but vu qu'elle s'éparpillait tout le temps.*

(occupational therapist)

*C'est ne pas être capable de programmer. Mais le trouble de programmation découle d'un **trouble d'inhibition** de cette information là, de se centrer sur la chose.*

(neuropsychologist)

**Loss of inhibition** was also seen, by the neuropsychologist, as the source of the following errors observed in an individual with a frontal lobectomy.

*C'est arrivé que si quelqu'un sonnait à la porte, elle pouvait décider que **vu que la porte était ouverte, elle sortait dehors**...(ça) ressemblait au « Utilisation behaviour ». Elle s'est ramassée des fois en taxi, je ne sais pas trop où, parce que les événements s'étaient placés devant elle de même, puis elle les a tous suivis l'un après l'autre ....*

(occupational therapist)

*Oui (ça peut être un indicateur de troubles de fonctions exécutives). Tout à fait. C'est un des aspects important, c'est l'**inhibition des interférences**. Si c'est pas inhibé, elle va entraîner la personne sur la voie de l'habitude.*

(neuropsychologist)

**Loss of self-monitoring**, as was previously discussed, refers to an inability to take account of mistakes and to correct errors. Loss of self-monitoring was seen, by both experts, as the source of the following error observed in an individual with a severe traumatic brain injury.

*Lors d'un repas au restaurant tout dégoulinait et il n'a même pas pensé s'essuyer avec une serviette de table...**Même avec des indices il ne se corrigeait pas**...Parce que quand ça fait deux ans que j'ai eu mon accident, je le sais que quand je mange j'ai tendance à baver. Alors je vais me préoccuper de m'essuyer. Lui il ne s'en préoccupait pas.*

(occupational therapist)

*Effectivement (c'était un trouble de fonctions exécutives). C'est le fait qu'il n'y a **pas eu de prise de conscience**.*

(neuropsychologist)

The following example, observed in an individual with multiple sclerosis, may also be related to **loss of self-monitoring**. The individual in question was falling up to five times per week while transferring from his wheelchair but showed no concern for these falls.

*Il n'est **pas capable de réaliser l'impact que ça a sur sa santé**, le fait de chuter comme ça... C'est ça qui me fait dire qu'il y a une atteinte des fonctions exécutives, parce que, admettons que je lui dis tu chutes? Qu'est-ce que tu pourrais bien faire? Qu'est-ce que tu penses que tu pourrais faire? Là y'a rien qui lui vient. C'est je vais continuer de tomber et puis je ne veux pas d'aide.*

(occupational therapist)

According to the neuropsychologist, this behavior alone does not suggest a “dysexecutive syndrome” as a psychological component must also be considered. Multiplying the observations and more formalized testing would reinforce the likelihood of identifying either of these as possible causes of the observed behavior.

A final issue was considered of central importance to both experts, i.e. whether or not executive functions are consistently required for the performance of everyday activities. This one issue was the focus of the inter-expert negotiation session. According to the occupational therapist,

*(**Les fonctions exécutives**) ça se manifestent tout le temps. Même faire la même affaire tous les jours, ça demande une intention. De rester dans une routine, c'est un comportement intentionnel. Je pense que c'est intentionnel, parce que quand les gens*

*deviennent déprimés, ce qui saute, ce sont les routines.*

(occupational therapist)

The neuropsychologist, however, is of the opinion that executive functions are not required for the performance of activities, which are considered habitual or automatic for the person. Consensus was not fully attained on this issue.

In summary, the occupational therapist illustrated clinical examples related to the “dysexecutive syndrome” and raised very pertinent questions regarding the possible interpretations of the observed behaviors. The neuropsychologist, on the other hand, helped to identify which of the many behaviors reported by the occupational therapist, may be indicative of a “dysexecutive syndrome”. Two behaviors, observed at a certain frequency, were particularly highlighted as indicators of clearly pathological behaviors related to the “dysexecutive syndrome, i.e. **loss of inhibition and loss of self monitoring.**

### **4.3 The characteristics of an assessment sensitive to the "dysexecutive syndrome" in everyday activities**

As was presented earlier, there is no golden standard by which to measure the impact of the “dysexecutive syndrome” on everyday activities. This section will expand upon previously stated characteristics required of such a measure, which include complex and novel tasks for the individual, natural context, and non-structured approach. The *ADL Profile* served as the main reference point in the opinions expressed by the experts.

### 4.3.1 Goal of the evaluation

Before developing a new instrument or adapting an existing one, both experts agreed that one must first clarify the intended goal of the evaluation. Opinions as to whether the evaluation should aim to be a **diagnostic measure** of the “dysexecutive syndrome” or a **descriptive measure** of the impact of the “dysexecutive syndrome” on everyday activities were varied. This subject prompted prolonged discussions between the experts. The following excerpts reflect some of the propositions put forth.

*Si notre but, c'est d'aller comprendre ce que le cerveau fait, c'est une chose. Si notre but c'est d'aller évaluer comment les fonctions exécutives se manifestent dans les activités de la vie quotidienne, là ça devient une autre affaire, parce que là, je ne suis pas en train d'aller savoir quelle partie du cerveau fait quoi, je suis en train de regarder **comment est-ce qu'on fait ça, faire une semaine, et puis faire une nuit, et puis faire une année, et puis faire une vie.***

(occupational therapist)

*Je pense que (le but de l'évaluation) c'est pas nécessairement de faire un diagnostic de syndrome frontal, c'est vraiment de **caractériser des comportements qu'on peut lier avec une certaine fiabilité à des troubles de fonctions exécutives.***

(neuropsychologist)

*(Le but de l'évaluation des AVQ) c'est de voir l'**impact** c'est à dire comment (les troubles de fonctions exécutives) se répercutent dans les activités de la vie de tout les jours...tu vas situer le comportement que tu observes comme par exemple préparer un repas, les erreurs que tu as vues, dans ton analyse, tu vas situer cela par rapport à un contexte. Tu vas regarder les autres rôles de la personne et les autres habitudes de vie.*

(research director)

The following table summarises the characteristics proposed by the experts pertaining to the three possible goals of the evaluation and to the potential contributions of each type of evaluation.

Table V

Three possible goals of an evaluation of the “dysexecutive syndrome”

<b>Descriptive</b>	<b>Diagnostic</b>	<b>Screening</b>
<p><b>Goal:</b> to describe the manifestations of the “dysexecutive syndrome” in everyday activities with the purpose being to understand a person’s ability to manage a day, a night, a week, a year, and ideally a lifetime.</p>	<p><b>Goal:</b> to accurately diagnose the presence of a “dysexecutive syndrome” through a detailed understanding of underlying cognitive processes</p>	<p><b>Goal:</b> to detect behaviours which may be related to a “dysexecutive syndrome” through the observation of tasks considered complex and novel for the individual in a non-structured and natural context.</p>
<p><b>Contribution:</b> This evaluation will provide information pertaining to the following:</p> <ul style="list-style-type: none"> <li>• Impact of deficits on task performance</li> <li>• Impact of context on task performance</li> <li>• Impact of deficits on individual’s roles and responsibilities ex: ADL, leisure, and work</li> <li>• Guidelines for intervention</li> </ul>	<p><b>Contribution:</b> This evaluation will provide information pertaining to the following:</p> <ul style="list-style-type: none"> <li>• Identification of specific deficits and of exact underlying causes of performance errors</li> <li>• Situate errors in relation to the contributing cognitive mechanisms</li> <li>• Guidelines for intervention</li> </ul>	<p><b>Contribution:</b> This evaluation will provide information pertaining to the following:</p> <ul style="list-style-type: none"> <li>◆ Identification of the need for more formal testing where indicated</li> </ul>

Consensus was not attained with regards to any one specific goal. Two possibilities remained after the negotiation session. Firstly, the goal of the evaluation could be to characterise behaviours, related to everyday activities, which can be associated with a certain reliability, to the “dysexecutive syndrome”. It was agreed that this goal would not be diagnostic, per se, of the “dysexecutive syndrome”, but rather a **screening measure**. Opinions regarding the goal of a **descriptive measure** of the impact of the “dysexecutive syndrome” was summarised as follows: (1) to describe the level of independence in everyday activities in consideration of executive functions, and (2) to describe the types of difficulties encountered during the performance of the task.

### 4.3.2 Task selection

For an evaluation to be sensitive to the “dysexecutive syndrome”, tasks selected for the observational analysis should possess the characteristics of **tasks of executive functions**, i.e. tasks which are both novel and complex. The complexity of the task, as defined by the neuropsychologist, is related to a variety of variables such as the number of steps involved, the sequencing and interrelation of these steps, the environmental context in which the task is performed and most importantly to the number of times the task has previously been performed by the person.

The process involved in determining which tasks are indeed tasks of executive functions is thus necessarily multifactorial. The neuropsychologist proposed a **subject / environment continuum**, which can provide valuable guidelines in this process. It proposes that a task is not inherently a task of executive functions as task simplicity or complexity is intimately related to the individual's ability to perform the task.

*Alors ce n'est qu'en fonction de ce qu'est le sujet vis-à-vis de la tâche, que la tâche devient fonction exécutive ou pas...La complexité de la tâche, donc n'est pas relative à la tâche comme telle, mais à une dialectique sujet environnement, dans la mesure où il y a un effort d'adaptation qui est plus ou moins grand pour l'individu.*

(neuropsychologist)

To select tasks of executive functions, the degree of complexity and novelty, for the individual, must be determined. This implies gathering information, prior to the observational analysis, pertaining to the individual's experience with a variety of tasks.

*Si un individu fait une tâche complexe des milliers de fois, elle devient routinisée pour lui. La complexité de la tâche, donc n'est pas relative à la tâche comme telle, mais dans une dialectique sujet/environnement, dans la mesure où il y a un effort d'adaptation qui est plus ou moins grand pour l'individu.*

(neuropsychologist)

The occupational therapist, on the other hand, suggests that the **parameters of the task**, selected with the intent of evaluating the “dysexecutive syndrome”, must be broadened as compared to traditional evaluations of everyday activities. She proposes that the operations or actions, which are considered as intrinsic to task performance, must extend beyond simple task

execution to include goal formulation, planning, and error correction. All of these processes must be observed, or at least not done for the client by the examiner, to meet the requirements of a non-structured approach.

*Quand tu veux aller détecter par les AVQ, s'il y a une atteinte des fonctions exécutives tu dois l'opérationnaliser différemment (ta tâche). La tâche commence plus tôt, c'est à dire quand tu commences à y penser et elle finit plus tard quand tu as assuré la qualité et fait les corrections ex: quand tu as remis la pièce dans l'état initial après avoir préparé un repas chaud.*

(occupational therapist)

Though it is generally thought that basic everyday activities do not correspond to the characteristics of tasks of executive functions, this is not always the case. Under certain conditions, nearly any task can correspond to a task of executive functions for a particular individual.

*On a déjà parlé du paradoxe entre AVQ et fonctions exécutives (dans ce sens, ce qui caractérise surtout les activités de la vie quotidienne, c'est qu'elles sont des conduites routinisées). Mais est-ce que ça fait qu'une activité de la vie quotidienne n'est pas une activité de fonctions exécutives ou ne peut pas le devenir? Si tous les éléments du contexte, de l'automatisme, de la routine, ne sont plus là... Il peut y avoir plus ou moins d'éléments manquants, qui font que ce n'est plus automatique.*

(neuropsychologist)

To determine the degree to which a generally routine task is a task of executive functions for the individual, various elements, termed here **task status modifiers**, must be considered. For example, recent changes in an individual's physical and cognitive abilities can modify the degree of complexity of the task for the individual.

*La détérioration des fonctions cognitives peut faire que ce qui était automatisé, comme les AVQ, donc qui étaient faciles, peut devenir difficile. En d'autres termes, l'atteinte des fonctions cognitives ramène d'un état plus automatique les AVQ à un état moins automatique, i.e., des activités maintenant plus exigeantes pour l'individu.*

(neuropsychologist)

*Je vous demande d'ouvrir une bouteille de jus...Si vous n'avez plus qu'une seule main, parce que vous avez eu une amputation, alors vos instruments physiques ont été altérés. La nature de la tâche est donc transformée. Elle devient pour vous une tâche nouvelle,...elle peut devenir de l'ordre des fonctions exécutives dans la mesure où cela demande maintenant une nouvelle adaptation de l'individu. Elle conduit à enclencher une analyse de la tâche et à trouver des solutions aux problèmes qui se posent.*

(neuropsychologist)

*Plusieurs personnes ayant subi un traumatisme crânien nécessitent l'utilisation d'un fauteuil roulant et ils doivent souvent se débrouiller dans un environnement qui n'est pas toujours adapté à leur besoin. L'intention aussi simple que d'entrer dans une salle de bain où le fauteuil roulant entre à peine, nécessite beaucoup de planification.*

(occupational therapist)

The neuropsychologist proposes that a supposedly complex task, which has been repeatedly performed by a particular individual, will no longer require much in terms of executive functions for that individual. On the other hand, a task that may ordinarily be considered simple and familiar, may for a specific individual, who has recently experienced changes in his physical or cognitive abilities, become a task of executive functions. Task selection must therefore consider variables such as an individual's past experiences, recent changes in physical or cognitive abilities, and the complexity and novelty of the task for the individual.

Task selection is also intimately interrelated with the goal of the evaluation. If the evaluation is selected to be a **screening measure** of the "dysexecutive syndrome" in everyday activities, the experts recommend that only two or three tasks be selected. In this instance, tasks will be selected on the basis of their correspondence with the most complex and novel tasks available for the individual being evaluated. It is proposed that this form of screening, along with a non structured approach and a highly distracting environment, may be more sensitive to detecting fine or subtle deficits, than traditional, more structured testing.

If the evaluation is selected as a measure of the impact of the "dysexecutive syndrome" on everyday activities, the use of a series of tasks is recommended. Two reasons underlie this recommendation: (1) as there are no pathognomonic symptoms, several convergent observations increase the validity of the final interpretation and (2) as the impact of observed errors on the person's other roles and responsibilities must be considered, a more valid measure is obtained subsequent to the performance of several tasks. The experts maintain that a valid measure of the impact of the dysexecutive syndrome requires the observation of many tasks, in many different environments.



In summary, expert opinions suggest that tasks should correspond to the characteristics of tasks of executive functions and that the definition of the task should be broadened so as to include all aspects, including goal formulation. The ideal number of tasks which should be used in the assessment is directly related to the goal of the evaluation.

### 4.3.3 Task analysis

Expert opinions suggest that task analysis must be done on the basis of identifying **errors in performance**. It is these errors which can suggest the presence of a “dysexecutive syndrome”. However, identifying whether a behaviour, observed during the performance of an everyday living task, in fact represents an error, requires, amongst other things, **normative studies**.

*Là, quand tu te rends compte que 75 % des gens normaux que tu as vu ont fait la même erreur que le traumatisé crânien puis que toi tu mettais dépendant, tu sais, tu te dis, trois-quarts de la population est dépendant. Alors dans mon aspect diagnostique, je vais dire écoute, il est dépendant, mais les trois-quarts du monde font la même erreur que lui.*

(occupational therapist)

*À titre d'individu normal, des fois, on a des troubles d'attention et de planification.*

(neuropsychologist)

Identifying whether an error can be attributed to a “dysexecutive syndrome” is admittedly complex. It remains, however, an essential characteristic of an assessment sensitive to the “dysexecutive syndrome” in everyday activities.

*La performance que j'observe s'explique par une atteinte des fonctions exécutives. Pour pouvoir dire cela, il faudrait nommer des sortes d'erreurs qui distinguent vraiment ce qui a rapport avec les fonctions exécutives.*

(occupational therapist)

*Ce qui serait pathologique, c'est l'élément caractériel... Si vous oubliez vos clés, c'est pas vraiment un problème. Mais si vous oublier comment vous en servir et bien là... Donc, il y a des comportements dont la probabilité d'apparition marque plus un déficit.*

(neuropsychologist)

As the source of the errors observed during an ADL evaluation may be multifactorial in origin, another essential characteristic is that the error analysis be based on a pertinent theoretical model. The experts proposed that various models, developed by renowned authors, in the fields of neuropsychology (A.R. Luria), and cognitive psychology (Norman & Shallice,

M.I. Posner, A. Baddeley), be reviewed for this purpose. Though all are thought to present components of interest, two models, which were proposed by both experts, are *Luria's model of cerebral functioning* and the *Supervisory System /Contention Scheduling Framework*. Interpretation of the results, would be facilitated, if based on these theoretical models.

*Il faudrait que les sortes d'erreurs soient rattachées au fonctionnement du cerveau. Quand Luria dit que chacune des unités a des espèces de niveau hiérarchique dans l'unité même... Faudrait que les erreurs, on les placent dans cette hiérarchie-là, pour que ça fasse du bon sens.*

(occupational therapist)

In direct relation to the second proposed goal of the evaluation, the impact of the error on the individual's roles and responsibilities must also be considered. Two models which were proposed to facilitate this interpretation are the Model of Human Occupation and the Occupational Performance Model.

*Si j'ai un travail qui me demande une rigueur absolument parfaite, si je suis contrôleur aérien, et puisque c'est grave que je retourne en arrière trois fois pour payer un compte par chèque, parce qu'est-ce que c'est que ça va être quand y va être contrôleur aérien, tu sais. La même erreur n'a pas le même poids.*

(occupational therapist)

In summary, task analysis must be done with a particular consideration of identifying **errors in performance**. To attain an acceptable level of validity in the process of interpreting these errors, the analysis must be supported by pertinent **theoretical models** such as *Luria's model of cerebral functioning* and the *Supervisory System / Contention Scheduling Framework*. The analysis must also be supported by normative studies. Interpretation of the impact of the error on an individual's everyday living can be supported by an alternate clinical framework, i.e. The Model Of Human Occupation or the Occupational Performance Model.

#### 4.3.4 Environmental analysis

Selecting an appropriate environment for task execution is an equally important component of the evaluation. As a central feature of the "dysexecutive syndrome" is **loss of inhibition**, a deficit at this level will be

most evident, especially in milder cases, in an environment which contains a lot of distractions.

*Les gens peuvent, surtout dans les AVQ, avoir nécessairement tout bien routinisé dans le temps. Mais là où est la pierre d'achoppement, pourrait être qu'il y a des éléments d'interférence qui arrivent. Et ces interférences sont selon moi centraux, car il suffit qu'il y ait un élément qui arrive...et là ça part sur autre chose, c'est à dire que le comportement dévie, ou ne se termine pas...L'interférence de l'environnement peut soit faire oublier la raison même de la tâche ou bien vous faire dévier vers des comportements plus automatiques... Ce qui est ...l'ultime test, ce sont ces fameuses tâches écologiques où beaucoup d'événements peuvent intervenir.*

*(neuropsychologist)*

Certain variations in the type of environment selected may be pertinent in relation to the two possible goals of the evaluation. A **screening measure** of the dysexecutive syndrome in everyday activities should, according to the experts, favour an environment with many distractions. This would optimise task complexity and therefore the sensitivity of the evaluation. On the other hand, a **descriptive measure** of the impact of the "dysexecutive syndrome" on everyday activities, should allow for the observation of performance, within several environments. This increases the assessment's ability to determine optimal performance as well as areas of difficulty.

In summary, an environmental analysis should be completed to determine the impact of the distractions on the individual's task performance. Use of a controlled environmental setting would lead to an underestimation of the possible impact of a "dysexecutive syndrome" on task performance.

#### **4.3.5 Open ended semi-structured interview**

Task selection, as was reported above, requires the identification of tasks, which are both novel and complex for the individual. The manner proposed, by the occupational therapist, to obtain this and other information is an open ended semi-structured interview. Guiding the individual in a discussion of life habits, roles and interests can provide valuable information not only in the selection of appropriate tasks for the evaluation but also with regards to the perceived impact of the deficits on the person.

### *Conclusion*

In conclusion, determining the characteristics of an assessment sensitive to the impact of the “dysexecutive syndrome” on everyday activities is a complex process. One must select the appropriate tasks, identify the errors and refer to a model of cerebral functioning to analyse the source and cause of the error. When interpreting the data, one must consider the degree to which the task was complex and novel for the individual in consideration of recent changes in the person’s physical and cognitive abilities and of environmental distractions. Finally, errors should be interpreted in terms of their impact on the person’s life roles and responsibilities. Furthermore, **normative** and **validity studies** are required to respectively establish a spectrum of normal performance and to establish the validity of the test in relation to other more traditional tests of executive functions.

Due to the many variables which must be considered, the experts recommend that an evaluation, in the form of everyday activities, should ideally be complemented with a more precise or objective neuropsychological investigation to isolate the causes of the underlying deficits. Isolating the impact of the environmental context from the various underlying cognitive mechanisms goes beyond the sensitivity expected of an ADL evaluation.

## CHAPTER 5: DISCUSSION

The goal of this study was, through the consultation of experts, to generate new understandings regarding criteria needed to improve the sensitivity of ADL assessments to detect the impact of the “dysexecutive syndrome” on everyday activities. To attain this goal, two preliminary objectives were considered, that is (1) to better understand the concept of executive functions and (2) to better comprehend manifestations associated with a “dysexecutive syndrome” in everyday activities. Based on a constructivist methodology, called "The Fourth Generation Evaluation" (Guba & Lincoln, 1989), the knowledge obtained in this study mainly consists of those constructions upon which there was relative consensus (or at least some movement toward consensus) between the two experts.

As to the inherent characteristics of an ADL assessment sensitive to the impact of the “dysexecutive syndrome” on everyday activities, consensus was obtained regarding the usefulness of an evaluation such as the *ADL Profile* to further investigations. It is proposed that in the presence of a series of pre-determined characteristics, an ADL evaluation of this type may be used either as a screening measure of the “dysexecutive syndrome” or as a descriptive measure of the impact of this syndrome on everyday activities. The validity of such a measure would necessarily be dependent on the identification of **typical errors or manifestations of the “dysexecutive syndrome”** in everyday activities. The neuropsychologist suggested that indicators of clearly pathological behaviours associated with a "dysexecutive syndrome", most often include, errors related to a **loss of inhibition** and to a **loss of self-monitoring**. A third indicator, **loss of goal formulation**, was presented by the occupational therapist. However, in her opinion, confounding problems such as motivation and depression must be identified prior to associating manifestations related to this indicator with a "dysexecutive syndrome".

With regards to the manifestations of this syndrome in everyday activities, movement towards consensus occurred through the inter-expert negotiation. The initial viewpoint of the neuropsychologist was that executive functions are only manifested in novel and complex tasks. He, in fact, initially highlighted the paradox of looking at the relation between executive functions and everyday activities. The initial viewpoint of the occupational therapist was that executive functions are required for the performance of all everyday tasks, even a simple task such as brushing one's teeth. She argued that even brushing one's teeth requires that a goal be formulated and that the task be initiated. She also noted that the many variations, in the normal population regarding the importance and value attributed to this task, is suggestive of a role of executive functions. Interestingly enough, subsequent to the inter-expert negotiation, the neuropsychologist subtly nuanced his viewpoint. At this point, his opinion was that executive functions are necessary, to different degrees, even for the performance of everyday activities. He noted, however, that they are most evident in those everyday tasks that are more novel and complex, as these require more input from executive functions. On the other hand, the occupational therapist more or less maintained her initial opinion that an individual is always having to adapt, even in tasks that he or she does on a daily basis.

In summary, subsequent to the inter-expert negotiation, consensus was essentially achieved. What was evident however, was a complex but subtle difference in the appreciation of the problem, due mostly to the different paradigms of their respective disciplines from which vantage point each expert viewed the question.

In accordance with the stated purpose of the present study, this last chapter is divided into two main sections. The first section will look at the assessment of the "dysexecutive syndrome" in everyday activities and the second section will examine the manifestations of this syndrome. In both

these sections, results will be discussed in relation to a second analysis of the literature. This second analysis of the literature was made possible thanks to new understandings obtained subsequent to both the individual interviews and the inter-expert negotiation. The critique, which will be presented in this chapter, was completed by the researcher. It was not validated by the experts involved in this study.

## **5.1 Assessment of the “dysexecutive syndrome” in everyday activities**

According to the opinions expressed by the experts in this study, it appears that determining the intended goal of the assessment is the cornerstone to further discussions. Indeed, when the experts were asked to state the necessary characteristics of a comprehensive ADL evaluation tool sensitive to the impact of executive functions, what they found lacking in clarity was the intended goal of this evaluation. Discussions with the occupational therapist revealed that, this basic issue, was one of particular concern. Having read the recommended preliminary readings for this study, she presented a perspective on the assessment of the "dysexecutive syndrome" that differed slightly from that offered in the neuropsychological literature. The occupational therapist's viewpoint was that the evaluation should serve to measure the impact of the "dysexecutive syndrome" on an individual's ability to manage his or her daily life. The need to differentiate this goal from that of the diagnostic goal presented in the neuropsychological literature was of concern.

The neuropsychologist, in counterpart, approached the question from a diagnostic perspective and based his comments on the perceived limitations of an evaluation such as the *ADL Profile* as a diagnostic tool. Both experts

thus viewed the assessment of the “dysexecutive syndrome” in everyday activities, as having a goal other than a diagnostic one.

Based on these comments, I returned to the literature to review the *Multiple Errands Test* and attempted to highlight the subtleties which differentiate this neuropsychological test from the *ADL Profile*, a test for occupational therapists. The *Multiple Errands Test* is a diagnostic measure of executive functions via task observation whereas the *ADL Profile* is a measure of independence in everyday activities. Insofar as diagnostic potential is concerned, the main difference found between these two evaluations is that the *Multiple Errands Test* is supported by a neuropsychological battery of tests which serve to identify potentially confounding variables. The possibility of including the *ADL Profile* within a comprehensive battery of tests such as this could be further explored if one chooses to pursue its potential as a diagnostic instrument.

A goal for which consensus was obtained, subsequent to the inter-expert negotiation, was the potential contribution of elements of an assessment such as the *ADL Profile* for the screening of the “dysexecutive syndrome”. Elements such as a non-structured approach in a natural context and inclusion of complex and non-routine tasks were of particular interest. This proposition would need to be validated with further research.

In summary, expert opinions, subsequent to the inter-expert negotiation, suggest that the **intended goal** of a comprehensive evaluation of everyday activities, in relation to executive functions, can either be: (1) a measure of the impact of the “dysexecutive syndrome” or (2) a screening measure. Both the occupational therapist and the neuropsychologist agree, that the evaluation must be supported by other specific neuropsychological evaluations in order to isolate and identify the causes of the underlying deficits.



Whether the intended goal is one of diagnosis, screening or a measure of impact, the potential sensitivity of an evaluation of everyday activities, to the "dysexecutive syndrome" is dependent upon the presence of a series of very specific characteristics. These characteristics, proposed by the experts, include: (1) the use of **tasks of executive functions**; (2) **environmental analysis**; (3) a **broader definition of the task**; (4) **normative studies**; (5) **pertinent theoretical models of cerebral functioning**, and (6) **refined error analysis**. The following sections will explore each of these in turn.

### *Tasks of executive functions*

The occupational therapist suggests that, to measure the impact of the "dysexecutive syndrome" on everyday activities, a variety of tasks should be used, i.e. novel and complex as well as familiar and automatic. The neuropsychologist, on the other hand, suggests that task selection for evaluation purposes must prioritise the use of **tasks of executive functions**. Though a wider variety of tasks may be required to measure the impact of the syndrome on everyday activities than to diagnose its presence, both experts agree that the assessment should use tasks of executive functions, i.e. novel and complex tasks. Where consensus was less clearly delineated is in the identification of tasks that meet these criteria.

Shallice et al. (1991), indeed suggest that novel tasks within which executive impairments will be evident do not include the most routine everyday tasks. However, an apparent contradiction in the proposition put forth by these authors may have contributed to the lack of consensus between the two experts in this study. More precisely, in describing the deficits of three individuals with reported deficits of the *Supervisory System*, these same authors, who propose that executive deficits will only be demonstrated in the performance of novel tasks, present case studies of individuals who have difficulty performing, what are generally considered to be, routine everyday tasks (Shallice & Burgess, 1991). In fact, one individual reportedly has to be told to shave and change his clothes.

The neuropsychologist further suggests that data interpretation should consider the degree to which the task was complex and novel for the individual. The occupational therapist highlighted the practical difficulty involved in determining this, as novelty and complexity appear to exist along a continuum rather than in a clearly delineated present or absent state. The example given concerned the task of paying a bill by cheque where there were many variations in the degree of novelty, i.e. never paid this particular bill by cheque but paid other bills, paid bills but not by cheque, etc. The neuropsychologist nonetheless proposes that three factors can be used to help identify the degree of novelty and complexity of the task for the person. These include: (1) **the person's previous knowledge of the task**; (2) **recent changes in the person's physical or cognitive abilities**, and (3) **environmental distractions**. For clarity's sake, discussion of the last factor will be presented in the section concerning environmental analysis.

Based on these opinions, a series of articles was reviewed to explore the extent to which these variables are considered in the literature<sup>3</sup>. The studies consulted used a wide variety of tasks considered, by their authors to be **tasks of executive functions** (Boyd & Sautter, 1993; Crépeau, Scherzer, Belleville, & Desmarais, 1997; Goel et al., 1997). For example, Goel et al. (1997) use a financial planning task. Though the authors present this task as one which is sensitive to executive functions, they specifically state that all subjects had previous experience with financial planning. A subjects' **previous knowledge of the task**, according to the neuropsychologist expert, reduces task novelty. Though the neuropsychologist attributes significant importance to this, most studies reviewed do not clearly investigate or document the subject's previous experience with related tasks in determining the degree of complexity and novelty of the tasks for the individuals in question (Le Thiec et al., 1999; Sirigu et al., 1995b). In order to apply this

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<sup>3</sup> The critique of the literature, carried out by the author to bring out other aspects to the discussion, is based on the opinions expressed in this study. Comments were not validated by the experts.

proposition a substantial number of tasks must be included in an evaluation protocol so as to allow adequate matching between an individual and appropriately complex and novel tasks.

Most of the evaluations reviewed fail to report the degree to which **changes in a person's physical and cognitive abilities** may have impacted on the degree of complexity and novelty of the task. To highlight the importance of this variable, consider the performance of the *Multiple Errands Test* by an individual in the process of learning to manoeuvre a wheelchair. Performance of the test in this situation would be more complex and require a significantly increased amount of planning. It is interesting to note, however, that in a recent study pertaining to this test, subjects with major physical disabilities were simply excluded from participating in the study (Le Thiec et al., 1999).

Another study, pertaining to individuals who sustained a traumatic brain injury, used the simple and familiar tasks of tooth brushing and instant coffee preparation (Schwartz et al., 1993). Though deficits attributable to executive functions are identified, the authors fail to present the possibility that, for these individuals, the tasks may possess the characteristics of tasks of executive functions. Factors, which may need to be considered, include: 1) the novelty of the environment (ex: inpatient rehabilitation hospital); 2) the amount of time which has passed since the last performance (ex: amount of time where the individual was in a comatose state ), and 3) recent changes in the physical or cognitive functioning of the individual (ex: paresis or paralysis).

Finally, as justly stated by the occupational therapist, pure task novelty is clearly a rare occurrence, particularly in everyday activities. It is a rare occasion where someone is faced with a problem for which he has no related prior experience. Even in the event that an individual has never directly performed a task, he will undoubtedly have observed others performing the

task, thereby reducing task novelty. This is equally true for an activity performed in a new or unfamiliar environment. Though the environment may not be familiar, prior knowledge of similar environments will facilitate the adaptation process (Spencer, Davidson, & White, 1996). An individual who recognises the fundamental similarities between contexts and the sub-components of the activity will not rely as extensively on executive functions for adequate task performance.

In summary, it is proposed that task selection should prioritise the use of tasks of executive functions, particularly when the goal of the evaluation is to evaluate the "dysexecutive syndrome". However, as no task is inherently a task of executive functions, task selection should consider three important variables: (1) previous knowledge of the task; (2) recent changes in the person's physical and cognitive abilities, and (3) environmental distractions. Based on the neuropsychologist's opinion, it is suggested that the evaluation should be comprised of a series of tasks from which the evaluator can select those which are most appropriate for the individual. Few of the studies reviewed met these criteria.

#### *Environmental analysis*

The importance of considering the impact of environmental factors on everyday activities was highlighted by the experts in this study. Everyday tasks generally tend to be performed automatically with little attention and conscious effort however they also tend to be guided by external stimuli. If stimuli, which are not relevant to the task at hand, are not appropriately inhibited, this can lead to the intrusion of unintended actions into the individual's performance. While evident in the "dysexecutive syndrome" (Lhermitte, 1986; Luria, 1966), intrusions and derailments onto unintended actions have also been reported in a normal group of individuals (Reason, 1984). The impact of external stimuli on performance will be considered in the context of two main types of environments: (1) **novel**, and (2) **familiar**.

This will be followed by a discussion regarding the pertinence of an evaluation approach, which favours the use of a **natural context**.

Various environmental factors can contribute to task complexity and task novelty. Though the importance of the environment has recently been noted in the literature (Humphreys & Forde, 1998; Schwartz et al., 1999; Schwartz et al., 1993; Schwartz et al., 1998; Schwartz et al., 1991), few of the studies reviewed considered the impact of these variables on performance. It is known that many ADL evaluations are performed in hospital settings. Recently hospitalised individuals are thus required to perform their everyday activities in what may be considered to be a **novel environment**. This environment contains a series of potentially novel contingencies such as: (1) new location of clothes and supplies; (2) modified schedules; (3) shared facilities, and (4) an environment, which is not necessarily adapted to their specific needs. In such novel environments, fairly routine tasks can assume the characteristics of tasks of executive functions, particularly for those with intellectual impairments. The impact of these factors on the degree of complexity of the task for the individual should not be underestimated. In fact, certain studies have shown better performance in everyday activities in a familiar home environment in comparison to a clinical setting for individuals living in the community with moderate to severe traumatic brain injury (Darragh, Sample, & Fisher, 1998) and older adults (Park, Fisher, & Velozo, 1994). The exact cause of this improvement was not specified, but familiarity was considered as an important contributing factor. A task performed in a novel environment can thus be thought to be more complex for the individual. In fact, the *Multiple Errands Test* uses a series of fairly simple tasks in a novel environment.

As was previously stated, intrusions and derailments towards unintended actions have also been reported in a group of neurologically intact individuals (Reason, 1984). An analysis of the pre-empting factors, revealed that the majority of "action slips" occurred when the subjects were performing a

familiar activity within a very **familiar environment**. A familiar environment, in the context of an evaluation of everyday activities, can therefore be thought to have two opposing influences on performance. Firstly, a familiar environment has been shown to positively influence the initiation of routine and automatic behaviours, which are appropriate in that environment (Spencer et al., 1996). This may be thought to decrease task complexity and thus reduce the extent to which executive functions are required to perform the task. On the other hand, a greater degree of inhibition may in fact be required when performing more or less novel tasks in a familiar environment, as the environment may in essence favour the activation of generally routine actions.

Finally, expert opinions support the use of a **natural context** (a parallel to everyday living environments) for evaluation purposes. The neuropsychologist proposes that a natural context has a greater amount of elements of distraction than controlled environmental settings, and will therefore allow for the observation of more subtle deficits of inhibition. While considering the variety of elements of distraction present at any one time in a natural context, the occupational therapist highlighted the difficulty in maintaining a certain consistency across patients in the degree of task difficulty. As the amount of distractions, and thus the complexity of the task will differ for each individual tested, test-retest reliability and the possibility of comparing performance across patients is reduced. Based on these issues, a second analysis of the literature, completed by the researcher, revealed that, few of the studies reviewed used a natural context. In most instances, studies used **controlled environmental settings** with only a limited amount of pre-selected elements of distraction (Hart, Giovannetti, Montgomery, & Schwartz, 1998; Humphreys & Forde, 1998). Variations in environmental characteristics have, however, been shown to influence the nature of the errors committed. In fact, a study by Schwartz et al. (1991) showed that a cluttered breakfast tray led to the opportunity for more object substitutions or intrusions, whereas the renewable supply of material available at the sink

environment led to the greater possibility of perseverative type errors. Other studies provided limited information regarding the impact of the natural environment on performance (Shallice & Burgess, 1991).

The use of a **natural context** is beginning to emerge as a viable and recommended form of evaluation. The author proposes however that the absence of such an environment may contribute to an underestimation of the actual impact of the "dysexecutive syndrome" on everyday activities. In fact, an evaluation which is completed in an artificial setting will fail to identify variables such as: (1) the actual amount and nature of the elements of distraction in the person's home or community environment, and (2) the person's ability to maintain goal-directed behaviour in the presence of elements of distraction. Use of evaluations in natural settings, such as the *ADL Profile*, and the *Multiple Errands Test*, are therefore recommended. Based on the experts' statements, it is concluded that both of these evaluations would benefit from a more in-depth analysis of the environment and its impact on performance.

#### *Broader definition of the task*

The occupational therapist suggests that the **parameters of the task** must be broadened so as to include the possibility of observing all components of the task, i.e. goal formulation, planning, performance regulation, and error correction. Observation of all of these components is rendered probable when using a **non-structured approach**, a proposed characteristic of assessments of the "dysexecutive syndrome" (Le Thiec et al., 1999; Lezak, 1982; Lezak, 1989; Lezak, 1993; Shallice & Burgess, 1991). Eslinger & Damasio (1985), in reporting the deficits of a patient named EVR, provide supporting evidence for this approach. EVR underwent removal of a large orbitofrontal meningioma which was compressing both frontal lobes. Though he performed very well in highly structured tasks, he had significant difficulties in real-life situations, such as the routine daily activities of self-care and feeding. In fact "when the environment failed to challenge him with

situations that demanded a response, he resumed his relatively goal-less, unpressured existence (p.1739)". He would for instance, take approximately two hours to prepare himself to go to work in the morning and this despite the presence of intact physical and intellectual functioning, according to traditional neuropsychological tests. In this case, information regarding everyday activities was obtained through extensive interviews. It is thought that an evaluation with a non structured approach would also reveal the impact of this individual's deficits on everyday activities.

Few of the studies reviewed used a non-structured evaluation approach, whether the goal was to evaluate everyday tasks (Arnadottir, 1990; Baum & Edwards, 1993; Fisher, 1995; Neistadt, 1992) or executive functions (Boyd & Sautter, 1993; Sirigu et al., 1996). In fact, some studies, as judiciously noted by the occupational therapist, attended in great detail to the manner in which errors were analysed, such as the *Action Coding System* (Schwartz et al., 1991), but failed to mention where the task began and ended. Many studies indeed focused exclusively on the execution component of the task. For example, in a study by Humphreys and collaborators (1998), patients were placed in front of a table and asked to perform a specific series of tasks such as making a cup of tea, wrapping a gift, and making a cheese sandwich. In this study, all task relevant materials were provided for the patient. Goals were thus formulated by (and a significant portion of the planning of the activities done by) the examiner.

According to the occupational therapist in this study, an ADL evaluation, which does not include formulating the goal, making choices, and planning the activity, is not likely to identify deficits which reflect the true impact of the "dysexecutive syndrome" on the individual's performance. If this premise is applied to various studies reported in the literature, one may ask questions such as: (1) in the study by Humphreys and collaborators (1998), would the individual who was observed making a cup of tea think of completing the task to quench his thirst if left at home for a reasonable amount of time? and (2) in



this same study, would the individual know where the materials required for the task are kept?

The manner in which each task is operationalised in the *ADL Profile* is somewhat similar to the occupational therapist's viewpoint which includes a broader definition of the task. As was previously reported, the *ADL Profile* examines four implicit operations, which are considered integral to task performance, i.e. *goal formulation, planning, performance regulation, and self correction*. Dutil et al. (1996) consider executive functions to be necessary for the realisation of everyday activities, particularly when the task definition includes these four implicit operations. An everyday task, such as personal grooming, operationalised in this manner considers the subject's ability with regards to the following aspects of the task: (1) ability to decide to wash himself; (2) ability to choose the most appropriate venue (i.e. shower or bath) according to the time available and other considerations; (3) ability to identify and choose the necessary material for the execution of the task (i.e. soap, shampoo and towels); (4) ability to execute all of the necessary components of the task, and (5) ability in the end to verify that he has indeed adequately completed the task of personal grooming (Dutil & Bottari, 2001).

In summary, although broadening the parameters of the task was proposed by the occupational therapist, few studies can be said to have considered the importance of this approach.

#### *Normative studies*

The need for normative studies, on ADL assessments, was particularly emphasised by the occupational therapist, during the individual interview. Normative studies were indeed proposed by the occupational therapist as an essential means of reducing rater bias and refining error analysis, while taking into consideration the normal variations in the performance of everyday activities related to age, culture, habits, motivation, sex, etc. This issue was also raised by the neuropsychologist in the inter-expert

negotiation. He, in fact, cited the current lack of normative studies, associated to an instrument such as the *ADL Profile*, as a limit to its diagnostic potential, in terms of executive functions.

Variations in the performance of everyday activities in relation to variables such as age, culture, and sex have been reported in recent studies (Dickerson & Fisher, 1997; Fisher, Liu, Velozo, & Pan, 1992; Iwarsson & Isacsson, 1997). The limited number of normative studies pertaining to ADL assessments reduces the inter-rater reliability and validity of these evaluations. Evaluators tend to judge certain actions as errors in relation to their own subjective perception of task requirements.

Fuster (1997), states that the manifestation of a "dysexecutive syndrome" may in certain instances be fully compatible with ordinary life especially if the lesion is in the dorsolateral region of the prefrontal cortex. In this instance, the person may lead an essentially normal life albeit one that is constrained by routine. This theoretical proximity, between normal control subjects and individuals with a "dysexecutive syndrome", reaffirms the need for a greater understanding of "normality" to highlight subtleties, which may be indicative of pathology. Hence, another reason to better understand the normal variations in performance.

Normative studies are therefore particularly recommended for the reduction of **false positives** and **false negatives**. False positives occur when patients are identified as having deficits, where in fact their functioning is within a normal range, and false negatives present when patients are identified as not having any deficits when in fact they do. Psychometric studies on ADL instruments would thus benefit from the presence of normal control groups to improve their validity, objectivity, and inter-rater reliability.

*Pertinent theoretical models of cerebral functioning*

As issue raised with particular conviction by the occupational therapist, during the individual interview, was the need for the evaluation to be based on a pertinent **theoretical model** of cerebral functioning. A review of the literature indicates that only a small number of ADL evaluations are based on models such as *The Model of Cerebral Functioning* (Arnadottir, 1990; Dutil & Forget, 1991). In counterpart, most studies pertaining to the "dysexecutive syndrome" in everyday activities are based on the *Supervisory System/Contention Scheduling Framework* (Brown & Marsden, 1988; Dujardin et al., 1999; Godbout & Doyon, 1995; Grafman et al., 1993; Humphreys & Forde, 1998; Karnath et al., 1991; Le Thiec et al., 1999; Perry & Hodges, 1999; Schwartz et al., 1993; Shallice & Burgess, 1996; Veale et al., 1996). Each of these models, discussed by both experts, will be reviewed in terms of their contribution to the assessment of the "dysexecutive syndrome".

The first model to be proposed was *The Model of Cerebral Functioning* (Luria, 1966; Luria, 1973). Most would agree that this model laid the foundation to much of our current understanding of the functioning of the brain (Christensen & Caetano, 1996; Seron et al., 1999). It has, in fact, greatly contributed, with its important foundation in neuroanatomy, to our understanding of the relations between various neuroanatomical structures. Based on extensive and detailed clinical observations, this model provides a valuable framework for task analysis. The degree to which performance of a task is impaired, secondary to a wide variety of cerebral lesions, is directly related to the importance of the cerebral lesion for the performance of the particular task. However, few of the recent studies pertaining to the "dysexecutive syndrome" make reference to this model (Grigsby et al., 1993). Christiansen (1996) presents certain noteworthy explanations. Though very committed to Luria's investigative method, she nonetheless reports that it has the disadvantage of being subjective, based on clinical experience, and lacking in validation studies. Advantages of the model are associated to the

three basic components of Luria's clinical approach, i.e. (1) his interpretation of cognitive activity as functional systems; (2) his emphasis on the individualised approach, and (3) the importance of error analysis (Ardila, 1992).

Both experts nonetheless supported the usefulness of this model as a theoretical basis for evaluations of the "dysexecutive syndrome" in everyday activities. When the comments reported by Ardila (1992) are looked at in consideration of the general ideas presented by the experts, two variables are particularly worthy of mention. First of all, the neuropsychologist proposed that a task is only a task of executive functions in relation to the individual. This opinion is congruent with the need for an individualised evaluation approach, as proposed by Luria. Secondly, the importance of error analysis, as will be discussed below, was equally highlighted in this study. Evaluations, which intend to measure the impact of impaired cognitive activities on the performance of global everyday activities, should therefore consider the potential contribution of Luria's model as a theoretical basis.

A second model of cerebral functioning to be discussed, by both experts, was the *Supervisory System /Contention Scheduling Framework*. As the occupational therapist was less familiar with this model, the comments of the neuropsychologist corroborated this model more than those of the occupational therapist. As was previously stated, this information processing model has been widely cited in recent studies. Based on the opinions expressed by the neuropsychologist, two components are particularly worthy of mention. In essence, an assessment of the "dysexecutive syndrome" in everyday activities based on this theoretical model, will (1) favour the use of **novel and complex** tasks, and (2) error analysis will be particularly interested in identifying **errors of inhibition** as inhibition is hypothesised to be the central role of the *Supervisory System*.

In summary, the important contribution of two of the models discussed by the experts, i.e. the *Model of Cerebral Functioning* and the *Supervisory System \Contention Scheduling Framework*, to the understanding of the “dysexecutive syndrome” has been well documented. However, recent studies pertaining to the “dysexecutive syndrome” in everyday activities make limited reference to *Luria's Model of Cerebral Functioning*. The findings of this study, propose, that the theoretical framework presented by Luria should continue to be studied, as his contributions remain very pertinent.

#### *Error analysis*

The need to identify typical errors of performance, that can be related to a “dysexecutive syndrome”, was an issue considered as very important by the occupational therapist. As the idea of “typical errors” makes direct reference to the manifestations of the “dysexecutive syndrome” in everyday activities, this will be discussed in more detail below. However, error analysis, on a more general level, is widely used in related studies. The majority of studies reviewed, in fact, identify errors and provide a qualitative analysis of the nature of these errors (Crépeau et al., 1997; Godbout & Doyon, 1995; Le Thiec et al., 1999; Luria, Pribram, & Homskaya, 1964; Schwartz et al., 1993; Schwartz et al., 1991; Shallice & Burgess, 1991).

Expert opinions further suggest that **error analysis**, within ADL assessments, would need to be refined, particularly if the intention was to develop their diagnostic potential and their usefulness as guides to subsequent rehabilitation. As presented in the result section of this dissertation, certain behaviours observed by the occupational therapist while using the *ADL Profile*, were associated with a “dysexecutive syndrome” by the neuropsychologist, during the inter-expert negotiation. However, diagnosing a “dysexecutive syndrome” globally, without identifying the specific impairments observed, has only limited usefulness in terms of guiding subsequent rehabilitation efforts (Crépeau et al., 1997). A

“dysexecutive syndrome” is in fact considered a large category lacking in specificity. As stated by the neuropsychologist, more useful information would be obtained if errors were not merely attributed to a “dysexecutive syndrome” but more precisely identified as a programming deficit, an inhibition deficit or another specific deficit.

The degree of specificity, which can be attained in an ADL evaluation, is however limited. As was appropriately stated by Shallice and Burgess (1991) and Burgess (1997), the reality is that quite frequently it is not possible to be precise about which processes are impaired within everyday life behaviour (such as a complex shopping task). Complex tasks involve lengthy periods of time and the activation of practically all cognitive systems.

Error analysis, as proposed by the experts, is thus substantially supported by the studies reviewed in the literature. As this type of analysis is directly related to the understanding of the manifestations of the “dysexecutive syndrome” in everyday activities, the discussion presented in the following section will serve as a complement to error analysis.

### *Conclusion*

A series of recommendations emerged from the expert opinions expressed in this study, with regards to characteristics which may increase both the validity and reliability of assessments of the “dysexecutive syndrome” in everyday activities. First of all, evaluations should use tasks of executive functions, i.e. tasks that have been previously identified as being both novel and complex for the individual. Secondly, the impact of the environment on performance should be more precisely documented as a variety of errors may be directly associated to environmental factors. Thirdly, the definition of the task must be broadened, to allow for the observation of all task components including goal formulation and error correction. Fourthly, normative studies are required for the development of objective, reliable and valid ADL assessments. Fifthly, evaluations should be based on appropriate

models of cerebral functioning. And finally, the evaluation should include the use of a qualitative analysis of the nature of the errors.

## **5.2 Manifestations of the "dysexecutive syndrome" in everyday activities**

The extent to which executive functions are in fact manifested in everyday activities was the central issue of discussion in the inter-expert negotiation. According to the initial viewpoint of the neuropsychologist, looking at the manifestations of the "dysexecutive syndrome" in everyday activities is paradoxical, as everyday activities, are considered to be inherently routine and automatic activities which do not require executive functions. The occupational therapist, on the other hand, was of the opinion that even routine everyday activities require constant adaptation and goal formulation. These opposing viewpoints were interpreted as emanating principally from the different disciplinary paradigms from which each expert viewed the question. Though the view of the neuropsychologist is widely held in the literature (Fuster, 1997; Shallice & Burgess, 1991), certain studies support the position that a "dysexecutive syndrome" can also be manifested in routine everyday activities as proposed by the occupational therapist. These two views on the issue will be discussed from the perspective of information gleaned from the literature, by the author.

Certain authors have described specific impacts of the "dysexecutive syndrome" on everyday activities. These manifestations were grouped, in the literature review, into four categories of pathological behaviours: (1) disturbance of initiative (Eslinger & Damasio, 1985; Lhermitte, 1986; Luria, 1966; Luria, 1973; Penfield & Evans, 1935); (2) non-selective goal-directed behaviour (Lezak, 1989; Lhermitte, 1986; Luria, 1966; Luria, 1973; Shallice & Burgess, 1991); (3) planning deficits (Eslinger & Damasio, 1985; Luria, 1966;

Penfield & Evans, 1935; Shallice & Burgess, 1991), and (4) disorder in self-monitoring (Luria, 1966). The literature also reports various presentations of the "dysexecutive syndrome" in everyday activities such as (1) Frontal Apraxia (Luria, 1966); (2) Action Disorganisation Syndrome (Schwartz et al., 1993); (3) Strategy Application Disorder (Shallice & Burgess, 1991), and (4) Environmental Dependency Syndrome (Lhermitte, 1986). The manifestation of a "dysexecutive syndrome" is however reported in certain instances, to be fully compatible with everyday life (Fuster, 1997).

From a theoretical perspective, the *Supervisory System / Contention Scheduling Framework* suggests that the role of the Supervisory System is to inhibit irrelevant actions or other automatic responses to the environment. The model hypothesises that this "inhibitory process" is only required in novel activities. However, Schwartz et al. (1991;1993), based on this same model, propose that in the case of familiar actions "problems only emerge when distracting stimuli are present". On the other hand, Reason (1984), demonstrated that normal individuals commit "slips of action" when they are pre-occupied or distracted. "Slips of action" occur when the intended action is replaced by an automatic or frequently executed action, generally upon sight of a given object in the environment. Both the studies of Reason (1984) and Schwartz et al. (1991, 1993), are consistent, in terms of the importance of distracting stimuli, either internal or external, in routine activities. In both instances, uninhibited elements of distraction may lead to the performance of strongly ingrained habits. If one understands the role of the *Supervisory System* as being primarily one of inhibition, then the findings of both these studies are consistent. In summary, it can be hypothesised that inhibition is first of all required to inhibit habits and routines to allow novel responses to the environment. Secondly, inhibition is also required to inhibit both internal and external distractions to allow for the performance of routine (selective, goal-directed) actions.



Manifestations of the “dysexecutive syndrome” in everyday activities were characterised, by the experts, as reflecting impairments of **adaptation, inhibition, self-monitoring and goal formulation**. These four themes refer in turn to the general definition of executive functions as well as to certain specific processes which may contribute to the deficits observed in everyday activities. When compared with the four categories which were presented in the literature review, adaptation and inhibition are two new categories. They were not presented in the literature review as this is new information obtained subsequent to the interviews and the inter-expert negotiation. The relation of each of these four concepts to information presented in the literature will be discussed below.

First of all, the concept of adaptation, proposed by the neuropsychologist, is supported by Burgess (1997), who states that “the primary purpose of executive functions is to facilitate **adaptation** to novel situations”. Secondly, the importance of **inhibition**, or the inhibitory control of interference, for goal-directed behaviour, is also well supported in the literature (Andrés, Van der Linden, Collette, & Le Gall, 1999; Cockburn, 1995; Fuster, 1997). Loss of the inhibitory abilities of the Supervisory System has, in fact, been stated as the underlying cause of many of the behavioral manifestations presented earlier, i.e. task inefficiency (Schwartz et al., 1993), slips of action (Reason, 1984), Environmental Dependency Syndrome (Lhermitte, 1986), and Strategy Application Disorder (Shallice & Burgess, 1991).

The neuropsychologist also suggests that the frequency of errors attributable to a lack of **inhibition**, is an indicator of pathology. As shown in a study by Reason (1984), normal subjects do at times fail to inhibit certain distractions. Thus, the mere presence of errors of inhibition does not indicate pathology, however the frequency at which these errors occur does serve as an indicator. An example, thought to reflect a pathological situation, was provided by the occupational therapist. She described an individual who,

while trying to prepare a meal, was continually distracted from the plan at hand and had great difficulty attaining the desired goal.

Thirdly, the neuropsychologist proposed that **loss of self-monitoring** is an indicator of a "dysexecutive syndrome". The importance of loss of self-monitoring has been well documented in the literature (Goldstein et al., 1993; Langevin & Le Gall, 1999; Lezak, 1989; Lezak, 1995; Luria, 1966; Pollens, McBratnie, & Burton, 1988; Prigatano & Altman, 1990). The importance of diminished error correction and error detection in everyday activities was demonstrated in certain studies with individuals who had sustained a traumatic brain injury (TBI) (Hart et al., 1998). In general, despite making more errors than controls, subjects with TBI corrected and showed awareness of proportionally fewer of their errors when compared to controls (Hart et al., 1998). The results of their study also demonstrate that error detection and correction can be reliably measured during everyday activities. They propose that a traumatic brain injury "may affect error detection and correction by reducing, or impairing the allocation of attentional resources needed for the simultaneous execution and monitoring of routine action" (Hart et al., 1998).

The amount of time required for an individual to become aware of the presence of an error in his performance may also be an important variable to be considered. Normal control subjects and individuals with posterior lesions would be expected to rather rapidly note any deviations in their actions (such as in the "slips of action" described by Reason, 1984) and more or less instantly redirect their actions towards the intended activity. On the other hand, individuals with a "dysexecutive syndrome" would be expected to continue their deviated action for a more prolonged period of time related partly to their delayed information processing, as well as their decreased overall awareness of their actions and errors.

The final indicator of the "dysexecutive syndrome", proposed by the occupational therapist, was **loss of goal formulation**. As with the other proposed indicators, this indicator has also been well documented in the literature (Lezak, 1983; Lezak, 1989; Lezak, 1993; Lezak, 1995; Luria, 1966). The occupational therapist suggests that to better understand the impact of **goal formulation** on everyday activities, one must consider the intricate relation between goal formulation and such variables as motivation and depression. The difficulty, as was stated by the occupational therapist, is in differentiating the impact of these confounding variables from that of impairment in goal formulation, which is related to the "dysexecutive syndrome". As few authors specifically addressed this in the literature reviewed, the following discussion presents examples drawn from three different case studies, which contribute valuable information to the occupational therapist's proposal.

Firstly, a study by Boyd and Sautter (1993), presents an example of the impact of subtle initiation deficits on the *Executive Route Finding Task* in an individual with a traumatic brain injury. Although the subject could adequately describe what he was going to do, he was unable to start the task until he was specifically told to "stand up and go to the door". The subject stated that he knew what he needed to do but could not understand why it was so difficult to get started. In this instance, the question of motivation to act does not appear to have been the cause nor did the authors mention it.

Secondly, Shallice and Burgess (1991), specifically exclude motivation as a possible explanation for the deficits observed in individuals' with a Strategy Application Disorder. In this particular study, the authors describe an individual with a traumatic brain injury having to be told to shave and change his clothes. This is an example of impaired goal formulation (or intention generation and realisation) in everyday activities. Though specific explanations for this particular behaviour were not reported, certain possibilities can be considered. For instance, a difficulty may be present with

regards to recognising the need to shave and change his clothes (socially appropriate behaviour). Logically, an individual cannot be expected to initiate a task that aims to respond to a need that has not been identified. This deficit, related to goal formulation (and self-awareness), significantly impacts this individual's everyday activities, well within the realm of routine activities.

The third example, provided by the occupational therapist, relates the inability of an individual with multiple sclerosis to formulate the goal of getting a doctor's appointment. The individual reportedly does not have the idea to pick up the phone to call for an appointment. Exclusive use of the *ADL Profile*, in this instance, allowed for the observation of this deficit, but not the isolation of possible underlying causes. In the absence of alternate neuropsychological evaluations, it was more or less impossible to determine whether the observed behaviour reflected a deficit in formulating a goal (related to a "dysexecutive syndrome"), a lack of motivation or a lack of interest.

Finally, furthering the knowledge base in this vast but rather unexplored field of research would benefit from the presence of more studies which considered the parallel between everyday activities and the open-ended multiple sub goal situations proposed by Shallice & Burgess (1991). Alternately, certain benefits may also be derived from considering a rather interesting definition of activities of daily living, or everyday activities, proposed by Hammonet et Bégue-Simon (1991). This definition, which is broader than traditional definitions, proposes that activities of daily living are routine activities performed by an individual in **various environments** to ensure both his **survival** and his integration into the **community**. Based on this definition, Dutil and collaborators (1996) further propose that these activities could be subdivided into three main dimensions, according to the location in which an activity is performed. The three dimensions include: (1) a personal dimension which regroups all activities related to self care; (2) a domestic dimension which regroups all activities that are typically performed

in the home, and (3) a community dimension that includes activities related to the social performance of the individual. The definition of activities of daily living proposed by Dutil et al. (1996) further subdivides each of these dimensions into the activities and tasks pertaining to each dimension. An activity is defined as a group of tasks that the individual must execute. For example, the activity of personal hygiene consists of the following tasks: bathing, *grooming and toileting*. A task is in turn composed of a series of operations that are necessary for the performance of the task (Crochard, 1987). The four operations in the *ADL Profile* are goal formulation, planning, regulated task performance, and error correction. The authors thus perceive the task as resulting from the performance of different operations. A preliminary study by Dutil et al. (1993) seems to have demonstrated, for several individuals with TBI, an association between executive functions, such as planning and error correction, and the performance on certain tasks of everyday activities.

### *Conclusion*

The "dysexecutive syndrome" can apparently be manifested in a multitude of ways due to the wide variety of variables that can cause difficulties in goal formulation, task initiation, planning, regulating performance, and error correction. There are, however, different perspectives as to the extent to which executive functions are manifested in everyday activities, both in the literature and between the experts.

## **5.3 Limits of the study**

The results of this study are limited by different elements. First of all, although the professionals interviewed in this study are considered to be experts in their fields, the consultation of only two experts limits the

transferability of the results. The opinions expressed in this study cannot be thought to represent the opinions of all experts in the field of executive functions and everyday activities. The use of a multi-method approach, involving the confrontation of ideas presented between the student, the two experts and information obtained from the literature, contributed to limiting small sample effects of the study.

Secondly, despite the rigorous analysis which was done of the literature on the subject, the facts are that the majority of relevant studies were written by neuropsychologists and analysed by an occupational therapist. Though the expert neuropsychologist, and the related clinical experience of the occupational therapist, greatly facilitated the exploration of complex and theoretical literature, the analysis and interpretation of the data was affected by the limited understanding of the occupational therapist. Feedback obtained from the neuropsychologist did however improve the credibility of the results.

Thirdly, the research was carried out in two languages, i.e. French and English, in order to respect the language of the experts. As the analysis and coding was simultaneously done in two languages, some information may have been lost and misinterpreted in the translations.

Fourthly, though the inter-expert negotiation session greatly contributed to developing a better understanding of the problem under study from the perspective of two separate disciplines, use of a single session may have limited completion of the process. As understanding the opinions of an expert from another discipline requires time and reflection, the process could not be fully completed in the three hour session planned in the methodology of this study. Lack of further availability of the experts prevented a late modification of the methodology.

Fifthly, the analysis of certain case studies presented in this dissertation, led to the identification of certain errors which appear to be more or less typical of the “dysexecutive syndrome”. As the analysis was of a preliminary and exploratory nature, the results must be interpreted with caution.

Finally, as the opinions of the experts continually needed to be validated through an extensive literature review, certain propositions could not be explored in sufficient depth to be presented in this dissertation.

## CHAPTER 6: CONCLUSION

The goal of this study was, through the consultation of experts and a literature review done as another analysis in the discussion, to generate new understandings regarding criteria needed to improve the sensitivity of ADL assessments to detect the impact of the “dysexecutive syndrome” on everyday activities. To attain this goal, two preliminary objectives were considered, that is (1) to better understand the concept of executive functions and (2) to better comprehend manifestations associated with a “dysexecutive syndrome” in everyday activities. The pertinence of this study is justified by the range of complex behavioural and cognitive disturbances present in these individuals which are related to poor outcome and difficult management (Burgess, 1997).

Expert opinions, obtained in this study, identified a central feature of the “dysexecutive syndrome” as being a reduced ability to adapt to complex and novel situations. Three contributing factors of this syndrome were identified as deficits in inhibition, self-monitoring and goal formulation.

Manifestations of the “dysexecutive syndrome” in everyday activities were extensively explored in the inter-expert negotiation session. Through this discussion, examples drawn from a series of case studies provided by the occupational therapist, served to illustrate various manifestations of deficits in adaptation, inhibition, self-monitoring and goal formulation.

The characteristics required of a measure of the “dysexecutive syndrome” in everyday activities were expanded to include: (1) the use of tasks of executive functions selected in consideration of the person’s previous knowledge of the task, any recent changes in the person’s physical or cognitive abilities and environmental distractions; (2) an analysis of the natural environmental context which considers the contribution of various



environmental factors to task complexity and novelty, as well as the impact of these factors on the person's performance; (3) a broader definition of the task, which includes observation not only of task execution but also of goal formulation, planning, and error correction; (4) normative studies to highlight subtleties, which may be indicative of pathology and decrease rater bias; (5) pertinent theoretical models to ensure an optimal understanding of the concepts under study, and (6) error analysis to identify behaviours, which can reliably be associated with the "dysexecutive syndrome". Inclusion of these criteria in currently used ADL measures, will serve to improve the sensitivity of these measures to problems caused by the "dysexecutive syndrome". This will in turn directly impact the quality of services offered to individuals with a "dysexecutive syndrome".

Results obtained in this study confirm the value of collaborative research between neuropsychology and occupational therapy. Indeed, the inter-expert negotiation session, contributed to a completely revised version of the results. Just as valuable, was the exploration, by occupational therapists, i.e. the researcher, and the expert occupational therapist, of theoretical models proposed by neuropsychologists and cognitive psychologists. Though the goals and perspectives of these two disciplines differ, it was found that neuropsychological research concerning cerebral functioning greatly contributes to occupational therapy research concerning everyday activities and visa versa. This study suggests that increased collaboration between these two disciplines would be highly beneficial to individuals with a "dysexecutive syndrome". Such collaborations would optimally contribute to a more adequate identification of the needs of these individuals as well as more appropriate interventions.

Several suggestions for future research can be proposed subsequent to the results obtained in this study. First of all, collaborative studies, involving both neuropsychologists and occupational therapists, could consist in the systematic observation of individuals with a probable "dysexecutive

syndrome” during the performance of everyday activities. Performance could be analysed from different perspectives and contribute to furthering our understanding of the impact of this syndrome on an individual’s life roles and responsibilities. Collaborative studies would optimally result in the proposal of a theoretical model, which integrates the perception of both neuropsychologists and occupational therapists, on the “dysexecutive syndrome”. Equally interesting would be the development of interdisciplinary evaluations. Such evaluations would theoretically have the advantage of being more valid, as the perspectives and expertise of two appropriate disciplines would be combined.

Suggestions for future research can also be proposed with regards to the continued development of the *ADL Profile*. I suggest that future research study the validity of a modified version of the *ADL Profile* which corresponds specifically to the criteria for the assessment of the “dysexecutive syndrome” presented in this study. A screening measure of the “dysexecutive syndrome” should be developed as well.

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**ANNEX A**  
**CONSENT FORMS AND ETHICAL CERTIFICATE**



Formule de consentement pour ma participation à un projet de recherche  
n'impliquant ni prise de médicaments ou autres substances ni analyses de laboratoire

**Identification du bénéficiaire : Nom:** \_\_\_\_\_

**Date de naissance :** \_\_\_\_\_

**No. de dossier :** \_\_\_\_\_

Je, soussigné(e), \_\_\_\_\_, consens par la présente à participer au projet de recherche suivant dans les conditions décrites ci-dessous :

**TITRE DU PROJET :** Validation d'un concept sous-jacent à la réalisation des activités de la vie quotidienne: les fonctions exécutives

**RESPONSABLES:** Elisabeth Dutil, M.Sc., Ron Levy, Ph.D., Caroline Botari, B.Sc.(ergo)

**OBJECTIF DU PROJET :** Mieux comprendre les fonctions exécutives nécessaires à la réalisation des activités de la vie quotidienne suite à traumatisme crânien

### NATURE DE MA PARTICIPATION

Des lectures pré-sélectionnées par les membres de l'équipe vous seront envoyées avant de faire l'entrevue. Par la suite, l'entrevue sera faite individuellement avec vous par un membre de l'équipe et portera sur la modélisation des fonctions exécutives lors de la réalisation des tâches de la vie quotidienne. En dernier lieu, une session de travail sera faite avec les experts qui ont participé à l'étude pour valider les résultats des trois entrevues.

### AVANTAGES PERSONNELS POUVANT DÉCOULER DE MA PARTICIPATION

L'entrevue et la rencontre de groupe peuvent susciter une réflexion au niveau de la pratique clinique de chaque expert. Les renseignements qui découleront de ce projet de recherche pourront être utilisés lors de l'évaluation et de l'intervention auprès des personnes présentant un traumatisme crânien afin de mieux interpréter les difficultés reliées à la réalisation des activités de la vie quotidiennes.

### INCONVÉNIENTS PERSONNELS POUVANT DÉCOULER DE MA PARTICIPATION

Aucun inconvénient personnel peut découler de votre participation

### RISQUE

Il est entendu que ma participation à ce projet ne me fait courir, sur le plan professionnel, aucun risque que ce soit.

### INFORMATIONS CONCERNANT LE PROJET

On devra répondre, à ma satisfaction, à toute question que je poserai à propos du projet de recherche auquel j'accepte de participer.

### ACCÈS À MON DOSSIER

Ne s'applique pas

**AUTORISATION D'UTILISER LES RÉSULTATS**

J'accepte que l'information recueillie lors de ce projet puisse être utilisée pour fins de communication scientifique et professionnelle et d'enseignement. Il est entendu que l'anonymat sera respecté à mon égard.

**RETRAIT DE MA PARTICIPATION**

Il est entendu que ma participation au projet de recherche décrit ci-dessus est tout à fait libre ; il est également entendu que je pourrai, à tout moment, mettre un terme à ma participation sans que cela n'affecte la qualité de ma pratique professionnelle.

**CONFIDENTIALITÉ**

Il est entendu que les observations effectuées en ce qui me concerne, dans le cadre du projet de recherche décrit ci-dessus, demeureront strictement confidentielles.

Je déclare avoir lu et/ou compris les termes de la présente formule.

\_\_\_\_\_ Signature de l'intéressé(e)

\_\_\_\_\_ Signature d'un témoin

Fait à \_\_\_\_\_, le \_\_\_\_\_ 19\_\_.

Je, soussigné(e), \_\_\_\_\_, certifie (a) avoir expliqué au signataire intéressé les termes de la présente formule, (b) avoir répondu aux questions qu'il m'a posées à cet égard et (c) lui avoir clairement indiqué qu'il reste, à tout moment, libre de mettre un terme à sa participation au projet de recherche décrit ci-dessus.

\_\_\_\_\_ Signature du responsable du projet  
ou de son représentant

Fait à \_\_\_\_\_, le \_\_\_\_\_ 19\_\_.

Les responsables du projet peuvent être rejoints au Centre de recherche de l'Institut de réadaptation de Montréal, 6300, ave. Darlington, Montréal (Québec), H3S 2J4. Tél. : (514) 340-2078. Fax : (514) 340-2154.

**(A ÊTRE COMPLÉTÉ EN TROIS EXEMPLAIRES)**



**CERTIFICAT D'ÉTHIQUE**

Par la présente le comité d'éthique de l'Institut de réadaptation de Montréal atteste qu'il a évalué le projet de recherche intitulé :

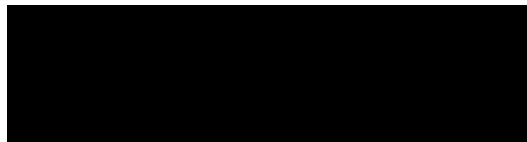
**“Validating a concept essential for successful evaluation of activities of daily living for people with a traumatic brain injury : executive functions”**

présenté par : **Elisabeth Dutil, Ron Levy et Caroline Bottari**

Le comité composé de :

**M. Jacques R. Nolet, directeur général**  
**Mme Lisette Gagnon, directrice des soins infirmiers**  
**Dr Bernard Leduc, physiatre**  
**Mme Marie-Hélène Chartrand, psychologue**  
**M. Bertrand Arsenault, chercheur**  
**M. Régis Blais, chercheur agrégé, Faculté de médecine**

**a jugé cette recherche acceptable sur le plan de l'éthique.**



**Ronald Riopel**  
**Président du comité d'éthique**

**RR /fd**

Date 99-05-03

*Centre hospitalier affilié à l'Université de Montréal*





**ANNEX B**  
**LETTER SENT TO EXPERTS PRIOR TO THE**  
**INTERVIEW**

Montréal, le 10 janvier 2000

Madame,  
Monsieur,

J'aimerais vous remercier d'avoir accepté de participer à mon projet de maîtrise. Vous trouverez en annexe une brève description de mon projet de recherche intitulé "Mieux comprendre les fonctions exécutives en lien avec le Profil des AVQ". La méthodologie retenue pour ce projet est inspirée de "The Fourth Generation Evaluation" (Guba et Lincoln, 1989).

Voici quelques informations et directives à suivre:

**Étape 1: Présélection des écrits recensés dans la littérature en regard du concept "fonctions exécutives" en lien avec les activités de la vie quotidienne.**

- ✓ Huit articles vous sont acheminés (document ci-joint) pour fin d'analyse.
- ✓ Dans le document, l'ordre de présentation des articles est le suivant: (1) articles récents d'introduction aux fonctions exécutives et aux défis reliés à la théorie et à la méthodologie de recherche s'y rattachant; (2) cadres théoriques et exploration du concept par des auteurs clés tel que Luria, Shallice & Burgess et Lhermite; (3) lien avec les AVQ tel qu'étudié par Schwartz, Humphrey & Forde et Von Crammon et al.; (4) lectures complémentaires
- ✓ Dans le cas où d'autres articles vous semblent nécessaires pour mieux comprendre le sujet à l'étude, je me ferai un plaisir de vous les faire parvenir.



## **Étape 2: Entrevue individuelle avec l'expert A suite aux lectures des articles présélectionnés à l'étape 1.**

### **Quand?**

- ✓ Cette entrevue devrait se dérouler dès que vos lectures sont complétées ou que vous jugez que vous êtes prête et disponible à discuter du sujet.

### **Comment?**

- ✓ L'entrevue se fera au centre de recherche de l'Institut de réadaptation de Montréal. Des questions (3 à 4) vous seront acheminées avant l'entrevue dans le but de mieux vous y préparer. Ces questions serviront de point de départ à la discussion.
- ✓ Le format de cette entrevue sera plutôt de type non formel au niveau de l'échange entre l'expert et l'étudiante (Carolina Bottari).
- ✓ Pour faciliter l'analyse subséquente des données, l'entrevue sera enregistrée avec votre permission.
- ✓ La durée de l'entrevue peut varier de une heure à deux heures.

## **Étape 3: Le verbatim de chacune des entrevues vous sera retourné pour valider la transcription et s'assurer que vous avez bien exprimé votre opinion.**

- ✓ Vous pouvez modifier le verbatim sans restriction car ces données doivent refléter le plus près possible votre compréhension du concept "fonctions exécutives" en lien avec les activités de la vie quotidienne.

## **Étape 4: Analyse par l'étudiante**

- ✓ Une analyse du verbatim validé préalablement par l'expert sera faite par l'étudiante.

**Étape 5: Retour de l'analyse à l'expert A**

- ✓ L'expert A est invité à commenter l'analyse faite par l'étudiante (ex: ajout, retrait, modification).

**Étape 6: Retour des commentaires de l'expert A à l'étudiante**

- ✓ Suite aux commentaires de l'expert A, l'étudiante apporte des modifications à la codification et à l'analyse faite à l'étape 4 et ce si nécessaire.

**Étape 7: Entrevue individuelle avec l'expert B suite aux lectures des articles présélectionnés à l'étape 1**

- ✓ La procédure décrite à l'étape 2 sera reprise avec l'expert B.

**Étape 8 : Le verbatim de l'entrevue sera retourné à l'expert B pour valider la transcription et s'assurer qu'il a bien exprimé son opinion.****Étape 9 : Analyse par l'étudiante****Étape 10 : Retour de l'analyse à l'expert B**

- ✓ L'expert B est invité à commenter l'analyse faite par l'étudiante (ex : ajout, retrait, modification).

**Étape 11 : Retour des commentaires de l'expert B à l'étudiante****Étape 12 : Modélisation des résultats par l'étudiante**

**Étape 13 : Discussion de groupe entre les deux experts et l'étudiante**

- ✓ La modélisation des résultats sera présentée par l'étudiante aux deux experts lors d'une discussion de groupe;
- ✓ Une discussion avec commentaires, analyse, et critique de cette modélisation sera faite par les membres du groupe. Les points divergents seront notés.

**Lieu:**

- ✓ La discussion de groupe se fera au centre de recherche de l'Institut de réadaptation de Montréal.

**Étape 14 : Rédaction du mémoire par l'étudiante.**

Pour toute autre information pertinente à ce projet, n'hésitez pas à communiquer avec moi soit au Centre de recherche de l'Institut de réadaptation de Montréal

En vous remerciant de votre précieuse collaboration, je vous prie de recevoir l'expression de mes meilleurs sentiments.

Bonne lecture!

Carolina Bottari  


**ANNEX C**  
**SAMPLE OF TRANSCRIPTS**

**TRANSCRIPT OF INTERVIEW WITH  
OCCUPATIONAL THERAPIST**

xxiii

275 Qui regarde l'ensemble des activités de la vie  
276 quotidienne sur un grand plan...

277 **\*Ergothérapeute :**

278 Oui.

279 **+Chercheur :**

280 La valeur que la personne apporte à ça, si elle a le  
281 goût de le faire, pis tout ça a un impact sur ce qu'on  
282 appelle les fonctions exécutives, t'as tout considéré  
283 ça, mais...

284 **\*Ergothérapeute :**

285 Là on dirait qu'on veut réduire ça à une lésion qui fait  
286 que là je ne forme plus d'intentions.

287 Comme ergothérapeute, le but de notre évaluation  
288 c'est-tu d'aller dire j'é mets l'hypothèse qu'il y a  
289 atteinte des fonctions exécutives ou le but c'est de  
290 dire quand j'évalue la personne dans son  
291 fonctionnement, faut pas que j'oublie qu'il y a tout  
292 l'aspect volitionnel, dont une partie du cerveau  
293 s'occupe. Qui fait partie de la tâche, qui fait partie de  
294 mon profil occupationnel et si j'évalue pas cette  
295 dimension là, spécialement avec les traumatisés  
296 crâniens, je suis dans le champ.

297 Parce que si j'oublie d'aller regarder comment elle  
298 organise sa vie, comment elle organise ses habitudes  
299 de vie, comment il est capable de planifier que  
300 demain, vu qu'il a rendez-vous chez le médecin, il va  
301 falloir qu'il mette son cadran une heure plus de bonne  
302 heure. Il faut qu'il ait le goût de s'organiser, le goût de  
303 fonctionner, il faut qu'il fasse ce qu'il faut pour se  
304 rendre le lendemain à l'heure, tu sais c'est ça là.  
305 Fonctions exécutives là, ça fait partie de ça.

Définition /  
Fonctions exécutives

Évaluation / But

Évaluation / But

Définition /  
Fonctions exécutives

**TRANSCRIPT OF INTERVIEW WITH  
NEUROPSYCHOLOGIST**

xxiv

431 individus-là qui étaient évaluer avaient cette capacité  
432 d'inhiber cet élément-là.

433 **+Chercheur :**

434 C'est tout ce que ça veut dire, là?

435 **\*Neuropsychologue:**

436 Ben, ça peut être à un premier niveau. On peut  
437 l'interpréter comme ça. Mais, si on regarde de manière  
438 plus générale dans l'Alzheimer, par exemple, ils sont très  
439 sensibles à cet élément de distracteur. Beaucoup,  
440 beaucoup, même dans différents travaux qui ont été faits,  
441 j'ai vu c'est très fort. C'est aussi connu quand même dans  
442 les populations avec lésions frontales; elles ont aussi  
443 touchées à ça.

444 **+ Chercheur :**

445 OK. Fait que pour revenir à où vous étiez rendu, j'sais  
446 pas si vous vous rappelez encore là...

447 **\* Neuropsychologue :**

448 Ouais, ben, j'essayais un peu de continuer sur la notion  
449 de la dialectique sujet-objet. On a parlé d'effort  
450 d'adaptation. Alors, bon c'est un peu comme ça que je le  
451 formalisais. La complexité de la tâche, donc n'est pas  
452 relative à la tâche comme telle, mais dans une dialectique  
453 sujet-environnement, dans la mesure où y'a un effort  
454 d'adaptation qui est plus ou moins grand pour l'individu.  
455 Ca c'est une grande question aussi qu'on entend  
456 régulièrement dans les conférences, la tâche est plus  
457 complexe, ah oui mais pour qui et c'est quoi une tâche  
458 complexe, et ainsi de suite. Alors c'est comme je le  
459 disais, on peut le formaliser, jusque dans une certaine  
460 mesure. C'est sûr que formellement on peut dire voilà  
461 cette tâche-là, ouvrir un jus de fruits, c'est quand même

Tâche/complexité  
Sujet / Processus  
d'adaptation

Tâche/complexité



462 plus simple que de préparer un repas. D'accord, OK.  
 463 Cela étant dit, si on essaie de mieux formaliser, on se dit  
 464 bon, pourquoi c'est plus complexe préparer un repas?  
 465 Parce qu'y a plusieurs étapes, parce qu'y a plusieurs  
 466 éléments qui s'entrecroisent, et ainsi de suite. Bon, on  
 467 peut formaliser. Mais ça serait un peu se faire piéger que  
 468 de se centrer sur juste ça, parce que y'a l'individu hein. Si  
 469 je me répète, c'est que ça a beau être complexe, il l'a fait  
 470 mille fois, elle va être plus simple pour cet individu-là  
 471 qu'une autre tâche qui est beaucoup plus simple mais  
 472 qu'il n'a jamais fait. Alors donc, l'effort d'adaptation et puis  
 473 sur le plan formel, ben ça se définit quand même à  
 474 travers certain nombre de paramètres. C'est sûr, c'est  
 475 dans un continuum et les caractéristiques fonctionnelles  
 476 des tâches qui sont très familières, automatisées,  
 477 routinisées, ben on observe tout simplement que l'individu  
 478 est plus rapide dans son exécution, qui peut faire des  
 479 tâches en parallèle qu'il peut fonctionner de manière plus  
 480 ou moins consciente, dans la mesure où y'a pas  
 481 d'éléments interférants. Qui cognitivement est assez peu  
 482 exigeant pour lui. Donc, c'est effortless. Donc le contrôle  
 483 de l'attention est moins marqué et puis, comme on le  
 484 signalait à l'instant, guidé par les stimuli externes.

485 + **Chercheur :**

486 Guidé par les stimuli externes?

487 \* **Neuropsychologue :**

488 Oui, dans le sens que les objets devant soi déjà aident à  
 489 faire la tâche et permettent le phénomène d'adaptation ou  
 490 d'accomodation.

491 + **Chercheur :**

492 OK.

Tâche / complexité

Sujet / Tâche

Sujet / effort  
d'adaptation /  
paramètres

Tâches /  
Familières

Tâches /  
Familières

**ANNEX D**  
**SAMPLE OF CODE DEFINITIONS**

## Lexique

### Définitions de certains codes utilisés dans l'analyse de l'entrevue du neuropsychologue:

#### Catégorie : Éléments modificateurs

**Définition :** Phénomènes qui peuvent modifier le statut de la tâche pour l'individu i.e. une tâche antérieurement automatisée devient une tâche contrôlée

- Dc =int** Degré de complexité de la tâche pour l'individu =df plus il y a de décisions à prendre, et plus ces décisions doivent être emboîtées, et plus ces décisions doivent s'étendre dans un temps long, plus elle devient complexe la tâche (Neuropsychologue, 1999)
- Di =int** Éléments de distraction =df Éléments qui détournent quelqu'un de l'objet auquel il s'applique, de ce dont il est occupé (Petit Robert, 1991); éléments d'interférence (Neuropsychologue, 1999)
- Dn =int** Degré de nouveauté de la tâche pour l'individu =df caractère de ce qui est nouveau; qui apparaît pour la première fois; qui était jusqu'ici inconnu de qqn; dont on n'a pas l'habitude (Petit Robert, 1991)
- Mn =int** Mécanismes d'inhibition de l'individu =df action d'un fait psychique qui empêche d'autres faits de se produire ou d'arriver à la conscience (Petit Robert, 1973)
- Oh =int** Overcoming a strong habitual response (Burgess) =df des comportements plus automatiques peuvent être induits par des éléments dans l'environnement (Neuropsychologue, L. 54)  
L'affaiblissement du processus de contrôle cause la désinhibition des mécanismes automatiques. La

désinhibition des mécanismes automatiques, pour certaines personnes, fait dévier la tâche (Neuropsychologue, L. 52,53)

- Sc =int Structure cognitive de l'individu  
 =df fait référence à l'apparition d'une nouvelle déficience en lien avec les 3 unités du fonctionnement cérébral de Luria (ex; attention, mémoire, résolution de problèmes, fonctions perceptuelles, praxies etc). Il est faux de dire que les fonctions exécutives sont une entité cognitive indépendante (neuropsychologue).  
 (Affaiblissement du processus de contrôle cause une désinhibition des mécanismes automatiques.  
 (Neuropsychologue L. 52)
- Sp =int Structure physique de l'individu  
 =df fait référence à l'apparition d'une nouvelle déficience dans les capacités motrices et sensitives de l'individu (ex; tonus musculaire, mouvement actif, sensibilité, amplitudes articulaire, équilibre assis et debout)
- Ta =int Tâche automatisée  
 =df tâches familières où le contrôle de l'attention est moins marqué et l'exécution de la tâche est guidée par les stimuli externes. L'exécution est plus rapide que lors de tâches contrôlées. Plusieurs tâches peuvent être exécutées en parallèles. La personne fonctionne de manière plus ou moins consciente (Neuropsychologue ligne 31,32)

## Lexique

### Définitions de certains codes utilisées dans l'analyse de l'entrevue de l'ergothérapeute:

#### Catégorie : **Éléments détecteurs**

Degré de nouveauté de la tâche	=df outil qui permet de définir le degré de nouveauté de la tâche pour la personne
Échantillonnage de tâches	=df outil qui utilise un échantillonnage de tâches incluant des tâches nouvelles pour la personne, des tâches familières, des tâches assez standardisées, des tâches pas standardisées
Erreurs typiques	=df outil qui est basé sur un modèle théorique qui permet le repérage, l'identification et la compréhension d'erreurs typiques de comportement intentionnel pathologique.
Facteurs environnementaux	=df outil qui analyse l'impact de l'environnement sur le fonctionnement de la personne et sur la complexité de la tâche
Fonctionnement occupationnel	=df outil qui permet l'analyse du fonctionnement occupationnel de la personne comme par exemple: comment elle organise sa vie, comment elle planifie ses activités (ex: rendez-vous), comment elle fait une semaine, une nuit, une année, une vie, comment elle maintient ses routines et comment elle change ses routines.

Interprétation des résultats	=df outil basé sur un modèle théorique qui facilite l'interprétation des résultats; L'analyse des erreurs se fait en considération des exigences occupationnel de la personne.
Montre	=df outil qui utilise une montre qui sonne à différents moments et qui guide la personne à évaluer sa satisfaction dans les activités qu'elle fait au moment de la sonnerie et la capacité entre autre de formuler des buts.
Modèles théoriques	=df outil qui est basé sur un modèle du fonctionnement du cerveau pour l'analyse de tâche et sur un modèle occupationnel pour le questionnaire
Normes	=df Présences d'études normatives sur diverses populations; état habituel conforme à la moyenne des cas (Dictionnaire de la langue française) Ex: adolescent, toxicomane,
Observation dans la tâche	=df outil qui utilise une observation directe de la personne dans une tâche qui donne l'impression d'être dans la vraie vie.
Satisfaction	=df outil qui permet la considération de la satisfaction de la personne à l'égard de son fonctionnement.

**ANNEX E**  
**SHORTHAND SUMMARY OF INTER-EXPERT**  
**NEGOTIATION SESSION**

## Shorthand summary of transcripts: inter-expert negotiation

<b>Légende:</b>	∈	appartenance à une classe
	<	inclusion complète d'une classe plus petite dans une classe plus grande
	•	et
	x	inclusion partielle d'une classe dans une autre classe (conjonction)
	=	identité (identique à)
	⊃	donc; implication; l'une entraîne nécessairement l'autre

Page	Personne	Énoncés
1	E Co Co E	1- Erreurs & activités routinières ∈ littérature 2- Activités routinières ≠ AVQ 3- Activités routinières ∈ point de vue cognitif (sans pensée) 4- AVQ ⊃ routinières + tâches de fonctions exécutives (FE) ou non routinières 5- AVQ = activités de la personne pour assurer son fonctionnement; survie; fonctionnement dans la communauté; adaptation sociale; socio-économique 6- Activités de fonctions exécutives: s'applique à des types de tâches différentes (inclus tâches d'AVQ) 7- Élément modificateur = Élément qui fait rompre l'équilibre entre état cognitif / physique • Tâche 8- Contexte ∈ modificateurs 9- Importance de la tâche • Intérêt par rapport à la tâche ∈ modificateurs du contexte de réalisation de la tâche 10- Identifier où est la difficulté • voir si on peut l'aider à s'adapter (environnement + / support) ∈ but de l'évaluation idéale.
6	CI	11- Erreurs types • normes ∈ but diagnostique 12- Beaucoup d'éléments nécessaires dans un AVQ pour conclure sur un trouble de fonctions exécutives
8	Co	13- Aspects d'inhibition • Troubles d'attention ∈ erreurs types Trouble d'attention • manque d'inhibition ∈ pas capable de garder son comportement dirigé vers un but
9	Co	15- Zone grise • Normal • Pathologique évident ∈ spectre de fonctionnement
10	Co	16- Isoler troubles de fonctions exécutives = illusoire 17- Aspect inhibition = erreur type très fort (typiquement pathologique)



Page	Personne	Énoncés
12, 18, 32	Ca	18- Perte de sens d'autocritique ∈ erreurs types (central et important)
12	Co	19- <i>Utilisation behaviour</i> ∈ trouble d'inhibition • erreurs types 20- Raffinement des grandes classes de marqueurs ∈ évaluation. Idéale 21- Causes des chutes = variation d'une fois à l'autre (sclérose en plaque)
14	Cl	22- Se lève • Fait sa journée • Demain pareil comme hier • Plus de buts • Plus d'intérêts = ressemble à une dépression • erreurs types (sclérose en plaque) 23- Incapable de réaliser l'impact sur sa santé (chute) ∈ erreur type.
15	Cl	24- Hurler dès qu'il a besoin de quelque chose (plusieurs fois par jour) ∈ erreurs types
17	Co	25- 22.23.24 ∈ trouble probable des fonctions exécutives (besoin de plus objectiver)
19	CO	26- Départager aspect contextuels • Atteintes des autres systèmes ∈ objectiver les problèmes • But évaluation compréhensive
19	Co	27- Contexte non structuré • contexte non protégé ∈ Caractéristiques d'instruments sensible aux troubles subtiles des fonctions exécutives
20	Co	28- Capacité de détecter troubles fins des fonctions exécutives ∈ problématique • but évaluation 29- <i>Multiple Errands</i> ∈ évaluation AVQ un peu plus structuré
21	E	30- Rôle de travailleur • routine hygiène personnelle ∈ Contexte en ergothérapie 31- Autres habitudes de vie (loisir, travail, expérience antérieure de la tâche) × Analyse des fonctions exécutives
22	E	32- Adaptation à l'environnement ∈ analyse en ergothérapie • définition fonctions exécutives
23	Cl	33- Comportement- adaptatif vs comportement. Intentionnel ∈ définition fonctions exécutives 34- Comportement.intentionnel ∈ terme limitatif
24	Co	35- Les fonctions exécutives ∈ comportement adaptatif
24	Ca	36- Trouble de formuler un objectif • Développer intention ∈ troubles de FE
25	Cl	37- Incapable de changer de routines ∈ erreurs types
26	Ca/Cl	38- Perd son objectif de vue +/- = Trouble d'inhibition 39- Détecter impact du problème ∈ but en ergothérapie •évaluation 40- Détecter présence du problème ∈ but neuropsychologie •évaluation
27	Co	41- Poids du problème ⇒ en fonction du contexte
27,31	E	42- Erreurs en fonction. du contexte ∈ but en ergothérapie • évaluation • Modèle rendement occupationnel.

Page	Personne	Énoncés
		Déterminer si l'erreur est problématique pour la personne ∈ Facteurs à considérer dans l'interprétation 43- Évaluation ergo • but d'intervention × but diagnostique • comprendre causes des problèmes • capacité d'intervenir
31	Co	44- Niveau d'analyse plus pointu ∈ caractéristiques évaluation idéale plus raffinée 45- Caractériser des comportements qu'on peut lier avec une certaine fiabilité a des troubles des fonctions exécutives ∈ but évaluation idéale
33	Co	46- Élément caractériel ∈ erreur typique • pathologique 47- Comportements qui sont pathologiques à certaines fréquences ∈ erreur typique • pathologique
33	E	48- Oublie • ne s'en rend pas compte ∈ erreur typique • pathologique • auto évaluation • prise de conscience 49- Individu nie par définition ses problèmes ou n'en prend pas conscience = dénie frontal
33	Co	50- Prend pas conscience de plaintes • pas d'autocritique ∈ dénie frontal • cognitivement incapable d'évaluer son comportement cognitif 51- <i>Self awareness</i> # capacité d'assurer la qualité 52- Réévaluer sa performance • Corriger les erreurs ∈ capacité d'assurer la qualité. (performance. sur objets extérieurs)
35	Co	53- Nie tous ses problèmes ∈ trouble de <i>self awareness</i>
36	E	54- Prise de conscience de ses déficits ∈ définition <i>self-awareness</i> 55- <i>Self-awareness</i> ⇒ plus abstrait • plus globale • évaluer soi – même • plus fins 56- Auto perception ∈ définition des fonctions exécutives (? aspect intégré des fonctions exécutives)
38	E	57- Cognitif ∈ sous-jacents • préalables aux fonctions exécutives • Intégré aux fonctions exécutives 58- Processus hiérarchique • intégratif ⇒ Cognition/FE/ autoperception 59- Terme formel • pas un truc isolé du reste • construction conceptuelle ∈ FE
39	Co	60- Modèles multidimensionnels • Plusieurs dimensions dans les tâches • Selon le contexte ∈ modèle Luria. (Le contexte met l'importance sur une chose ou l'autre)
40-41	Co	61- Auto correction • autocritique ∈ définition FE (à des niveaux différents) 62- Niveau d'analyse • AVQ plus intégrés ∈ but ergothérapie 63- Impact • répercussion dans les AVQ ∈ but ergothérapie
41	Co	64- Mécanismes d'intégration beaucoup plus généraux ∈ but ergothérapie 65- Mécanismes fins • analyse plus pointue ∈ but neuropsychologie
42	E	66- Situer erreurs par rapport a un contexte • autres rôles • autres

Page	Personne	Énoncés
		habitudes de vie ∈ but ergothérapie 67- Situer erreurs en fonction des mécanismes en jeu ∈ but neuropsychologie • Impact ou non sur la tâche. ex préparer un gâteau
42	E	68- (67) ∈ aider ergo. comprendre le pourquoi de l'erreur 69- Contexte structure ∈ petits tests pointus neuropsychologie pas sensible aux FE
44	E	70- Tâches d'AVQ (non structuré • nouvelle • complexe • milieu de vie) ∈ évaluation FE supérieur que petits tests pointus neuropsychologie. 71- Profil des AVQ ∈ évaluation. qui diagnostique trouble de FE
44	Ca	72- Manque de normes ∈ raison pour laquelle le profil des AVQ ne peut être outil diagnostique des FE 73- Faux positif ∈ limites du profil des AVQ. • problématique • manque de normes
45	Co	74- Validation en fonction d'autres tâches plus traditionnelles ∈ limites Profil des AVQ pour but diagnostique 75- Tests neuropsychologiques relativement normaux • AVQ touchés ∈ problématique. (résultats de l'étude d'Élisabeth: AVQ plus sensible mais ne savons pas le pourquoi).
47	Co	76- AVQ impliquent beaucoup de dimension ∈ difficile de cibler d'où découle l'échec
47	Ca	77- Profil des AVQ ∈ but dépistage • autres tests pour déterminer causes des erreurs s'il y a lieu. (problèmes ressortent plus dans ce type de test) 78- Niveau d'analyse ∈ élément à raffiner dans le profil des AVQ 79- Dépistage = Survol
48	E	80- 2 ou 3 tâches ∈ but de dépistage 81- 14 heures d'évaluation ∈ but situation de handicap 82- Grille d'analyse pour sélection de tâches ∈ évaluation Idéale (tâches nouvelle/connue; environnement nouveau/connu; tâche routinière et nouvelle en fonction de la personne)
49	E	83- Téléphoner pour un autobus voyageur ∈ tâche complexe • nouvelle (Problème sévère pour patient analyser sur vidéo)
50	C	84- Tâche plus nouvelle • plus complexe • environnement avec le plus de distracteurs ∈ tâches pour dépistage • évaluation idéale (commencer par le plus difficile. Ex. nouveau/complexe). 85- Définition des FE • Critères qui permettent de dire qu'une erreur est reliée aux FE ∈ grille sélection tâche • évaluation. Idéale
51	Ca	86- Normes • tâches nouvelles • complexe ∈ évaluation idéale
52	Co	87- Routine +/- 1 élément • spectre de nouveauté ∈ évaluation idéale
	Co	88- S'éloigner de la routine d'origine ∈ définition nouveauté 89- Trop de faux négatifs ∈ problématique 90- Test dépistage AVQ ∈ solution

Page	Personne	Énoncés
54	Co	91- Porte d'ascenseur ouvre • patient Alzeihmer entre ∈ élément de non inhibition • <i>Triggering effect</i>

## Question 2 Manifestation

Page	Personne	Énoncés
55	Co	92- Manque 1 élément d'une recette c passe pas à l'action 93- Difficulté à s'adapter à un changement. • manque de flexibilité ∈ erreur type ∈ rigidité • trait de trouble de FE 94- S'éparpille ⇒ plusieurs causes possibles 95- Incapable de s'organiser ∈ devons définir plus finement
59	Co	96- Éléments de non inhibition ∈ bases automatiques • indicateur de trouble de FE 97- Trouble de mémoire U trouble de FE c chute mais ne l'admet pas. (Dissociation entre régulation verbale et comportement réel)
63	Co	98- Trouble de mémoire à court terme c répète toujours la même idée U Trouble de programmation • persévération 99- Analyse de la cause du comportement • comportement final et observable ∈ analyse des erreurs • évaluation idéale
64	Co	100- Plusieurs points cohérents ∈ conclusion • évaluation idéale
64	Co	101- Symptômes pathognomoniques ⇒ rare 102- Plusieurs tâches ⇒ important
65	E	103- Sélection de tâches liée aux 3 grand facteurs
68	Co	104- Comportement social ∈ élément culturel 105- Comportement socialement inadapté ∈ trouble de FE U manque d'adaptation. au contexte 106- Même avec des cues ne se corrige pas ∈ trouble de FE (pas de prise de conscience)
72		107- FE se manifeste tout le temps ⇒ Tâche routinière peut devenir non routinière.
73	Ca	108- Définition modificateur ⇒ ce qui fait qu'une tâche peut être déplacée de tâche familière à tâche de FE
74	Ca	109- Contexte ∈ élément modificateur 110- Environnement ∈ élément modificateur • Spectre de nouveauté
76	Ca	111- Manque d'analyse préliminaire ∈ erreurs types
	E	112- Manque de flexibilité (incapable de se réajuster en fonction d'un obstacle qui arrive en cours de route) ∈ erreur type 113- Analyse préliminaire • organiser les étapes • développer une stratégie • développer des tactiques ∈ définition planification
77, 82	Co	114- Moments d'anticipation ∈ analyse préliminaire • définition planification 115- Ordonnée des décisions ∈ définition planification 116- Distracteurs (interne & externe) ∈ modificateurs de tâche

Page	Personne	Énoncés
		117- ? comportement adaptatif = terme Français pour FE 118- Expliquer causes sous-jacentes au niveau d'indépendance € but évaluation idéale 119- But évaluation idéale

**ANNEX F**  
**DATA SYNTHESIS**

## Data synthesis

### Research question 1: What are executive functions? Occupational therapist

Code	Verbatim
Population	En évaluant des clientèles sans traumatisme crânio-encéphalique dans ma pratique en CLSC, j'ai observé des comportements très similaires à ceux observés chez les TCC ayant eu des difficultés au Profil des AVQ. J'observais un phénomène semblable chez les cas de démence, les déprimés, sclérose en plaque, maladie de Parkinson.
Differential diagnosis	Ce qui me préoccupe c'est comment démarquer les atteintes exécutives frontales versus une dépression qui fait que je n'ai plus de comportement intentionnel versus une démence qui avance doucement. Plusieurs de ces cas-là se retrouvent avec des anti-dépresseurs. J'en viens à me demander si une bonne évaluation, qui considère aussi l'hypothèse d'une atteinte des fonctions exécutives, pourrait modifier ce traitement quand les anti-dépresseurs sont inefficaces.
Volition	Il faut qu'il ait le goût de s'organiser, le goût de fonctionner; les fonctions exécutives en font partie; «intentional behaviour» c'est de la volition.
Affect	Les fonctions exécutives sont définies d'un point de vue cognitif, mais moi je trouve qu'il y a un élément affectif aussi, qui n'est pas nommé dans la définition; comme ergothérapeute, je ne suis pas experte du tout dans les définitions, je me demande, pourquoi est-ce qu'ils ont enlevé l'aspect affectif quand ils ont défini le comportement intentionnel. Parce que c'est l'aspect affectif. Ils n'ont pas d'affect. Quelquefois, il parlerait du voisin d'à côté, de l'aspect affectif puis des fonctions exécutives; je trouve que cela ne ressort pas dans la littérature. Il faut que je sois connecté avec ma motivation ou avec mes émotions afin de vouloir me souvenir de quelque chose, de vouloir faire quelque chose demain, et là quand ça va arriver, je vais arriver à ce qu'il disait, le «marker triggering».
Normality	Il ne faut pas penser qu'il y a du monde correct dans les fonctions exécutives, du monde pas correct dans les fonctions exécutives, c'est vraiment quelque chose de continu.
Development	Puis je me dis comment on devrait regarder le développement de l'enfant au lieu de le regarder quelqu'un qui se brosse les dents six fois. Au lieu d'y aller avec des bobos, regarder normalement ça devrait être comment. Les gens développent des buts comment dans la vie, puis peut-être que quand on se met à regarder ça, on va dire c'est impossible d'essayer de décortiquer ça en petits morceaux. Je me dis est-ce que ça se décortique l'âme d'une personne, ce qui fait qu'elle veut aller où elle veut aller. Peut-on mesurer ça? tout l'aspect développement normal, norme, pour ensuite dire il y a un problème.

# Neuropsychologist

Category Definition:	Code	Verbatim
	Goal formulation	Des fonctions exécutives c'est d'abord la nécessité de formuler un but. Donc en faire une représentation, planifier l'élément d'anticipation, choisir entre diverses alternatives ou diverses séquences d'action, parce qu'on peut atteindre un but de différentes façons mais il faut choisir la plus efficace, compte tenu des circonstances.
	Working Memory	Ensuite, garder évidemment l'information en mémoire de travail. Il faut garder le but, il va de soi. Après ça, les sous-buts qui ont été élaborés. Comme je vous disais, quand vous avez une décision, quand vous devez faire une action, laquelle action ne peut pas être faite tout de suite, vous devez en faire une autre, et des fois encore une troisième, vous devez toujours avoir en tête les sous-buts qui ont été élaborés. Si vous avez un taux de mémoire de travail faible ou bas, tout ça passe à la trappe.
	Task initiation	Évidemment, vous devez initier le plan d'action.
	Task regulation	Après ça, le faire concrètement dans l'environnement. Donc ce qui implique encore des sous buts, des contrôles de systèmes plus ou moins automatisés. Vous devez évidemment contrôler de façon à éviter les interférences. L'interférence, soit interne ou externe, par les processus d'inhibition, donc de suppression des stimuli qui sont parasites, et vous avez aussi à contrôler les habitudes, les routines dont on parlait à l'instant. Ce qui implique donc une flexibilité adaptative.
	Error detection and correction	Corriger le plan et puis évidemment de manière réursive analyser les résultats de vos actions, vérifier si ça correspond au but anticipé et corriger éventuellement les erreurs
	Adaptation to novel situations	Les processus cognitifs impliqués dans l'adaptation de l'individu à l'environnement au sens large. Il n'y a pas de tâches de fonctions exécutives si l'individu ne fait rien ou n'a pas besoin de s'adapter
	Modulation contrôle de routine.	Si on regarde très généralement les caractéristiques fonctionnelles de tâches qu'on appelle de fonctions exécutives, les deux principales sont la capacité d'adaptation aux situations nouvelles puis la modulation du contrôle de routine. Les actions que l'ont fait sont fondées sur les automatismes, les conditions automatiques qui vont faciliter la réalisation de la tâche. Mais il y a un prix à payer avec ça. Si le contrôle n'est pas bien fait, c'est-à-dire s'il n'y a pas une bonne capacité de fonctions exécutives, alors il peut y avoir des éléments dans l'environnement qui vont vous induire une autre action, qui vont faire dévier de la tâche, qui vont vous induire d'autres types de comportements plus automatiques. Je prends un exemple d'orientation dans l'espace. Votre trajet maison/bureau est très automatisé. Mais si quelque part vous devez aller à un autre endroit, juste avant de vous rendre au bureau, les conditions d'automatique, l'automatisme, c'est-à-dire les conditions de l'environnement vont vous amener à refaire le trajet automatisé.
	Subject/ environment dialectic	Ce que je définis, c'était dans une dialectique sujet/environnement. Ça s'inscrit dans une situation où il y a d'un côté un individu avec un certain nombre de capacités cognitives et motrices qui seront ses instruments à la fois cognitifs et moteurs, pour intervenir sur l'environnement. Alors, c'est un jeu entre les deux. C'est une dialectique entre des sujets/ tâches ou des sujets/ environnement. Alors ce n'est qu'en fonction de ce qu'est le sujet vis-à-vis de la tâche, que la tâche devient fonction exécutive ou pas.



## Research question 2: How are executive functions manifested in activities of daily living?

### Occupational therapist

Code	Verbatim
Maintenance of routines	Ça se manifeste tout le temps; même faire la même chose tous les jours, ça demande une intention; de rester dans une routine c'est un comportement intentionnel; je pense que c'est intentionnel parce que quand les gens deviennent déprimés, ce qui saute, ce sont les routines; quelque part c'est tout un travail de les maintenir les routines; quand je dis maintenir une habitude on prend comme se brosser les dents, ça l'air de rien, c'est de l'ouvrage de se brosser les dents à tous les jours
Change of routines	Changer de routine c'est un comportement intentionnel.
Intentionality	Ça peut-être l'air naïveux de se brosser les dents, mais il n'y a personne qui se les brosse de la même façon, pas avec la même intention. Il y a beaucoup d'intentionnalité dans se brosser les dents; cela dépend de tes valeurs et de ce que tu veux faire de ta bouche, ce que tu veux faire de ta santé.
Inefficiencies	Dans mon exemple de sauce à spaghetti, c'était un marqueur important que la personne était tout le temps en train de perdre du temps sur d'autre chose, puis elle était tout le temps en train de perdre son objectif de vue, à tout moment, pendant la tâche; mais elle n'était pas capable de garder la «track» étant donné qu'elle s'éparpillait tout le temps. Le fait de s'éparpiller ce serait «efficiencies».
Decision making /Goal articulation	Est-ce qu'elle est capable de décider qu'elle veut se préparer un repas. Il y a un lien avec les fonctions exécutives aussi. C'est n'est pas seulement quand je suis rendue dans la sauce à spaghetti, quand je décide de faire de la sauce à spaghetti

## Neuropsychologist

Category	Code	Verbatim
<p><b>Situations requiring executive functions:</b></p>	<p>Complex tasks in novel situations</p>	<p>L'autre facette des fonctions exécutives se définit en fonction de caractéristiques générales de tâches. Ce sont des tâches complexes en situation nouvelle. Plus il y a des décisions à prendre, et plus ces décisions doivent être emboîtées, et plus ces décisions doivent s'étendre dans un temps long, plus la tâche devient complexe. Ce peut être des tâches excessivement complexes comme faire un gâteau, faire un café ou préparer un repas. Vous recevez des amis, vous préparez un repas. Inutile de vous dire combien ça peut être complexe tout ce qu'il faut planifier, anticiper, organiser. Et c'est dans ce sens-là qu'elles ont leur poids dans la définition des fonctions exécutives. Et en revanche, si un individu fait une tâche complexe mais il le fait des milliers de fois, elle devient routinisée pour lui. La complexité de la tâche donc n'est pas relative à la tâche comme telle, mais dans une dialectique sujet/environnement, dans la mesure où il y a un effort d'adaptation qui est plus ou moins grand pour l'individu.</p>
<p><b>Task status modifiers:</b></p>	<p>On a déjà parlé du paradoxe entre AVQ et fonctions exécutives; (ce qui caractérise surtout les activités de la vie quotidienne c'est qu'elles sont des trucs routinisés). Mais est-ce qu'une activité de la vie quotidienne n'est pas une activité de fonction exécutive ou ne peut pas le devenir? Si tous les éléments du contexte, de l'automatisme, de la routine, ne sont plus là. Il en manque un, par exemple. Il peut y avoir plus ou moins d'éléments manquants, qui fait que ce n'est plus automatique; quand il y a un problème, physique ou cognitif, on passe de tâche familière automatisée à tâche nouvelle non automatisée; ces dimensions-là vont transformer la tâche un peu vis-à-vis du sujet. Puis c'est pour ça que l'ergothérapeute, entre autre, doit prendre conscience que ces conditions sont différentes. C'est la critique que vous faites aussi du fait que dans les AVQ c'est souvent des situations qui sont protégées, des situations qui sont standardisées, dans lesquelles on décontextualise, puis il y a un minimum d'adaptation. Il y en a toujours un, mais c'est pas le contexte plus général.</p>	
	<p>Environmental distractions</p>	<p>Si j'avais à suggérer quelque chose dans l'évaluation des fonctions exécutives, comme facteurs dont il faut tenir compte, c'est la composante environnement mais plus spécifiquement les éléments distracteurs, d'inhibition à la tâche. Parce que les gens peuvent, surtout dans les AVQ, avoir nécessairement tout bien routinisé dans le temps. Mais là où est la pierre d'achoppement, ce pourrait être qu'il y a des éléments d'interférence qui arrivent. Et ces éléments d'interférence sont, selon moi, centraux, parce qu'il suffit qu'il y ait un élément qui arrive, que la mémoire de travail soit mal engagée ou soit affaiblie, et là ça part sur autre chose. Dans un certain nombre de tâches, les éléments de la tâche vont faire dévier le sujet sur d'autres. L'interférence de l'environnement peut soit faire oublier la raison même de la tâche ou bien vous faire dévier vers des comportements plus automatiques. Si vous êtes entré dans la pièce et que vous aviez une raison de le faire, vous cherchiez quelque chose, mais quelque chose est arrivé, l'interférence soit interne ou externe, et puis vous vous êtes retrouvé dans la pièce et vous avez dit: Merde, qu'est-ce que je cherchais! Mais c'est quoi un distracteur? Un distracteur, c'est une information qui n'a pas été inhibée.</p>

Category	Code	Verbatim
	Change in individual's physical instruments	<p>Je vous demande d'ouvrir une bouteille de jus. Si vous n'avez qu'une seule main, parce que vous avez eu une amputation... dans votre vie, vous avez appris à le faire d'une certaine manière. Vos instruments physiques ont été altérés. Alors la tâche est transformée. Elle devient pour vous une tâche nouvelle, parce que c'est toujours relatif aux habiletés propres. Donc, dans ce sens-là, aussi simple que soit cette tâche elle peut devenir de l'ordre des fonctions exécutives dans la mesure où ça demande une nouvelle adaptation de l'individu d'enclencher une analyse de la tâche et de trouver des solutions aux problèmes qui se posent.</p>
	Change in individual's cognitive instruments	<p>La perte des fonctions cognitives peut faire que ce qui était automatisé, comme les AVQ, donc qui étaient faciles, peuvent devenir difficiles. L'individu qui n'a plus les mêmes outils cognitifs, comme par exemple quelqu'un qui n'a plus de pouvoir de concentration ou n'a plus la même mémoire, doit fonctionner autrement.</p>
	Occurrence of an error	<p>Qu'est-ce qui fait que des activités automatiques deviennent justement des activités nouvelles, donc impliquant les capacités cognitives et alors des fonctions exécutives. C'est quand il y a l'apparition d'une erreur. Quand l'individu fait une erreur, pour corriger son erreur, parce que la présence d'une erreur dans le système apporte une nouvelle étape, en un sens interfère. Donc là il n'est plus question d'aller ensuite de manière automatique. Imaginez sur une chaîne de montage la machine qui prend un objet qui fait un traitement, qui le met là. Ça va si l'objet est là mais aussitôt qu'il y a quelque chose qui marche pas, la machine continue à faire le traitement. Mais, tout est foutu.</p>

*Research question 3: What would constitute a comprehensive ADL Evaluation which would allow for a good operationalisation of executive functions?*

*Occupational therapist*

Category	Code	Verbatim
Goals	Occupation al profile	Mais, alors je me dis qu'il faudrait qu'on soit capable d'arriver à la fin du Profil pour dire dans quelle sorte d'activité il y a des problèmes, c'est quoi les « patterns », est-ce les activités nouvelles, les activités connues, y-a-t-il des domaines où ça va mieux que d'autres?; Comment est-ce qu'on fait ça, faire une semaine; puis faire une nuit, puis faire une année, puis faire une vie; c'est ça le concept du profil occupationnel. C'était on va regarder les AVQ, loisir, travail, le fonctionnement d'un patient; je ne suis pas en train d'aller vérifier quelle partie du cerveau fait quoi.
	Differential diagnosis	Moi ce que je trouverais extraordinaire, ce serait qu'on puisse l'aider à dire est-ce que c'est une personne qui abuse ou est-ce une personne qui se laisse aller ou c'est une personne qui est incapable. C'est vrai que ce serait intéressant qu'on puisse isoler.
	Screening	S'il est capable d'aller dans la nature puis d'avoir ses intentions, de planifier ses affaires, de s'acheter quelque chose, ça veut dire qu'en quelque part, le reste va aller bien (i.e. unité 1 et 2 de Luria); ça veut dire définir c'est quoi les vraies erreurs, ça veut dire donner un poids aux erreurs, ça veut dire on revient aux critères. Si je veux interpréter mes données, puis que je ne sais pas mes données de base sur la mémoire, la perception et tout ça, je ne pourrai jamais faire une interprétation.
	Diagnosis	Le but du Profil ce n'est pas d'aller décortiquer puis analyser comme les troubles de mémoire, les troubles perceptuels, etc. On est mieux de ne pas aller dans l'aspect trop diagnostic, on est mieux juste de dire ces sortes de tâches-là se passent ainsi, ces sortes de tâches-là se passent ainsi. Puis comme ces sortes de tâches-là ont rapport avec les problèmes qui ressortent lorsqu'ils ont des problèmes aux fonctions exécutives, ça suggère des problèmes de fonctions exécutives. Le Profil des AVQ mesure la situation de handicap; y donne une idée, puis certaines lignes directives par rapport aux composantes possiblement sous-jacentes qui causent les problèmes. Mais il ne va pas donner des diagnostics de ces causes sous-jacentes là.
Theoretical model		Il faut que j'aie un bon modèle théorique en arrière, c'est sûr, parce qu'après ça je ne pourrai jamais rien ramasser, les erreurs, il faut les rattacher à un modèle qui a rapport avec la façon de fonctionner du cerveau... Même si on veut pas aller dire il est où le bobo dans le cerveau... Faut mettre un poids à ces choses-là.
Evaluation method	Task analysis	Il y a une partie où un clinicien observe la personne dans la tâche. Je pense que comme ergo il n'y a rien comme ça. Mais il ne faut vraiment pas se limiter à ça. Ce serait pour aller décortiquer les bobos qui ressortent; chaque tâche a un poids différent dans ses opérations (repas chaud = décisions, planification; payer un compte par cheque = correction des erreurs).

Category	Code	Verbatim
	Watch	<p>Si je veux connaître sa situation de handicap, là c'est l'idée de la montre; pour aller chercher l'aspect volition, qui est vraiment ça en observant les AVQ, moi je me dis va lire sur les affaires de montre. Moi je trouve que c'est la façon vraiment puriste d'aller le chercher, à part que de te planter dans sa maison pendant une semaine; la place idéale pour savoir si la personne peut formuler, là c'est à tout moment (Tu demande ce qu'elle fait). Ils utilisent une montre qui sonne à différents moments de la journée, qui est portée par le sujet. De façon aléatoire, le «beeper» sonne. Quand le «beeper» sonne le sujet note ce qu'il est en train de faire et avec quel degré de satisfaction pendant qu'il le fait. Avec ça, ils ont un échantillonnage sur 24 heures, pendant tant de temps, de ce que la personne a fait à différents moments dans le temps, est-ce qu'elle est en train de faire quelque chose qu'elle a choisi de faire, était-elle heureuse pendant qu'elle le faisait? Plutôt que d'utiliser un mode d'évaluation par questionnaire, qui comporte un biais parce que le répondant peut nier certaines difficultés ou omettre de répondre en considérant l'ensemble des éléments, ils tentent de mesurer à des moments aléatoires le niveau de satisfaction de la personne.</p>
	Semi-structured interview	<p>Je trouve l'idée du questionnaire intéressante. Pas juste dire est-ce que tu te laves plus souvent qu'avant, moins souvent qu'avant; c'est tout ce qu'ils répondent à côté qui m'intéresse; c'est un prétexte le questionnaire, pour faire parler le monde. La cote, je m'en fous, c'est ce qui m'ont dit qui m'intéresse; je pense qu'il y a des questions qu'il faudrait poser par rapport aux AVQ... Si on veut aller chercher les fonctions exécutives... (exemple) Le faisais-tu pour ta santé... est-ce que tu le fais sur le pilote automatique ou le sens que tu donnes à tes activités est-il différent? Tu sais quand avant tu travailles temps plein, faire tes AVQ, AVQ ça a un sens, quand t'es rendu trop handicapé, puis que tu fais juste ça dans la vie faire tes AVQ AVQ, ils n'ont plus le même sens; faudrait avoir des questions qui iraient chercher du subjectif; je pense que ça pourrait nous donner une idée justement de comment la personne est capable d'expliquer sa vie, est-elle capable de se voir aller, est-elle capable d'une certaine auto-critique dans ça, puis on pourrait la faire parler sur comment elle structure ses semaines, comment elle fait ses semaines, qu'est-ce qu'elle veut faire la semaine prochaine, dans un an. Qu'est-ce qu'elle veut faire de sa vie? Je pense qu'il faudrait que ça aille chercher ça. «if observed behaviours appear to suggest a problem, a comparison with premorbid functioning would appear to be essential» étant donné le questionnaire pré-post. Laisser jaser le monde qui est avec cette personne là pour voir qu'est-ce qu'ils vont dire, puis tu as plein d'information qui t'arrivent; quand tu fais le questionnaire, ils vont te répondre quelque chose qui pour eux est acceptable comme explication. Leur schéma de référence c'est selon les connaissances qu'ils ont.</p>
	Occupational Profile	<p>L'opération "formuler un but", comment pouvons-nous l'observer? Ça pourrait être de faire des bilans occupationnels.</p>
Task complexity	Subject/Environment (Neuropsychologist)	<p>On voulait en mettre de la complexité, mais personne dans cette affaire n'a eu la même complexité. Les cas avec des atteintes plus légères se choisissaient automatiquement des mises en situation plus compliquées, et ceux avec des atteintes plus sévères se choisissaient des mises en situation plus simples; les personnes de haut niveau avaient un niveau de difficulté beaucoup plus élevé que les personnes de bas niveau. Mais ce qui est intéressant c'est de voir que ça faisait partie de la cotation; s'il échoue parce qu'il a choisi quelque chose de trop dur pour ses capacités, c'est un signe que la personne ne sait pas bien s'adapter à sa situation actuelle.</p>
	Steps	<p>Le nombre d'étapes dans les tâches à exécuter serait important à prendre en considération dans notre analyse (indicateur du degré de complexité de la tâche).</p>
Plan verbalization		<p>Je trouve que la seule manière qu'on peut savoir si la tâche était conforme, s'il a été critique envers ses erreurs, s'il s'est autocorrigé, c'est si on sait exactement son plan, avant. Ce serait un biais d'évaluation, mais on l'aurait égal pour tout le</p>

Category	Code	Verbatim
		monde; on l'aide un peu en lui posant cette question-là; on pourrait avoir deux tâches, une on lui demande de verbaliser avant puis l'autre pas. Puis l'on voit si ça a un effet.
Environmental analysis		Dès que j'évalue les fonctions exécutives, il faut que je regarde dans quel contexte je les évalue, parce qu'à partir de ce moment-là, je ne regarderai pas la même chose.
Norms		Il faut vraiment faire des normes. Je pense que ce n'est pas juste parce que tu as des atteintes aux fonctions exécutives que tu ne réussiras pas le test; quand tu te rends compte que 75 % des gens que tu as vus normaux ont fait la même erreur que le traumatisé crânien puis que toi tu mettais dépendant, tu te dis que le trois-quarts de la population est dépendant. Alors dans mon aspect diagnostique, je vais dire écoute, il est dépendant, mais le trois-quarts du monde fait la même erreur que lui.
Task Purity		En quoi, quand je fais faire ce test-là, j'évalue juste des fonctions exécutives. Ou j'évalue quoi d'autre. Comment est-ce que je peux isoler ça? Est-ce que ça s'isole des fonctions exécutives?
Impact of evaluator's presence		Alors je les amène à voir que, c'est drôle tout d'un coup quand vous êtes là, tout le temps il ne tombe plus. Tu sais, ça l'organise. Juste quand je suis là moi l'ergothérapeute, son transfert est parfait. Il place bien sa chaise, place bien ses pieds tout est parfait quand je suis là. Je n'ai jamais vu ce client être à risque de chutes pendant les transferts. Il tombe tout le temps. Ça le fait performer, le fait que j'observe. Tout simplement. Là tout d'un coup il les fait toutes les choses qu'il faut qu'il fasse.
Error identification		Si vous voulez faire une approche diagnostic, que votre but c'est de donner des espèces de causes, comme des espèces d'explications, je pense que la seule façon d'y arriver c'est en nommant des erreurs qui marquent des problèmes. Shallice et Burgess c'était intéressant comment ils regardaient les tâches, ça nous donne une piste. Moi, ce que ça me disait c'est que ce sont les erreurs qu'il faut aller coder; puis idéalement nos bobos, on peut leur donner un poids, chacun. Faut vraiment qu'il ait un poids de donner pour ne pas avoir juste une liste de bobos un à côté de l'autre.
Task sampling		L'évaluation qui tient compte de tout, elle va regarder des tâches nouvelles, des tâches connues, elle va avoir quelque chose de simple, quelque chose de complexe... quelque chose d'assez standardisé, mais qui a rapport avec la vie quotidienne, qui donne l'impression qu'elle est dans la vraie vie ; ça m'aiderait à voir, par rapport à la norme. J'aurais plus de facilité à aller chercher la norme. Quelque chose de pas standardisé. C'est plus un échantillonnage représentatif. Étant donné la possibilité d'automatismes, je pense qu'on doit tester plusieurs tâches (Personnes avec atteinte du niveau de vigilance). Tout à coup qu'il se mettrait à faire quelque chose sur le pilote automatique.
Novelty factor	indicator	On pourrait peut-être donner un poids au degré de nouveauté justement : nouvel environnement, nouvelle capacité de la personne. Un peu comme un indicateur de degré de nouveauté de la tâche.
	Level of functioning	Ça n'a pas besoin d'être si nouveau que ça pour quelqu'un qui est à un très haut niveau de fonctionnement (sans autre nouvelle altération physique ou cognitive et dans un environnement familier sans aucun changement causé pour altérer ses automatismes), que tu as besoin d'une tâche très sensible pour trouver des choses subtiles. Mais si on regarde pour des personnes qui ont de sévérités plus sévères, plus graves, dans le fond il y a plein de choses qui deviennent nouvelles.
	Practice	«As task demands constantly change with practice, amount of practice should be noted when reevaluating». La fréquence avec laquelle ils le font, ça faisait partie du questionnaire.
Impact of verbal instructions		Il faut à mon avis considérer l'impact de la consigne verbale. Il faudrait qu'il y ait un modèle peut-être aussi d'éléments qu'il y a dans une consigne. Ça pourrait être un élément où, écoute, décris-moi donc comment tu fais ta journée? Décris tout ça. Tu vois que t'as tes éléments de tâche. Tu dis, vas-y. Puis des fois je disais, pourrais-tu ajouter ça aussi, j'aurais

Category	Code	Verbatim
		<p>besoin de le voir dans mon évaluation, puis je le laisse organiser son plan avec ça. Puis quand c'est trop vaste, je le laisse partir, là je vois qu'il est dans le champ, là je lui réduis ça à une tâche. Quand je suis rendue dans une tâche, là j'essaie; dans la tâche il y a toujours des sous-éléments. Quelquefois, il faut vraiment que t'aïlles vers le petit, petit élément; hiérarchie au niveau des consignes; je pense qu'il y aurait moyen de standardiser d'où on part, puis un entonnoir. Alors le client haut fonctionnel, tu lui poses la question bien vaste, puis à mesure que le client a des problèmes, tu réduis ton entonnoir, tu finis par lui dire est-ce que ça va mettre tes souliers, tu sais. Sais-tu ils sont où tes souliers? Ça c'est un soulier; il faudrait toujours noter la consigne verbale donnée.</p>

# Neuropsychologist

Code	Verbatim
Goal	<p>Le but initial est de comprendre les AVQ, la capacité de la personne à s'adapter à l'environnement, son potentiel d'autonomie, d'indépendance.</p>
Norms (interviewer and expert)	<p>Les auteurs disent qu'un instrument valide des fonctions exécutives consisterait en des tâches nouvelles pour tous et c'est là le défi. C'est certain qu'on peut trouver des tâches nouvelles pour un individu mais si c'est juste nouveau pour cet individu-là, tu ne peux pas le comparer à d'autres personnes et donc tu n'as pas de normes, tu n'as pas de barème (intervieweur).</p> <p>C'est l'individu en soi dans ses caractéristiques propres qu'on veut évaluer. C'est-à-dire cet individu-là, mais en même temps, c'est un individu qui est un représentant de tous les autres. Et c'est ce qu'on veut viser par les tests. (neuropsychologue)</p>
Error analysis	<p>On peut toujours se dire que l'erreur qu'il fait est de type du trouble des fonctions exécutives. Moi je dis raffinons un peu l'analyse ou allons à un grain plus fin. Et on peut aller plus loin en disant qu'il peut avoir l'étiquette, une erreur de programmation pour diverses raisons. Parce qu'il n'a pas choisi la bonne séquence, parce qu'il a été dévié dans son action vers une conduite plus automatique, parce qu'il a eu une interférence à l'extérieur qui fait que l'individu a perdu ce qu'il avait en mémoire de travail; ce serait bien de faire une analyse qualitative des erreurs en fonction du construit cognitif de l'inhibition; mieux caractériser les erreurs</p>
Interpretation	<p>Si on ne comprend pas bien ces mécanismes, ces contextes généraux, vous arrivez à des interprétations aberrantes, parce que vous avez beau vous dire que cette tâche-là c'est quand même complexe pour l'ensemble des individus. Mais il peut arriver que, pour des conditions x, y, z, on n'ait pas aperçu, qu'ils sont d'ordre contextuel ou bien individuel, vous n'évaluez plus la même chose. C'est-à-dire que vous pouvez évaluer dans un groupe sur dix individus des fonctions exécutives, mais pour un des individus, ce n'est plus une fonction exécutive; ce n'est pas une application bête et disciplinée de la cotation. C'est dans ce sens-là que le travail d'Elisabeth fait une avancée quand même importante, parce que ce n'est pas juste une question de résultat, c'est aussi une question du processus, des conditions, parce que je n'ai pas vu ça souvent, de dire qu'on s'interroge sur ce qui faisait avant, pour comprendre ce qu'il est maintenant.</p>
Ecological	<p>Ce qui est particulièrement intéressant, et en fait qui est l'ultime test, ce sont ces fameuses tâches écologiques où beaucoup d'événements peuvent intervenir; qu'est-ce qui fait que dans les tâches écologiques il y a des erreurs qui apparaissent et qui n'apparaissent pas dans le testing plus pointu, classique? Les AVQ c'est souvent des situations qui sont protégées, des situations qui sont standardisées, dans lesquelles on décontextualise, puis il y a un minimum d'adaptation.</p>
Task selection	<p>En termes de la sélection il y a l'importance que ce soit des tâches nouvelles, considérant la personne, l'environnement, que ce soit vraiment nouveau pour la personne; dans un cadre d'analyse des fonctions exécutives vous pourriez aussi étudier les capacités d'adaptation sociale. Parce que ce sont des analyses de comportements faits; l'interprétation fine du contexte social qui fait qu'un comportement est adapté ou pas. Ils peuvent réussir sur ces aspects-là (soins personnels, domiciliaire et communautaire), et puis pourtant il n'est pas adapté. Il perd son emploi tout le temps. Pourtant il réussit, il réussit à faire son boulot mais il perd tout le temps son emploi. Pourquoi?</p>



<b>Code</b>	<b>Verbatim</b> Parce que, vous savez pertinemment qu'il faut qu'on interagisse avec des gens, qu'on échange, et puis ça devient l'enfer d'avoir un collègue de travail qui ne connaît pas les règles sociales, ça bousille tout.
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## Research question 4: Which theoretical Models best operationalize executive functions and activities of daily living?

### Occupational therapist

Category	Code	Verbatim
Error analysis	Coding	Il faudrait que ce soit un modèle qui te permette de comprendre les sortes d'erreurs et que je coderais les erreurs en fonction d'un modèle. Quand j'ai essayé de coder les erreurs sans modèle, je me suis rendu compte que j'étais bien limité; c'était très difficile à savoir s'il y a un problème, s'il n'y a pas de problème. Je me demandais tout le temps la question. La performance que j'observe s'explique par une atteinte des fonctions exécutives. Pour être capable de dire ça, il faudrait nommer des sortes d'erreurs qui distinguent vraiment ce qui a rapport avec les fonctions exécutives.000
	Weighing	Il faudrait qu'il y ait des sortes d'erreur typiques, puis qu'on leur donne un poids à ces sortes d'erreurs typiques. Le poids, il faudrait qu'il soit donné en fonction de l'environnement, en fonction de complexité de tâche, puis en fonction de la complexité de la tâche en rapport avec l'expérience de la personne, de la tâche comme telle aussi, puis l'expérience de la personne; il faut qu'il y ait un poids, puis le poids il a rapport avec la hiérarchie de Luria. Mais si j'ai un travail qui me demande une rigueur absolument parfaite, si je suis contrôleur aérien, puis que ce n'est pas grave que je retourne en arrière trois fois sans payer un compte par chèque, parce qu'est-ce que ça va être quand il va être contrôleur aérien! La même erreur n'a pas le même poids.
	Interpretation	Dans le Shopping de Shallice et Burgess, il y avait comme un beau «background» théorique, puis quand il arrive dans les types d'erreurs, je trouve que ça s'applait. Ça n'a plus rapport avec le modèle dans le fond.
	Hierarchical	Il faudrait qu'il y ait des niveaux hiérarchiques dans le modèle. Il ne faudrait pas que je dise j'ai vu ça, ça y est. Je trouve que c'est ça aussi qu'il y avait dans les articles, il avait attention, concentration pour participer à un test comme ça. Après ça, il fallait qu'il ait un minimum de mémoire pour partir, puis faire ça, puis il avait évalué que la personne avait les morceaux qu'il fallait. Puis après ça, tout ce qu'ils observaient, les erreurs qui restaient, c'étaient des erreurs, vraiment des fonctions exécutives de l'unité trois.
Model of Occupational Performance		Ce serait intéressant d'avoir un modèle type "rendement occupationnel", un modèle type "occupation humaine", dans le sens où tu regardes cette personne-là, fonctionne-t-elle ou ne fonctionne-t-elle pas, est-elle contente de ce qu'elle fait, n'est-elle pas contente de qu'elle fait, fait-elle ce qu'elle veut faire dans vie. Le fond c'est que quand tu fais ton entrevue avec la personne, tu reconnais à la base que ce qui compte c'est sa satisfaction dans ses activités. Puis que la personne est capable de faire des choix dans ce qu'elle veut faire. Alors dans ton intervention comme ergothérapeute, tu ne veux pas qu'elle devienne autonome partout, mur à mur, à tout prix. Ton but c'est d'identifier avec elle ce qui compte, puis de travailler sur ce qui compte. Puis tu laisses tomber le reste en quelque part.
Luria's Model of cerebral functioning		Il faudrait soit que ce soit rattaché au fonctionnement du cerveau, les sortes d'erreurs; quand Luria dit que chacune des unités a des espèces de niveau hiérarchique dans l'unité même, puis que c'est comme si ça finit par se multiplier au niveau hiérarchique. Il faudrait que les erreurs, on les place dans cette hiérarchie-là, comme pour que ça fasse du bon

Category	Code	Verbatim
		<p>sens. Ce que Luria m'aidait à voir quand j'étais dans la tâche, c'était de dire, il y a autre chose en-dessous. Il y a l'unité 1, l'unité 2, là est-ce que ce que j'observe si ça vient de l'unité 1, de l'unité 2 ou de l'unité 3? Est-ce qu'elle ne s'en souvient plus, est-ce qu'elle n'est pas capable de s'organiser avec l'information qu'elle a pour aller plus loin dans son plan? Dans Luria, je me comprends. Je trouve que ça se comprend dans une globalité. Je trouve que de dire «semantic, sequence, perseveration, step omission, tool omission, addition, quality, spatial», tu mets ça là, toutes sur la table, toutes pareilles, tu calcules la quantité de fois que ça arrive, puis c'est ce qui dit que t'as un problème?</p>

## Neuropsychologist

Code	Verbatim
Luria's Model of Cerebral Functioning	<p>Le modèle de Luria je le trouve très bien, parce qu'il a été précurseur là-dedans et puis qu'il dit beaucoup de choses intéressantes et qu'il a développé l'essentiel, la structure générale. Luria a fixé le grand scénario, si vous voulez, ou le squelette ou les principes généraux.</p>
Models of inhibition and models of working memory	<p>Il faut tenir compte des mécanismes d'inhibition. Parce que, dans le fond, dans les AVQ surtout, c'est des trucs très automatisés. Puis on peut imaginer que l'individu, puisque c'est bien automatisé, c'est quand même dans sa structure cognitive, bien implanté dans son système nerveux si on veut. Que dans le fond si les AVQ sont touchés ce n'est peut-être pas que les sous-processus automatiques sont perdus en soi. Mais qu'il y a des éléments cognitifs interférents ou complémentaires qui sont perdus. Un modèle qui nous parle de mécanismes d'inhibition, ce serait un modèle de Posner, par exemple;</p>
Baddeley's model of working memory	<p>Il faut tenir compte des modèles de mémoire de travail. La plupart des gens s'entendent pour dire que la mémoire de travail est un élément essentiel dans les fonctions exécutives; une fois que vous avez planifié votre action, vous devez mettre cette information en mémoire. Vous devez mettre en mémoire une série d'informations que vous aviez prises en faisant votre tâche. Vous devez mettre en mémoire les erreurs que vous avez faites et ainsi de suite; le modèle de Baddeley pour la mémoire de travail.</p>