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Reliability, Validity and Educational Use of the Cognitive Abilities Profile

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DECLARATION

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ABSTRACT

The Cognitive Abilities Profile (CAP) (Deutsch and Mohammed, 2010) is a collaborative tool for psychologists and teachers. The CAP is based on principles of Dynamic Assessment (DA) and uses a consultative model for rating pupils' cognitive abilities in various cognitive domains and for planning interventions to facilitate pupils' progress accordingly.

The CAP was developed in response to a perceived need for educational psychologists (EPs) to have access to alternative assessments to standardised psychological tests, particularly in the case of learning disadvantaged and ethnic minority pupils. Using DA as one possible approach creates a need for EPs to have access to training and to receive support with the implementation of DA-based intervention methods within local services. However, surveys of EP use of DA indicate limitations in training, inadequate support and difficulties in wider application of DA.

In the present work, a quantitative methodology has been used to examine the validity and reliability of the CAP in overcoming the above-noted difficulties in the implementation of DA by EPs. The methodology involved the collection and analysis of data from three groups of EPs, two of which conducted consultations with teachers using the CAP and the third group of EPs used its own choice of consultation methodology and functioned as a control group.

The findings of the present work provide evidence of good construct validity of the CAP cognitive domains, adequate inter-rater reliability between CAP users and evidence of advantage for pupils in some areas of functioning between pre- and post-use of the CAP, as validated by independent standardised tests. Analysis of perceptions of EPs of the utility of the CAP, based on the results of feedback questionnaires, addresses issues of user friendliness of the CAP. CAP users agreed on the need for initial training for psychologists and support for practitioners. The findings have implications for adoption of a novel approach in EP and teacher related work.

Keywords: Dynamic Assessment; Cognitive Abilities; Consultation

Chapter 1 Introduction and overview of the CAP study

1.1 Rationale

The Cognitive Abilities Profile (CAP) (Deutsch and Mohammed, 2010) is a collaborative assessment and intervention tool for Educational Psychologists (EPs) and teachers, as well as other practitioner psychologists and therapists, based on principles of Dynamic Assessment (DA). The CAP uses a consultative model for rating cognitive abilities of pupils and for planning interventions so as to facilitate their progress.

EPs have traditionally assessed cognitive skills and achievement in children and adolescents by means of standardised and norm referenced psychological tests. However, major demographic changes by which large groups of culturally and linguistically different populations have become part of the UK and many other countries, have increased challenges to the use of such tests (e.g. Howe, 1997), as assumptions of equality of educational opportunity and experience may not be satisfied. In the case of minority groups, certain standardised tests are not regarded as being culturally fair. Furthermore, research has shown that other populations in addition to minority groups, such as children and young people with learning and emotional difficulties, may be unable to demonstrate a true picture of their cognitive skills under standardised testing conditions (Hessels, 1997; 2008).

For a number of EP services, the need to find alternative or complementary methods of testing has become increasingly relevant and has led to the implementation of two key additional or alternative approaches, namely DA and consultation practices. Services have begun considering DA in place of, or alongside, traditional tests commonly used by EPs. Briefly, DA comprises an approach based on Vygotskian principles in which support, feedback and discussion within the assessment leads to a fuller picture of ability and learning potential rather than an unaided snapshot of performance. DA is described and discussed fully in chapter 2. Additionally, consultation practices have gained importance in establishing student needs and in setting educational targets.

Nevertheless, although EP practice has diversified and become focused on wider systemic and ecological issues affecting children, families and schools, standardised testing remains a core activity for many EP services (Farrell and Woods, 2015). This is not least because it

forms part of the statutory duties assigned to EPs and use of such tests is protected and restricted to the profession. A survey of UK EP use of DA (Deutsch and Reynolds, 2000) confirmed findings similar to those found in other countries, (Lidz, 1992; Haney, 1999; Haywood and Lidz, 2005) namely that whilst DA may be appreciated for its concepts and theoretical underpinnings and is a growing subject of research (Lidz and Elliott, 2000; Sternberg and Grigorenko, 2002), DA has not significantly entered mainstream EP practice.

The CAP is a novel attempt to find a way of bringing concepts and methods of DA into the regular practice of psychologists and into mainstream classrooms, via a consultation approach, whilst trying to address some of the challenges to DA practice that various surveys had revealed. The innovation of the CAP lies in the CAP's use of principles of DA without the CAP necessarily requiring the conduct of a DA itself, i.e. without direct testing of a pupil. The CAP thus attempts to address or bypass some of the barriers to greater use of DA. A further innovation lies in the design of the CAP as a consultative tool. This is particularly advantageous, since EP use of consultation is presently increasingly popular (Wagner, 1995; 2000), but consultation is an approach that seems to lack clarity in practice. EPs do not have a shared understanding with their clients as to what exactly consultation is (Leadbetter, 2006), how it is defined and how to ensure consistency of practice. Additionally, as the use of consultation by EPs is currently under-researched, its value to clients has yet to be determined (Kennedy, 2008; Henderson, 2013). The current version of the CAP (Deutsch and Mohammed, 2010) is in use in a number of EP services in the UK and elsewhere but has not been systematically evaluated until now.

Problems identified as obstacles to wider use of DA fall into two main areas: practical and conceptual. At a practical level, challenges are related to (i) Training and support; (ii) Sharing skills with mainly untrained school staff; (iii) Time issues for practice. At a conceptual level, obstacles include lack of clarity of concepts underpinning DA such as learning potential and cognitive modifiability; the structure and components of mediated learning; the validity of various taxonomies of cognitive functions associated with different DA models and concerns regarding some aspects of validity and reliability of some DA models. These concerns have been particularly raised in relation to the more individualised models of DA, which are the DA models best known to UK EPs when compared to normative or standardised

psychological tests in general use (Büchel and Scharnhorst, 1993). These issues will be central themes of the present thesis.

1.2 Approach

The CAP is designed as a functional tool. It is not a test and it is not a normative assessment. The CAP is a structured collaborative process to be used by those involved with a learner of any age – typically teachers, parents, psychologists and others. The CAP uses a framework of observation and consultation to develop a profile of the student, which is repeated over time, so as to investigate and jointly rate cognitive abilities and jointly plan and monitor agreed interventions. The need to address at least some of the concerns raised by critics of DA is reflected in the choice of research questions that are investigated in this study. Specifically, aspects of reliability and validity of the CAP are investigated, since the CAP aims to be a rigorous tool.

The main body of the CAP consists of three sections, which are used to (A) rate the pupil, (B) consult with the teacher(s) and (C) observe classroom or other tasks. All three sections are briefly described in chapter 4 of this thesis together with the theoretical and practical rationale for their inclusion in the CAP as a whole. Only Section A is the subject of this study, although, an outline of Sections B and C, may be found in Appendix 3. The rating process of the pupil's cognitive abilities, which is done by means of a collaborative consultation activity (psychologist, teachers, parents etc.) and is followed by the joint development of an Individual Cognitive Education Plan (ICEP) with specific and measurable targets. The ICEP is reviewed and rescored over time. In this study, following the initial rating of the pupil (Section A), an ICEP was developed for each pupil participating in the study. The ICEP was then reviewed 3-4 months later. Teacher interventions following the first (baseline) CAP ratings, were not formally supported or monitored by the EP and the interventions themselves are not the focus of this study. The main goal of this study is to investigate the properties of the CAP tool itself. The combination of DA and consultation found in the CAP, which has not been developed previously into a working tool, attempts to create a quantifiable tool from two very different approaches. This is a necessarily small-scale study, involving three Educational Psychology Services, 47 pupils and 26 educational psychologists acknowledging the challenging and complex area of study.

1.3 Research aims

The overall research aim is to investigate aspects of validity and reliability of the CAP and the perceived usefulness thereof.

Specific research questions (RQs):

RQ (i)

Reliability:

A. *Does the CAP show adequate internal consistency?*
B. *Does the CAP have adequate inter-rater reliability i.e. can various independent CAP users achieve substantially similar CAP scores when rating a pupil?*

A: Correlations between CAP domains and Cronbach's alpha were calculated, testing the tool's internal consistency.

B: Testing levels of interrater reliability:

IRR study 1: The CAP was reused (rescored) for the same pupil and with the same teacher but was administered by a different psychologist blind to the first CAP scores.

IRR study 2: The CAP was used for one pupil but scoring was completed by several teachers or therapists, blind to each other's scores.

RQ (ii)

Convergent and known-groups validity:

Do the CAP consultation ratings correlate with scores on independent tests? Do the pupils who were targeted as having additional needs using the CAP, also score lower on direct testing?

RQ (iii)

Are there different rates of improvement over time for pupils for whom the CAP has been used, compared to pupils who did not have the CAP?

One-way ANOVAs compare the services at baseline. Two-way mixed ANOVAs are used to assess whether pupils in the two CAP user groups improved on static tests of cognitive abilities more than pupils in the control group. Where significant differences were found, post hoc tests were used to further examine the direction of change.

RQ (iv)

What are the perceptions of EPs with regards to the usefulness of the CAP? How do the perceptions of these EPs compare to a third (control) group of EPs who undertook consultations without the CAP?

Perceptions of usefulness of the CAP were investigated by means of post-CAP questionnaires to all EPs and were analysed using Kruskal-Wallis non-parametric tests comparing the CAP consultation experiences with EPs in the control group who used any consultation procedure of their own.

1.4 Structure of the thesis - Overview

Chapters 2 and 3: The Literature Review

These two chapters explore literature pertinent to two core areas of educational psychology practice for which the CAP has been developed and which form the basis of the innovative aspects of the CAP. Chapter 2 discusses theoretical and practical concepts of DA; perceived benefits and challenges in comparison to widely used standardised tests; and in particular critiques of the DA models best known to practitioner psychologists. Chapter 3 focuses on the use of consultation in EP practice, its diverse theoretical roots, practical aspects and challenges to implementation. Consultation is an increasingly popular approach in EP practice and is discussed in relation to its potential as a framework for delivering DA principles.

Chapters 4 and 5: The Cognitive Abilities Profile

These two chapters discuss the CAP tool in detail, since the CAP is a response to practical and theoretical challenges in the use of DA explored in the literature review. The CAP in its

application of some DA concepts and methods to be used within a framework of EP lead consultation, moves some practices from typical DA use in 1:1 direct work (testing) with children, to inclusion in a broader consultative structure which focuses on joint problem solving with teachers, parents and others. Whilst the CAP was designed to contribute to identification of cognitive needs irrespective of age, the focus of this study is on the use of the CAP with school age children. Hence, in this study, the CAP end users are generally referred to as pupils.

The CAP also aims to bridge the gap between assessment and intervention, which is a commonly noted limitation of traditional testing procedures (Wagner, 1995). This is achieved in the CAP by operationalising a main principle of DA, which is that assessment and intervention should be directly linked (Haywood and Lidz, 2007). The CAP is also intended to contribute to evidence based practice in the work of educational psychologists, by building in systematic follow up, review and evaluation of effectiveness of interventions for the pupil, which interventions have been agreed upon in the consultation.

The structure of chapters 4 and 5 is set forth below:

Chapter 4:

1. Begins with a brief overall rationale for the CAP's development.
2. The CAP's three sections are overviewed, followed by an outline of the seven Cognitive Abilities (CA) domains, which constitute section A of the CAP and an explanation of the CAP's rating scale.
3. This section explains how the CAP was conceived, drawing on theoretical concepts of Luria (1980) and Feuerstein (2002) and how the parts of the CAP relate to these theoretical constructs.

Chapter 5:

1. The rationale for the CAP, set out in chapter 4, is now followed by a more detailed explanation of each of the cognitive domains and subcomponent items in Section A.
2. The procedure that follows the joint rating of a pupil on Section A – summary scores;

selection of targets; setting up the intervention plan and the cycle of monitoring and review, is briefly set out.

3. Reference is made to previous pilot studies of an early version of the CAP, which lead to the development of the current model (Deutsch and Mohammed, 2008). The CAP Record and Summary forms are attached as an appendix.

This completes the discussion of the parts of the CAP used in this study.

Chapter 6: Method

This chapter sets out the methods used for this study and the timescale and order of the research methodology. The methodology focuses on the CAP tool itself, its validity and reliability and its perceived usefulness by EPs and teachers. The present study is not an intervention study; that is, it does not investigate the efficacy or impact of any specific interventions that might be put into place following the initial CAP analysis of a pupil's needs. Sternberg points to "simple inertia" in psychologists wanting to stay with the comfortable and familiar, often preferring forms of test administration that are easy to use and easy to understand. For this reason, perceptions of the use of CAP by EPs as potential CAP users, is part of the research study, since even well-known conventional psychometric tests are known to be less used on account of a reputation for being complicated (Sternberg, 2000, p.xi). A quantitative approach is used to investigate this study's research questions.

Chapter 7: Results

In this chapter the results of the study are set out. Statistical analysis is provided in response to the research aims above, using the following analyses: correlations and intraclass correlations to examine reliability and some aspects of validity; t-tests to compare children who were targeted for additional support, or not, for the known groups validity; ANOVAs and Kruskal-Wallis tests to investigate the usefulness of the CAP in terms of change over time across services. A descriptive analysis of EP views is also presented.

Chapter 8: Discussion

This chapter brings together the analysis of the research goals and results and suggests some explanations and interpretation. Findings are linked to theoretical concepts underpinning the CAP and also to practical issues that prompted the CAP's development. Limitations of this study and future directions, as well as implications for psychology practice are discussed.

Chapter 2: Literature Review (i)
Dynamic Assessment

2.1 Introduction

In this chapter and the next, two interrelated themes are developed, Dynamic Assessment, because the development of the CAP arose from the goal of applying concepts and principles used in some models of DA to the assessment of cognitive abilities; and consultation as a framework for EP practice, in relation to practitioner psychologists' work. Consultation frameworks and methods are examined for clarity, styles of consultation, effectiveness and value for different clients. Both these areas relate to the work of EPs and represent the innovative aspects of the CAP, i.e. its use of DA principles without necessarily conducting direct testing and the structure of the CAP as a consultative model for EP use of DA concepts.

2.2 Traditional measurement of cognitive ability and the DA approach

Measurement of cognitive ability has been a core goal of many traditional educational psychology tests. From a theoretical perspective, understanding the nature of cognition and how this is actualised in test structures and procedures is an area of fundamental difference between traditional tests of cognition and dynamic assessment.

The standard practice of using both intelligence and achievement tests as a measure of a student's learning ability is problematic because in these tests, learning appears only through its distant objectified results (Haywood and Lidz, 2007). For example, the logic of such testing dictates that if the vocabulary score of a student is high then this indicates that this student was more efficient in learning new words. However, such a conclusion is based on substituting the final, objectified result of learning for learning itself: the process of learning appears here only through the number of words that the student was able to retrieve during the test. The learning process itself is not tackled during the assessment. For example, the testing does not enable the assessor to know which *strategies* were used by the student for learning new words, nor how much *time* he or she invested in their learning.

The product-vocabulary score may thus be erroneously interpreted as reflecting the student's *learning ability* (Kozulin, 2011, p.170-171).

Sternberg and Grigorenko (2002) state that in some societies including but not limited to the United States, people's success and failure is largely determined by results of such tests. Those who do not test well lose opportunities whether in regard to grouping in school, college admission or admission to graduate schools. They assert that conclusions are drawn which go way beyond the inferences that should be properly drawn from such test scores (Sternberg and Grigorenko, 2002, p.ix). In contrast DA approaches are based on a learning model, in which it is the capacity for ability, which is of most interest.

There is a tendency to use the terms 'intelligence' and 'cognition' interchangeably. The two concepts need to be understood in any discussion on the differences between assessment of intelligence and assessment of cognition (Haywood and Lidz, 2007). The most fundamental difference between intelligence and cognition is that 'pure' intelligence (g) is primarily genetic, whereas cognitive processes must be acquired. The corollary assumption is that "whereas intelligence is only modestly modifiable, with great effort, systematic cognition, when acquired, is eminently modifiable" (Haywood, 2007, p.26). Cognitive functions (or as termed in the CAP, cognitive abilities) can be defined as processes by means of which one perceives, or comprehends ideas. Many cognitive processes are implicit, but they all involve aspects of perception, thinking, reasoning, and remembering.

Most tests of cognitive abilities do not attempt to measure 'non-intellective' variables, such as motivation, emotion and attitudes and thus miss an important element of learning. In contrast, emotional and behavioural variables should be combined with the more 'intellectual' processes, and this is the model used within the CAP structure. Cognitive processes are conceived of as a mixture of native ability, motives, habits and attitudes toward learning.

There are also some basic assumptions underlying most cognitive measurement. One of these is that all children have had equal opportunities for learning and that all children have had equal learning experiences. Thus, differences in test scores are seen as the result of differences in children's capacity to profit from a 'standard' learning experience (Hessels,

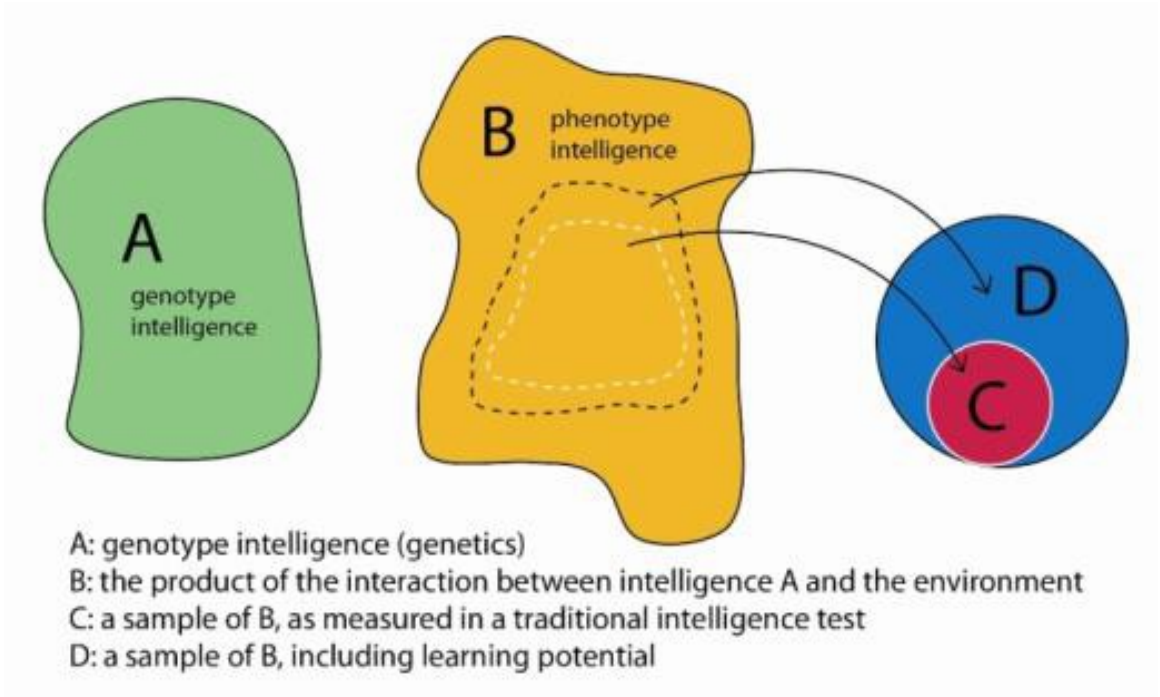
2008). However, when children's developmental conditions are not equal, then basic assumptions underlying cognitive measurement are not met. This means that differences in static test scores cannot be seen as the result of differences in children's learning capacity and therefore may not be good indicators of children's future academic learning. Hessels (2008) gives examples of situations in which children are disadvantaged in their access to learning. These include children with (severe) learning difficulties, children with mental health issues, children with a different ethnic/cultural background, children with hyperactivity and impulsivity and indigenous children from families with low socio-economic conditions (and low parental education). These are all 'at-risk' children. Sternberg and Grigorenko use a general descriptive term, 'learning disadvantage' to make the point that causes of low performance on tests of cognition can be both environmental, internal or both (Sternberg and Grigorenko, 2002).

Beckmann (2003) concludes that operationalisation of constituent elements in *all* cognitive tests should be in line with a more process-oriented theoretical definition i.e. focused on the child's capacity to acquire new skills and abilities. This implies that learning should be an integral part of the test and that learning potential measures are the optimal type of cognitive tests (Hessels, 2008; Beckmann, 2001; 2006). As such, all DA models have a learning (intervention) phase built into their procedures although these vary in nature.

In the subsequent chapter 4, describing the CAP in detail, the implementation of a learning phase within this consultation model based on DA principles, is discussed. The learning phase in the CAP happens between measurements, i.e. between the baseline CAP and the review, but unlike some work, e.g. Hasson (2011); Hasson & Camilleri et al. (2012), the actual learning is not directly controlled or measured in this study. In a classroom setting, the mediated learning/cognitive intervention is happening all the time.

Guthke and Beckmann (2003, p.230) developed a model of intelligence, which is shown in Figure 1.

Figure 1: Model of Intelligence
(from Guthke and Beckmann, 2003)



The model takes the concept of inborn intelligence A (the genotype) from Hebb (1959) and adds the concept of developed intelligence B (the phenotype) derived from Vernon (1970) and Beckmann (2001). Together these form C, which is the performance factor measured in traditional cognitive tests. The additional element, D, is added which represents the learning potential. The resulting combination comprises an estimate of the child's intelligence, which is defined in this model, as the child's potential for change (learning). In the model it is the D, the sampling of learning, which is the focus of Dynamic Assessment.

The hypothesis that learning potential tests are better estimates of children's general cognitive abilities should be confirmed by their greater (predictive) validity. Thus, tests of learning potential should obtain better estimates of children's general cognitive abilities and better predict future learning. From a clinical perspective they should help bridge the gap between assessment and intervention. From this standpoint some DA test developers, for example, Hessels (1996, 2000, 2002), Hessels-Schlatter (2002a, 2002b), Büchel (2006), Beckmann (2001), Guthke and Beckmann (2003), Resing (2000), amongst others, have developed tests of learning potential which demonstrate the predictive value of tests that include a learning phase, in comparison to the predictive value of standardised (unaided)

tests. Others, such as Feuerstein (1979, 1995, 2003) and Tzuriel (2001, 2011), have developed tests to assess a learner's cognitive modifiability, not limited to changes in test performance. These different approaches demonstrate that the field of Dynamic Assessment (DA) has a variety of models, methods of administration and analysing data, which will be further discussed below.

2.3 DA as a form of testing

2.3.1 Principles and concepts of standardised and dynamic testing

In this section, some principles underpinning cognitive and standardised assessment are examined and similarities and differences between them are noted.

Assessment is central to the work of all psychologists as it is the data gathering aspect of psycho-educational consultation. Assessment is not the same as any of its procedures, that is assessment is not testing, although testing may be included as part of an assessment (Lidz, 2007, 2011). Different principles and methods are used in the assessment of cognition, by those using static (i.e. unaided) testing procedures and by those using dynamic assessment procedures. The differences affect not only the assessment tools themselves, but also the goals, procedures and interpretations as well as the type of educational and cognitive interventions that may follow from the different procedures used.

Psychologists, especially educational psychologists have traditionally focused on measurement of cognition by means of direct testing procedures, to assess as objectively as possible the unaided performance of the testee at a point in time. Static tests are defined as those that sample behaviours at a single point in time, without intervention or support built into the assessment period. Hence this term is used to express the idea of an unaided test. No intervention, feedback or teaching during the test is permitted so that the test results can be norm-referenced to stated criteria, whether age related or other measures. Thus, static tests are often referred to as normative tests (Haywood and Lidz, 1987, p.6), even though in theory DAs could be normed; and static assessments do not always have normative information available.

The development of DA in practice began from a theoretical standpoint and a view of the nature of human abilities, which contrasted with the established view that measuring unaided performance on a test, demonstrates cognitive ability as a stable property of those being tested. A fundamental position taken by the theoreticians who were the precursors of DA development, was that cognitive ability should not be measured statically, (i.e. without learning support within the test), but assessed as part of a dynamic learning interaction. This reflects the DA view of testing, being designed to reveal possible responsive changes in performance on tests, because cognitive ability is seen as a combination of genetically determined elements, together with historical and current problem-solving experiences and behaviours. The intervention – the dynamic part – is the means of revealing more varied problem-solving skills and thus more learning potential which, for a variety of reasons, may not be shown in unaided performance. Traditional tests of cognition score current performance only, which is regarded as evidence of internal and stable levels of intelligence, not readily open to modification and change. Thus, in traditional normative cognitive tests, intervention within a test is an irrelevant concept and is undesirable in practice since it prevents the possibility of norm referencing.

It is important to state that it should not be thought simplistically that the field of standardised educational psychology testing consists only of IQ type cognitive tests, although they have dominated the educational psychology field, (Howe, 1997; Sternberg & Grigorenko, 2002) nor that DA is 'opposed' to static testing as a whole. Static tests are used in many applications, such as in the diagnosis of certain mental health conditions; assessment of neurological conditions and testing of specific skills which may be diagnostic and whose goal is not overall measurement of cognition, but which may classify the test taker and be used for designing treatments and for prognosis. However as will be seen, there is one concept that does divide most static tests from DA approaches, which is the concept of *change.* DA is based on a change model of human intellective functioning that stresses proximal modifiability and growth whereas static testing (in the field of measurement of intelligence at least) is based on a stability model that stresses continuity and linear growth (Jensen, 1992; Jensen, Robinson-Zanartu & Jensen, 1992). Jensen (1992, p.7) contrasts the measurement of the properties of stability with the properties of modifiability and asserts that it is not possible to measure both at the same.

2.3.2 Comparison of static and dynamic assessment in practice

Comparison of static and dynamic assessment is summarised as follows (see also Table 2.1)

Static assessment:

- Focuses on current performance assumed to be predictive also of an individual's future performance.
- Implicitly assumes that intellectual functioning and learning ability are stable and resistant to significant change.
- Excludes learning from the assessment procedure.
- Emphasises the product (assessment score) rather than the process (how this score has been achieved).
- The results of static assessment are used predominantly for classification of students and selection of educational settings rather than development of specific educational intervention strategies.

Dynamic assessment:

- Assumes that 'static' (unassisted) task performance reveals only a fraction of students' cognitive and learning skills.
- Aims at evaluating students' modifiability or learning potential rather than their current performance level.
- Includes a learning phase as an integral element of the assessment procedure.
- Focuses on learning processes rather than products of learning.
- The results of DA are used predominantly for recommendations regarding those cognitive and learning functions that should be selected for targeted cognitive intervention.

Table 2.1: Comparison of dynamic and standardised approaches to assessment
Adapted from Feuerstein (1995), Haywood & Lidz (2007), Lidz (2011), Kozulin (2013)

	DYNAMIC	**STANDARD**
Examiner:	Interactive (assisted)	Neutral (unassisted)
Learner:	Active	Reactive
Task:	Process	Product
Assumes:	Learner changeable	Learner stable

2.4 Theoretical underpinnings of Dynamic Assessment

The term dynamic or interactive assessment is most frequently used to describe tests of learning potential (future oriented) – in contrast to tests of unaided performance (current or historical performance) – on tests. The key element of all DA approaches is the belief that evaluation of individual learning potential is as important as testing the current performance level of a student and that the best way of doing this is to insert learning and/or interactive elements into the assessment procedure. One of the initial goals of DA was to demonstrate that reliance on static intelligence or achievement tests often results in the erroneous placement of children with high learning potential but low current performance levels into special educational settings that do not correspond to their true abilities and needs. DA helps to formulate specific recommendations for cognitive intervention aimed at improving individual's learning strategies and cognitive skills.

2.4.1 Origins of DA: the work of Vygotsky

Lidz (2011) describes DA as part of a larger assessment/consultation process and as one among a large variety of assessment tools that are applied in relation to assessment questions. Contemporary DA rests on the theoretical foundations of Vygotsky and Feuerstein. It is defined as the creation of a zone of proximal development (ZPD), i.e. the area (or zone) between the individual's independent functioning and the next (or proximal)

level a person can reach whilst being supported. Within the ZPD the assessor provides mediation of cognitive processes to promote higher order mental functioning of the learner (Lidz, 2007, 2011).

The relationship between thinking and learning constitutes one of the fundamental problems of cognitive psychology. Vygotsky defined the search for the ZPD as (1) active interaction between adults and children during the assessment; (2) emphasis on emerging rather than already established mental functions; and (3) comparison between individual and aided performance as a measure of the child's ZPD (Chaiklin, 2003). Vygotsky's goal was not to determine the child's facility with these learning prompts, but to use them as a means of viewing the child's emergent mental functions. Functions emergent at one developmental age under favourable conditions are actualised during the next age (Chaiklin, 2003). In other words, evaluation of the child's ZPD allows one to imagine his or her thinking, as it will appear later on. In this sense ZPD is related to the task of exploring children's mental development or cognitive modifiability, rather than immediate learning potential (Kozulin, 2011).

Vygotsky (1978, 1986) emphasised the central role of context and collaborative interaction for intellectual development. The ZPD builds on the principle that the outcome of social interaction is internalisation of the socio-cultural demands through the development of mental tools such as language (Kozulin, 1998; Kozulin, Gindis et al., 2003) and is a necessary component of development, instruction and therefore, assessment. The ZPD is used both to explore the nature of the learner's functioning, as well as to determine the next steps of instruction. In Vygotsky's view, the psychologist or teacher should be looking for and measuring cognitive abilities, which *are in the process of formation,* and may be evident only under supported learning conditions, in order to score the potential for movement and change. That is, a cognitive ability (CA) is not either present or not present.

The concept of emerging cognitive abilities, which are described as within the person's ZPD, expresses the notion that there is a process of development that can be identified and become the next (proximal) step of learning. The intensity of effort involved in facilitating the move of the learner from his or her zone of actual development to the zone of next

development and the nature of the interventions and interactions that seem to promote this enhanced development is analysed within the interaction between the learner and the DA provider, who is referred to as the mediator. Thus, the CA may be potentially available, but not yet actualised. From the perspective of acquiring cognitive skills derives the basic orientation of DA, which is the search for potential development of cognitive abilities not yet fully present in the student's functioning and under which conditions these can be actualised and crystallised in the student's repertoire of skills. Traditional (static) approaches measure the learner's zone of actual development (ZOA); dynamic assessment creates and explores the zone of proximal development (ZPD) (Haywood and Lidz, 2007; Lidz, 2003, 2011).

For an in depth understanding of the individual's competencies and needs, Haywood and Lidz suggest that information is needed about both the ZOA and the ZPD. Thus, the need to gain information both about the learner's unaided skills and knowledge at a point in time, as well as their learning potential under supported learning interventions is also expressed in the model of Guthke and Beckmann (Figure 1).

2.4.2 The contribution of Feuerstein

The second theoretical basis of DA stems from the work of Feuerstein, who developed a theory and model of the specific interactions that promote creation of the ZPD, summarised by the notion of 'mediated learning experiences' (MLE) (Feuerstein, 1979, 1995, 2003). The notion of mediation or *Mediated Learning Experience* expresses the idea that the mediator (typically parent or teacher) places themselves between the learner and the world of experiences, shaping, focusing and directing the learner toward the perception, encoding and utilisation of important learning (cognitive and emotional) processes. MLE's are descriptions of learning interactions that promote higher mental processes, such as mediation of intent, meaning and transcendence (elaborated into twelve such components). MLE, within this model, describes the types of interactions provided by the assessor (in other settings – parent and teacher) when engaging in DA.

Further elaboration of these concepts will be found in chapter 4, which focuses on the CAP tool itself and which will discuss which elements of Feuerstein's DA model have been used, adapted or set aside in the CAP.

Feuerstein proposed that MLE works on two levels; from parent to child as a specific intergenerational form of cultural transmission and on a universal human level as the mode of transmission of culture and knowledge, unique to human society. In his view, when there is a breakdown in social and cultural transmission, i.e. failure to provide or access adequate MLE within a society, culture or family, this can result in deficient cognitive functioning and therefore lessened ability to benefit from the individual's encounters with successive learning opportunities (Feuerstein, 1995, 2002). The elaboration of Feuerstein's concept of MLE, its components and its role in the formation of cognitive development has been extensively described and has led to a large body of research both on MLE within some dynamic assessment models and its use in formal and informal learning activities (Deutsch, 2003; Tzuriel, 2000; Lidz, 1991, 2003; Haywood and Tzuriel, 1992; Kozulin, 1998; Burden and Williams, 1998; Deutsch and Mohammed, 2010). It has also been incorporated in specially designed cognitive development programmes, such as Greenberg's (1992) CEA (Cognitive Education Advantage) programme; Bright Start, an early years cognitive development programme (Haywood, Burns & Brook, 1985); Cébé and Paour's (2000) and Klein's (1993) MISC (More Intelligent and Sensitive Child) programme, offering mediational skills to mothers of premature and low birth weight infants. Burden (1998) described MLE as the development of the cognitive tools for 'learning how to learn' when analysing Feuerstein's Instrumental Enrichment (of cognitive functions) programme. The means of shaping the learning capacities of the individual as a humanly driven enterprise is contrasted with the approach of Piaget (1959, 1965), who viewed adult interventions in the cognitive development of children as peripheral rather than central (Kozulin, 1998; Feuerstein et al. 2003; Haywood et al., 2003).

Feuerstein's use of the term *deficient* when describing 'deficient cognitive functioning' (DCF's) is somewhat similar to Vygotsky's concept of the ZPD. Feuerstein regarded DCF's as primarily a failure, or a lack of, spontaneous use of a prerequisite function, skill or strategy that is necessary for successful problem solving (Lidz, 1987; Kozulin, 1993). Feuerstein's

Learning Potential Assessment Device, (the LPAD), was one of the first, if not the first, attempt to elaborate a dynamic assessment procedure, providing a catalyst and model for others (Lidz, 1987; Haywood and Tzuriel, 1992; Lidz, 2007; Tzuriel, 2000; Sternberg and Grigorenko, 1998, 2002). Feuerstein adapted some well-established static tests, such as Raven's Matrices (Raven, 1938, 2004) and Complex Figure Drawing test (Osterrieth, 1944) for use in a dynamic interaction with the learner. Some of his sources were from Rey's work, such as the Organisation of Dots test; Rey's 16 Word Memory test; Plateaux test and others. His choice for the LPAD battery was guided by the need to find materials which were as culture-free as possible and which could be adapted for mediation within the test situation, enabling both teaching to the test and more broadly, attempting to modify the child's deficient cognitive functions. From this initial work, he developed his theory of Structural Cognitive Modifiability (Feuerstein, 1979, 1980), asserting the potential to structure and restructure inefficient cognitive processes, which may appear as poor intellectual and emotional functioning in unaided tests, but which can be open to active modification.

In DA models, as will be shown below, the mediation within the test can be very varied and there is no universally agreed method of mediating. Feuerstein proposed certain core criteria, which he considered as defining MLE within any social/cultural context, as well as other optional criteria of MLE, which would vary according to need (Feuerstein, Klein and Tannenbaum, 1991; Feuerstein, 2003; Tzuriel, 2001; Lidz, 1987, 2003; Deutsch, 2003).

Although the general features of DA are shared between all DA test developers and users, there are different DA procedures resulting from different ways of interpreting and operationalising the search for learning potential.[1] Just as methods of intervention/

[1] Perhaps because of the diversity of DA models and methods, an agreed curriculum for teaching DA has not been established to date (Lidz, 1992; Haywood and Lidz, 2005; Deutsch, 2007; Green, 2015). Lidz developed a teaching curriculum for DA within a Masters degree psychology programme in one US college, (2001/2002) but it was not formally implemented (Lidz, 2011, personal communication). Currently in the UK, the British Psychological Society sets out a framework for its qualifying doctoral programmes for Educational Psychologists. In England and Wales, DA is not specifically named, but in the Scottish EP training framework, it is. In most EP training in the UK, specific allocation of time and topics is left to individual courses to decide. Different courses have elected to introduce students to DA very briefly, for example a one day introduction, whilst others have chosen to include DA modules in more depth, enabling students to begin to use DA toward professional practice (O'Neill, 2012). Lidz's (1992) survey of teaching of DA at postgraduate level in the USA showed very limited training opportunities. Deutsch and Reynolds in the UK (2000) and Haney et al. (1999) in the USA, found the DA teaching situation much as in Lidz's (1992) survey. Haywood and Lidz (2005), in a further follow up of DA training, commented that despite proliferation of research and applications of DA there are very few active DA trainers worldwide.

mediation vary within the DA, interpretations of changes resulting from the interventions also vary and these will now be discussed. In chapter 4 of this thesis further elaboration of how the CAP has used, adapted or set aside different elements of DA will be given.

2.5 DA different procedures and models

There are common threads that bind users of the DA paradigm, which can be summarised in three assumptions shared by authors working in different countries and different educational systems (Grigorenko & Sternberg, 1998; Haywood & Lidz, 2007; Lidz & Elliott, 2000).

- Given the different educational experiences of children brought up in dissimilar cultural circumstances, conventional (static) assessment might not adequately capture their level of cognitive development.
- Psychologists and educators should be interested not in where children are *now*, given their previous educational experience, but where they can be *tomorrow*, assuming that they are given adequate educational intervention from now on.
- There is little use in assessing for the sake of assessment; assessment should be carried out as a part of intervention (i.e. being assisted or dynamic in nature) and for the sake of selecting or modifying intervention.

Approaches within the broad field of DA differ in their operationalisation of the three general principles just noted, practical goals, specific ways of interaction with students (both for purposes of assessment and instruction), amount of accumulated data, and popularity.

DA procedures have been developed for use from infancy to old age across a wide range of need (Lidz and Elliott, 2000; Sternberg and Grigorenko, 1998; Haywood and Lidz, 2007). Examples include DA of gifted learners (Lidz and Macrine, 2001); Culturally and linguistically different populations (Peña and Gillam, 2000; Kester, Peña & Gillam, 2001); DA of speech and language, for example, the DASS (Dynamic Assessment of Sentence Structure) (Hasson, Dodd and Botting et al., 2012); The Dynamic Assessment of Pre-schoolers' Proficiency in Learning English – DAPPLE (Hasson, Camilleri, Jones, Smith and Dodd, 2012) and DA of bilingual children's language (Hasson and Camilleri, 2014); Clinical populations such as

children with ADD and Autism, (Lidz and Gindis, in Kozulin et al., 2003; Haywood and Lidz, 2007); Traumatic Brain Injury, (Jepsen, 2000; Haywood, 2007); Psychiatric conditions such as DA with schizophrenic patients, (Wiedl et al., 2004); DA of Specific Learning Disabilities, (Swanson, 2005; Swanson and Howard, 2005; Jeltova, 2011); Moderate and severe learning disabilities, (Hessels et al., 2003, 2008); Sensory Impairments, for example DA of deaf learners, Keane (1987); DA in industrial settings, (Embretson and Reise, 2000; De Beer, 2010); and group screening (Jepsen and Lidz, 2000; Lidz and Greenberg, 1997; Feuerstein et al., 1995, 2003).

In referring to many applications of DA, Haywood and Lidz (2007) and Lidz (2011) comment that because DA can be so customised and individualised, the nature of the difficulties of the client should not matter. Common to all these applications is the perception of at-risk factors or disadvantaging circumstances for different groups and individuals, either in their limited access to normative educational opportunities, or disabling conditions that would render their static test taking performance as confirming a poor history of acquisition of knowledge and skills, but without insight into future possibilities explored under guided learning conditions. Because DA is not usually age normed, but focuses on cognitive processes, following the same principles, the CAP can be used for those in need at any age and in a wide variety of contexts. Some of these procedures have not been extensively used outside their research contexts, but are shown in the following Table 2.2, to illustrate the diversity of applications.

One way of noting differences between DA models is by labelling one type of DA procedure as a ‘sandwich’ DA, in contrast to a ‘multi-layer’ DA (Sternberg and Grigorenko, 2002; Grigorenko, 2009). The sandwich procedure used in some DA models consists of three distinct phases: test (unaided), teach (mediate), post-test (unaided). Alternatively, when a series of hints is made available, the first response of the learner is noted and further hints are given if required. This second type of procedure corresponds to ‘test, teach, test, teach and test’ and is therefore multi-layered. In some of the latter models, mediation is continued until a given criterion is reached; in other such models, there may be pre-structured limits built into the design of the intervention.

Table 2.2: DA: Selected procedures*

Assessment	Authors	Target population	Description
Adaptive Computer Assisted Learning Test Battery (ACIL)	Guthke & Beckmann (1995)	Years 5-9 [Germany] age 10+	Reasoning in figural, numerical and verbal domains. Computer provides error related hints.
Analogical Reasoning Learning Test (ARLT)	Schlatter & Büchel (1997)	Mental Age 3-7 [Switzerland]	Analogical reasoning; series of hints, based on type of error. Transfer tasks one week later
Application of Cognitive Functions Scale (ACFS)	Lidz & Jepsen (1997)	Mental Age 3-5 [USA]	Semi-standardised; yields qualitative and quantitative information
Cognitive Modifiability Battery [English] (and others) Dynamic Assessment of Young children DAYC)	Tzuriel (1995a, 2000)	Age 5-9 [Israel]	Various reasoning tasks; including analogy, seriation; memory
Dynamic Assessment of Infants' and Toddlers' Abilities	Kahn (1995, 1998)	Infant/preschool age 4. [USA]	Cognitive actions; clinical approach to mediation required for a given criterion
Dynamic Assessment of the Level of Internalisation of Problem-Solving Activity	Karpov & Gindis (1988, 2000)	6-7 years [USA]	Analogical reasoning
Dynomath	Gerber (1994)	12+ [SA]	Multidigit multiplication; computer provides series of prompts
Evaluacion del Potencial de Aprendizaje	Fernandez-Ballesteros Calero (1988, 1995)	10-adult [Spain]	Matrices, based on the Raven tests; structured training sessions between unassisted pre- and post-tests

Learning Potential Test for Ethnic Minorities	Hessels (1993)	8 years [Netherlands]	Inductive reasoning and verbal ability
Learning Potential Test of Inductive Reasoning	Resing (1990,1997)	7-8 years [Netherlands]	Inductive reasoning; verbal analogy/visual exclusion
Leipzig Learning Test (Lerntest)	Guthke & Beckmann (1997)	6-8 years [Germany] [France]	Inductive reasoning (classification); standardised set of prompts
Mindladder Computer Assisted Modifiability Enhancement	Jensen (1999)	Primary-college [USA]	Wide range of reasoning tests; computer presentation but controlled by mediator
Learning Potential Assessment Device [English]	Feuerstein et al. (1980, 1995)	MA 8-Adult [Israel]	Wide range of tasks; Individualised mediation
Testing the Limits	Carlson & Wiedl (1997)	Child-adult [USA; Germany]	Uses pre-existing tests in a dynamic format
Dynamic Assessment of Vocabulary (and other DA tests of language and narrative processes)	Peña and Quinn (2000)	Pre-school children [USA]	Semi-standardised Mediation provided between unassisted pre- and post-tests
Swanson-Cognitive Processing Test (S-CPT)	Swanson (1995)	4.5-adult [USA]	Working memory; uses standardised prompts
DA of Speech and Language	The DAPPLE: Hasson and Camilleri (2014); The DASS; Hasson, Dodd and Botting, (2012)	Pre-school and Primary and bilingual children [UK]	Semi-standardised prompts to assess need for intervention

*This is a partial selection of DA applications adapted from Grigorenko and Sternberg (1998, 2002); Lidz and Elliott (2000); Haywood & Lidz (2007).

Most DA tests fit into one of a number of DA groups. Lidz and Elliott (2000) suggest the following groups, but these are not exclusive categories, as there is some overlap between different models. Most of these have a pre-test and post-test, but what differs is what happens in the middle, i.e. the nature of the mediation. (1) A pre-test and post-test + *Standardised Intervention;* (ii) A pre-test and post-test + *Graduated Prompts;* (iii) *Adaptive Testing* using computerised tests with an intervention phase-, but no personal interaction. (iv) *Mediational Approaches*: individualised; intervention is not pre-determined.

2.5.1 Group distinctive characteristics

The distinctive characteristics of these groups are now briefly described, whilst noting that there is some overlap.

2.5.1.1 DA Group (i)

Standardised forms of DA, in which the intervention stage is pre-determined, i.e. the same for all users is demonstrated, for example, in the work of Budoff (1987). His goal was to improve classification of children labelled at that time as 'mentally retarded' (today's UK terminology would be moderate learning disabilities (MLD); or as 'pseudo-retarded' (Budoff's phrase) for describing performance which appears to be learning disabled based on the child's performance in unaided tests, but is shown to be readily changeable as a result of their response to intervention within the tests, hence the term 'pseudo'.

2.5.1.2 DA Group (ii)

The graduated prompts model is most clearly associated with the work of Campione and Brown (1987) who attempted to operationalise Vygotsky's ZPD as a number of steps to reach a specific level of performance. The number of prompts required is used to assess the amount of help the learner requires in a variety of domains, including academic achievement, as well as the ability of the learner to maintain and transfer the level of learning over time. Lidz and Macrine (2000) used this graduated approach in their study of culturally different gifted learners when using the Naglieri Non-Verbal Abilities Test.

2.5.1.3 DA Group (iii)

Adaptive (computerised) testing has been developed by Guthke and Beckmann (2000) to construct the 'Lerntest' and similarly used by Resing (Resing, 2000; Bosma and Resing, 2006). Guthke and Beckmann developed an Adaptive Computerised Intelligence Learning Test battery, the ACIL, using it in one of their studies to assess reasoning ability in students aged 12-16, in three domains: figural, numerical and verbal. These short-term learning tests differ from some expectations of DA, in that a) they use a psychometric approach which emphasises the importance of standardisation to enable comparison and test fairness; b) they are computerised such that there is no presenter/test-taker interaction; c) they do not follow the 'classic' DA sandwich design of pre-test – training – post-test; d) they are short term learning tests, as just one test session is necessary (Beckmann, 2006). In the view of some DA proponents the first two aspects would disqualify these tests as examples of DA, (see Tzuriel's commentary in Sternberg and Grigorenko, 2001, p.242). Other classifications would include these tests, as part of DA, even if at the margins, because there is an intervention, albeit limited, during the test itself. Swanson (2000) acknowledges that especially those whose work belongs to the Mediated Learning group of test developers, might not consider his work 'true' DA.

In practice a number of DA test developers and researchers vary their model according to the goal of the DA investigation. Resing and Hessels, for example, have used both standardised DA and graduated prompting as well as adaptive tests. Using different methods of DA, standardised and adaptive, Hessels designed an Analogical Reasoning Test (HART) for children age 5-15, which can be group or individually administered, and administered as a paper and pencil or as a computerised test, (Hessels, 2003, 2005; Hessels, Berger and Bosson, 2008).

2.5.1.4 DA Group (iv)

Mediated learning models (ML), also categorised as Metacognitive Mediation models (Haywood and Lidz, 2007, p.17), are regarded as the most clinical type of DA, most clearly associated with Feuerstein's LPAD. This approach does not attempt to pre-structure the mediation or pre-determine a specific set of steps. The aforementioned DA methods contrast with the LPAD's mediational approach as the latter aims to create changes within

the learner's cognitive and emotional functioning during the course of the interaction. Using the analogy of a multi-layered cake, the ML approach at its most individualised, would consist of test, teach, test, teach, test and teach, without pre-structured limits. Their distinguishing features from other DA models are:

1. They do not prescribe at the outset the nature and extent of the interventions.
2. The co-construction of the learning experience is developed and expressed by means of the ongoing teacher/learner relationships with the pupil.
3. The goal of the interventions can be more ambitious than specific task improvement, and would seek to modify the pupil's cognitive abilities by generalising across a wide range of applications, not limited to the school context. This is the model best known to DA users in the UK and similarly in other parts of the world, as shown in the Haywood and Lidz survey of DA trainers (2005), whose findings are further discussed below when discussing training issues related to DA.

2.6 Learning potential and cognitive modifiability, what is DA measuring?

This section discusses some of the challenges to theoretical concepts that have been proposed as underlying all forms of DA, but are particularly highlighted in the ML models of DA. The terms *learning potential* and *cognitive modifiability* are often used interchangeably (Kozulin, 2011, p.169) and there appears to be no consistent definition as to whether they are actually the same concept, or whether learning potential and modifiability can be distinguished. In addition, if they are different concepts it is unclear what the implications for assessment and interpretation of changes would be for DA of individuals or groups. The identification or search for learning potential is considered a core purpose of DA, yet the concept itself is problematic (Kozulin, 2011; Passig, 2016). There is general agreement that learning potential is about achieving 'more,' under supported learning conditions, than the individual can achieve alone. However, what this potential consists of is defined in different and often overlapping ways. Kozulin distinguishes between a learner's responses to the acquisition of new knowledge and regards this as more closely associated with the concept of learning potential, in contrast to the use and modification of thinking (problem-solving)

processes, which he regards as closer to the concept of cognitive modifiability. We may distinguish between people who learn rapidly but may not be considered good thinkers; and those who are considered intelligent thinkers but slower learners (Kozulin, 2011, p.170).

Grigorenko and Sternberg (1998, p.92) make a similar point when they observe that some children may do well on cognitive tests but appear to have a slow rate of learning and vice versa. Lidz (2011) asks whether the concept of learning potential might be more useful if replaced with the notion of responsiveness and transfer. Lidz and Peña (2009) compare DA with certain methods of instruction, such as Response to Intervention (RTI) to explore whether this is what is actually meant by cognitive modifiability or whether the two may share common features, but are not the same.

The majority of DA research has blurred the distinction between changes in thinking and learning. Beckmann (2006, p.36) used all these terms as goals of his DA tests. Haywood and Lidz suggest that *learning potential* can be described as the child's response to intervention, whereas *cognitive modifiability* may be the discussion on how much investment and of what kinds are needed to promote cognitive gains in performance. Feuerstein considered the need to aim for *structural* change – possibly neurologically, but certainly *cognitive* structural change in the individual – as a key feature of his model (Feuerstein, 1979, 1997, 2003, p.105) and believed that other DA approaches limit the assessment and modification of intellectual and cognitive processing (Feuerstein et al., 2003, p.107). Thus, whilst discussing the issue of *change* in DA, the purpose and nature of such change should be clarified. What is supposed to change in a DA?

The nature of 'cognitive modifiability', proposed as a trait by Feuerstein in the LPAD, is not easy to define or test. Lidz asks whether modifiability is a trait and to what extent is it, or is it not, generalisable? If the aim of the LPAD, is cognitive modifiability – to change thinking style rather than just changes in test performance – the model would need to establish criteria and demonstrate reliability in measuring such modifiability. It would need to suggest, based on the test results and mediation, how generalisabilty may be improved and in what way modifiability and intelligence interact if they are not the same. This is where the CAP, both in this study and in day to day use would be *less* like Feuerstein's LPAD model,

in that the CAP learning phase (targeted interventions) will be more controlled because variables including cognitive targets, modalities of teaching, levels of complexity and specific applications are agreed, monitored and measured over time. Feuerstein's DA system (LPAD) model has been realised only partially (Kozulin, 2011, p.179) because many of the LPAD tasks do not have sufficient systematic variability in terms of complexity, modality and operations, resulting in greater difficulty in measuring changes and accounting for generalisability.

Another area raised in critiques of DA concepts, in particular in relation to Feuerstein's LPAD, concerns his theoretical view that lack of mediated learning experience (MLE) is the proximal factor that accounts for deficient cognitive functions (DCFs) and that provision of MLE is what is required for re-mediation of DCF's.

Frisby and Braden (1992, p.290) state that this is not a logical argument. They suggest an analogy with curing a headache by taking aspirin; the cure does not mean that the headache was caused by lack of aspirin. A similar point is made (see chapter 4 of this thesis) when noting how Feuerstein's original list of deficient cognitive functions in adolescents appears to have been reversed to produce a list of *emerging* cognitive functions in young children (Feuerstein et al., 2003). Cognitive difficulties observed in adolescents do not logically lead to the construction of an early years developmental model by reversing a deficiency list. This poses significant challenges to selecting and measuring targets to be achieved resulting from a DA process, which is aiming for cognitive modifiability (Feuerstein, 2003). In effect it has to be dealt with in a more modest way, which often equates to limited specific changes in the use of a cognitive function within a defined area of learning. Thus, in the MLE model of DA, there cannot be general a priori predictions of areas of change or of specific targets be worked on. These can only be individually set and agreed for each child from each DA assessment. This is why in the CAP, a functional approach, as used by Haywood and Lidz, is regarded as necessary (see chapter 4). Change can only be interpreted if specific targets are set, defined in terms of interventions and measured with objective criteria. In the CAP manual (Deutsch & Mohammed, 2010) this functional approach is explained with the use of

targets – Specific, Measurable, Achievable, Realistic, and Time limited targets[2], (see CAP Manual, chapter 6). Thus, although the CAP shares Feuerstein's conceptual approach to some extent, it differs in methodology and process in important ways.

Furthermore, the individualised, flexible responsiveness of the assessor to the needs of the learner has – to date – precluded the use of computerised intervention in this form of DA, although it is being trialled in research using Mediated Learning (ML) processes (see for example, Passig, Tzuriel and Eshel-Kadmi, 2016). The ML group is represented by Feuerstein's LPAD (1980, 1995); Tzuriel's Dynamic Assessment of Young Children (DAYC) (Tzuriel and Klein, 1985; Tzuriel, 2000; Tzuriel and Galinka, 2000); Lidz's Pre-School Learning Assessment Device (PLAD, 1991); the Application of Cognitive Functions Scale; (ACFS, 1997; Lidz and Jepsen, 2000) for school readiness and Curriculum Based DA-CBDA, (Lidz in Haywood and Lidz, 2007). This is the model with which the CAP is most closely associated, because both in theory and practice, the interventions arising from the CAP profile, and assessment of change can be repeated without limits on a regular basis.

Many current DA users regard this conceptual lack of clarity as of more theoretical than practical significance and take a pragmatic functional view of DA in its role of defining learning potential as the next steps of learning and the means to achieve them (Haywood and Lidz, 2007; Tzuriel, 2000; Deutsch and Mohammed, 2010). For the CAP, the term *learning potential* is based on the teacher's knowledge of the pupil's performance in many and varied curricular tasks undertaken by the pupil over time. In DA use, there is a need to decide what are the goals of the DA and whether the tools being used deliver these chosen goals. For example, in the DA of language undertaken by Hasson and Camilleri et al. (2012),

[2] SMART is an acronym for Specific, Realistic, Achievable, Measurable and Time-scaled. Developed for business and marketing, SMART targets and are routinely applied to setting and monitoring educational goals. An objective that follows SMART is more likely to succeed because it is clear (specific) so users know exactly what needs to be achieved. Goal achievement is known, because a way to measure completion has been agreed. A SMART objective is more likely to happen because it is an event that is achievable. Before setting a SMART objective, relevant factors such as resources and time are taken into account to ensure that it is realistic. Finally, the timescale element provides a deadline which helps people focus on the tasks required to achieve the objective. The timescale element ensures that task completion or review of progress, is not postponed.

their goal appears closer to the search for learning potential following mediation of specific language tasks, rather than attempting to measure broader cognitive modifiability.

2.7 Other classifications of DA procedures

DA procedures other than those using the individualised LPAD type of approach, have embraced to varying degrees, elements of the rigour of static tests. Some of these have been standardised to such an extent that they are not considered by all DA researchers to incorporate sufficient interaction to represent the DA paradigm (Swanson in Lidz and Elliott, 2000, p.73). A somewhat different classification of DA tests, to that of Lidz and Elliott above, is that of Haywood (2007) who assigns DA tests to one of three groups, but with considerable overlap. These are (i) Restructuring the Test Situation; (ii) Learning Within the Test and (iii) Metacognitive Mediation. He assigns Feuerstein's LPAD as well as Lidz's CBDA and Tzuriel's tests to all three categories; Budoff's work to Learning within the Test; The Graduated Prompts work of Campione and Brown to Restructuring the test situation; Guthke's Lerntest as well as those of Hessels, to Learning within the test; Carlson and Wiedl's Testing the Limits is assigned to Restructuring the test situation and Learning within the test; Haywood's classification places the information processing work of Swanson and that of Das and Naglieri (see chapter 4 of this study), in restructuring the test situation. Although some DA tests such as those of Swanson, Guthke and Hessels have been extensively validated, this has not increased their use in everyday practice.

Tzuriel's younger years DA tests, such as the Cognitive Modifiability Battery (CMB) and the Children's Analogical test of Modifiability (CATM) (Tzuriel, 2001) closely follow the LPAD model when used for individual assessment, but Tzuriel also uses a graduated prompts or standardised mediation approach when using DA for between groups research, such as in comparing cognitive modifiability of inferential reasoning in young socially disadvantaged and advantaged children (Tzuriel, 1989, p.65-80), or comparing development of analogical reasoning using pictorial analogies in teenagers and young adults with or without learning disabilities (Vakil, Tzuriel et al., 2010). This work demonstrates as Lidz's does, that different DA approaches can be used for a variety of purposes. Lidz's Curriculum Based Dynamic Assessment (CBDA) and her early years Application of Cognitive Functions Scale (ACFS) (Lidz, 2003; Haywood and Lidz, 2007), use principles of mediated learning adapted from

Feuerstein's model and apply these within a domain analysis of cognitive processes derived from the work of Luria. In Lidz's CBDA model the order of administration is reversed in that it begins with an analysis of the cognitive components of specific academic tasks that are causing difficulties for the learner. The DA tasks are then designed to explore the particular task components, which have been identified. In most other DA models, including the LPAD, the DA task is first administered (the pre-test), mediation is then given, followed by the post-test. The results of the post–test together with the learner's response to the mediation are interpreted for application to academic and other areas of functioning. The Cognitive Abilities Profile (CAP), in common with Lidz's CBDA, adapts elements from the mediated learning model of Feuerstein's LPAD and places these within a cognitive domain framework derived from Luria's model of mental processes (Luria and Yudovich, 1971; Luria, 1976) which is discussed in detail in chapter 4 of this study.

In summary, a range of DA models has been briefly presented here, and of these, the characteristics of the Mediated Learning DA models were described in more detail, because of the influence of this type of DA on the construction of the CAP.

2.8 Issues and limitations of DA

DA, as any approach, is appropriately used to generate data in response to specific questions. It is not appropriate for all aspects of assessment. The referral issues that would lead to consideration of DA use would be to provide insight and additional information to take the pupil forward in their learning. This was one of the issues raised in the Deutsch and Reynolds survey of DA use in the UK (2000). Training and support in DA, especially the Mediated Learning model, requires more input than for a standardised test. This is not to imply that standardised tests do not require expert understanding and interpretation, but the demands on the DA user are somewhat different:

1. DA test administration itself requires skill and experience in the joint construction of the learning experience, the development of the pupil's ZPD and mediation involved;
2. Beyond administration is the interpretation of DA, which is not pre-determined with given norms.

3. Analysis of cognitive abilities, within and across different learning activities is not standardised nor norm referenced, therefore requires specific training and interpretation.
4. Analysis of mediation techniques; For example, (i) selection of *types* of mediation, verbal, tactile, etc., (ii) *stages* of mediation (before, during or after the activity) and (iii) judging the level or *intensity* of the mediation, are amongst techniques of mediation which are taught to MLE/DA practitioners.
5. Application (generalisation) of findings across different contexts.
6. Sharing with teachers and others, who may themselves have limited understanding of cognitive (metacognitive) education.

These issues will now be discussed in relation to challenges to the wider use of DA which have been identified and which affect EP practice (Lidz and Elliott, 2000; Haywood and Lidz, 2007; Deutsch and Reynolds, 2000; Haney, 1999; Sternberg and Grigorenko, 2002; Haywood and Lidz, 2005; Deutsch and Mohammed, 2008; Lidz, 2014).

2.8.1 Training for DA

Training issues for practitioner use of DA was one of the core concerns of practitioner psychologists who were surveyed by Deutsch and Reynolds (2000) and was one of the reasons that lead to the development of the CAP. What constitutes adequate training in DA continues to be an issue for EP services. It was also a methodological consideration in this research.

Haywood and Lidz (2005, 2007) maintain that only professionals trained in depth to do diagnostic assessment, with specific training and supervision in these approaches should use DA. Haywood and Lidz repeatedly emphasise the need for the use of DA to be by trained professionals, psychologists, speech and language pathologists and educational diagnosticians.

Aside from the issue of basic training, the key is supervised practice (Haywood and Lidz, 2007, p.333). In this regard DA is much more akin to the training of clinical psychologists and psychotherapists. Many professionals involved in teaching and practicing DA have concerns

as to what constitutes a sufficiently expert background. Writing about the use of Lidz's Application of Cognitive Functions Scale (ACFS), Lidz reiterated the need for DA to be in the hands of professionals who are highly trained in assessment and diagnosis. The risk of following the instructions very literally and not being able to embed the procedure into a broader context of assessment and interpretation was identified. The ACFS and DA in general, needs more time to train, more skill in administration and more skill in analysis (Lidz, 2012).

Although these findings refer to use of DA itself, a challenge in use of the CAP, is whether it is possible to offer adequate training and practice of *some* DA principles and methods, without the direct use of DA tests. In designing the CAP, the subject of this research, there was awareness and concern about the need for adequate training and supervision. Thus, there would be a need to provide some initial training for the research participants who would be using the CAP, of at least one day, although informal studies of an earlier version of the CAP indicated that one day would *not* be sufficient for confident practice – see Deutsch and Mohammed (2008) and chapter 4 of this thesis. More details of the training and how it was organised in the research timetable, is provided in chapter 6: Method. In this study it was recognised that there would be tension between the wish to offer sufficient training in the use of the CAP, which could lead to good practice, as against the constraints of a research context. This issue will be revisited in the Discussion chapter of this thesis when addressing the question of what could or could not be expected from EPs who had minimal initial training for purposes of this research and teachers who had no background or training at all, in cognitive education in the classroom.

As noted above when discussing the specific challenges facing DA practitioners, the link between assessment and intervention is built into the theory and practice of DA models especially those which offer a high level of individual mediation. In some DA models the goal of the DA as informing individualised recommendations for future work is particularly highlighted (Kahn, 2000; Karpov and Gindis, 2000; Feuerstein, 1995; Jensen, 2000; Guthke and Beckmann, 2000; Tzuriel, 2001). Thus, the approach taken in DA is that assessment of the ability to learn should incorporate actual learning within the procedures (Estes, 1982a). Tests of learning ability that are to be applied to some practical purpose should be

constructed so as to allow full play of the processes that might be involved in the criterion situation (Estes, 1982a, p.191). Finn and Tonsager (1997) make the same point when stating that any responsible conversation about assessment must attend to the quality of intervention and that all schools of DA agree that assessment and intervention are intertwined. Haywood and Lidz (2007) consider that DA is most useful in generating detailed descriptions of learners engaged in learning.

This central emphasis in DA implies that there would be benefit if users were those who have a direct and ongoing [teaching] role with the child and can assess the child's learning strengths and abilities, from their regular interactions with the child. This differs from the traditional role of an outside expert (the EP) assessing a pupil in a one-off session and moves the process into one that involves collaborative assessment by those who work with the child. In this way, the intended CAP process differs not only from traditional testing used in standardised assessment, but also from many DA models in which there is direct work with the pupil. The CAP structure is that of a consultation framework, in which direct work with a pupil may or may not be undertaken by the EP (Wagner, 2000; Gutkin and Curtis, 2009). Different forms of EP consultation in current use are discussed in chapter 3.

Although it is possible to obtain quantitative information from a DA, particularly in the processes that use more structured mediation, assessors need to learn to make detailed observations to describe and analyse how learners go about problem solving and how the child responds to the mediation provided. Herein lies one reason for the general awareness that DA tests are complicated and need adequate training and supervision.

2.8.2 Validity and reliability of DA

Among the challenges to DA are issues of validity and reliability, acceptable levels of which are developed for most standardised tests. The next section outlines critiques of DA, particularly DA models in which intervention (mediation) is not pre-structured and which are regarded as having few psychometric properties in comparison with standardised tests. The more that some DA models incorporate standardised features, such as pre-determined mediation sandwiched between a static pre- and post-test, the closer these models approximate to the psychometric properties of static tests. Therefore, in this study, issues

regarding some aspects of validity and reliability are investigated. A bigger question, which is raised in DA literature, is whether challenges to validity and reliability are even relevant concerns in terms of the theoretical concepts that underpin DA (Poehner, 2008; Lantolf and Poehner, 2010; Haywood and Lidz, 2007; Tzuriel, 1992; Sternberg and Grigorenko, 2002). This issue, which some researchers regard as critical and others as not relevant for DA procedures, is now discussed.

Haywood and Lidz (2007) take the position that further information is needed about reliability and validity of inferences made from DA. Lidz recommends assessors to 'stick close' to their descriptive data and seek to confirm their hypotheses through a variety of assessment sources, follow up and feedback. The model described in Haywood and Lidz (2007) relies largely on individualised mediation although there are examples of more standardised/scripted approaches. This presents challenges to traditional notions of reliability and validity and challenges to training. Haywood does not advocate standardising DA tests; rather, he has insisted that they have acceptable *reliability* when given in the static mode. Haywood and Lidz (2007, p.329), Haywood (1997, pp.103-129). Haywood and Tzuriel (2002, pp.40-63) argue that good test reliability is essential if we are to attribute any change in performance from pre-mediation to post-mediation to the mediation itself; otherwise, score changes could just reflect the test's unreliability/random variation. Specifically, as will be discussed below, the issue of inter-rater reliability is relevant to DA, whereas some other aspects, which are part of achieving acceptable metric levels for standardised tests, such as test/retest reliability, are regarded as incompatible with the basic concept of DA as a change model.

2.8.3 Validity issues (i): Generalisability – 'real world' validity

The issue of generalisability from DA is complex. In standardised assessment, test results relate to either some general ability which is considered stable or to specific curricular areas, predicting academic achievement based on current performance in academic tasks. DA is related to strategies of learning and metacognitive abilities and capacity for change of the pupil, which would then need to be generalised by the pupil to novel applications.

DA aims to link assessment and intervention because the DA process in itself constitutes a number of acts of learning. The position taken by Feuerstein et al. (2003) of the irrelevance of psychometric features of validity and reliability for the LPAD, seems to refer to predictive validity of changes from the LPAD and although the LPAD manual outlines certain indicators of change, these are described qualitatively and remain difficult to generalise (LPAD manual, 2015). Although much clinical work with upward and downward age extensions of the LPAD and application to varying conditions and cultural contexts has taken place, there appears to be a paucity of published research from such accumulated case studies that might address some of these questions.

Generalisability is about 'real world' application (Lidz, 1991). If one can be confident that the assessment adequately captures the abilities in question, then it is possible to realise how the individual possessing these abilities will perform under other circumstances. So, assessors try to design assessment tasks that closely parallel the non-assessment contexts. Messick (1995) refers to this as task generalisability. Poehner (2008) argues that DA forms a valid basis for generalisation in that the DA is itself a source of development. Transcendence or *bridging* is built into the LPAD model. Applying cognitive mediation in a variety of activities; increasing complexity; observing how the pupil responds; adjusting the mediation and the task and applying the mediation from one task to the next, is the way in which the process can be a valid representation of generalisable skills and strategies. However, generalisation of cognitive abilities (or the lack thereof) to academic and curricula applications is also an area of challenge that to date has not been systematically addressed with the exception of Lidz's CBDA, in the mediated learning DA models. Feuerstein et al. (2003, p.105) state that "the tasks of the instruments composing the LPAD are designed to assess generalised prerequisite mental operations and modalities of functioning; they are only secondarily or inferentially related to specific academic or other content". The difficulty of generalisation of the more clinical DA findings in to academic or other contexts was identified by EPs in the Deutsch and Reynolds survey (2000) and has been the repeated experience of this researcher over many years of training and supervising psychologists and teachers using the mediated learning DA models.

The need for training and ongoing support in applying all these aspects of DA and being able to practice at a high level of competence within this complex system is not easy to achieve. In DA models where a variety of cognitive processes are assessed (for example in Tzuriel's Cognitive Modifiability Battery (CMB), and assessment is carried out flexibly and in different modalities (e.g. verbal, spatial, etc.), test analysis requires a level of experience that goes well beyond test administration.

Applying mediational strategies and insights gained from specific tests used in DA into curricular applications, is challenging for many EPs who are accustomed to static testing/observations that focus on curricular achievements but without analysis of the contributory cognitive processes of different tasks (Deutsch and Reynolds, 2000). Haywood and Lidz consider this challenge in relation to three common ways of conducting DAs, noting how their DA model is heavily reliant on the mediational skill of the examiners. There are a variety of ways of conducting DA that can promote generalisation of use. Amongst these are Lidz's CBDA that begins with curriculum analysis; Videoing DA sessions and sharing them with other professionals and parents; having a key person attend the DA, such as a teacher or LSA and arranging for practical feedback after the DA. Hasson (2011) found that following skilled identification of the mediation required for children's development of language and sentence structure, it was challenging for speech and language therapists ,despite their own professional expertise, to know *how* to carry out the recommended mediation. This issue links again to the challenges of training in DA work not only for assessors, but also for others directly involved with children such as teachers, therapists and learning support assistants, as well as parents, who are often expected to deliver mediation on an ongoing basis. The need for teachers to have an understanding of cognitive processes and appropriate skills in mediation is raised in chapter 4 when describing the CAP design and content. These issues will also be further analysed in the final discussion chapter of this study, when reflecting on the extent to which it is feasible for teachers and EPs to make judgments about a pupil's cognitive strengths and difficulties via consultation and for EPs to do so with them, with little prior training.

2.8.4 Validity issues

(ii) Predictive validity

Prediction in DA is of a different form and purpose than that of static tests. A static test is usually based on a 'question, record and score' format wherein the examiner presents the question, records the examinee's response and awards a prescribed number of points, based on the examinee's given response. There are many different types of tests, e.g. performance, attitudes, traits, beliefs, feelings and emotions. The term 'static' refers only to the nature of the administration of the test; no help may be given within the test; it is not about the subject or content of the test. Dynamic assessment directly contrasts with static assessment procedures, in its central principle of feedback/intervention during the process of the assessment itself. Prediction from static tests rests on classification based on a one-off performance. It is used for determining actual levels of mastery and assigning eligibility, for example, for special education resources. DA aims for change; it is not performance-based assessment and has not been developed to serve those purposes. It goes beyond testing the limits and could be described as 'trial teaching' (Haywood and Lidz, 2007, p.325). Predictions of change and progress in cognitive and metacognitive skills based on a DA assume that the conditions made possible at the DA can be replicated in other contexts. Haywood and Lidz point out that there is a huge problem in ensuring that the specified conditions for improved performance can actually be made available. Improved performance might be predicted from DA if, for example, mediated classroom-based cognitive education is provided. "There is an almost irresistible tendency to expect improved performance without providing the specified conditions that would make it possible to achieve" (Haywood and Lidz, 2007, p.329). However, it is possible that the pupil's response to mediation may be predictive of ability to respond to other similar learning opportunities. This issue is relevant to the CAP and is further discussed in chapter 4. Whilst the present study does not seek to examine predictions of change in pupils based on unspecified teacher interventions, it does ask whether the very identification of learning needs by teachers during the CAP analysis at the baseline stage of rating a pupil's cognitive abilities could raise teacher awareness of CA's that are involved in the processes of learning and teaching to the extent that it may begin to affect their practice and bring about some added benefit for the pupil.

It is important that DA should not be regarded as necessarily serving as an alternative to static assessment. Each has its own purpose and anticipated outcomes. Assessment has to respond to the referral issues and the decisions to be made (Haywood and Lidz, 2007, p.326). Lidz (2011) as noted earlier, points out that information is needed both about the pupil's ZOA as well as their ZPD.

2.8.5 Reliability issues: (i) internal consistency / reliability

Measurement of the internal consistency of abilities is also not always seen as compatible with DA. Thus, some DA practitioners regard DA as not compatible with the idea of measurement of stable properties in standardised testing (Lidz, 1991) and thus DA undermines the validity of interpretations based on performance.

Feuerstein (1988, p.199) agreed that the LPAD has no internal consistency, nor test-retest reliability. The LPAD is a collection of test items, representing a range of cognitive processes and modalities and although it is referred to as a battery, this is not because the tests were chosen to represent some specific construct, nor have they been brought together for the purpose of internal consistency. This is demonstrated also by the fact that LPAD does not invite cluster scoring. Subtests are loosely assigned to different modalities, such as visual-spatial; visual-motor and perceptual organisation; memory with a learning component and instruments involving higher cognitive processes and operations (Falik, Yosef and Feuerstein, 2015). LPAD tests aim to investigate similar and overlapping cognitive skills, which are mediated within different types of activities. Feuerstein was much more interested in a clinical method and single case studies and for him statistical standardisation was not of great importance or even a necessity (Feuerstein et al., 2003). In an updated paper on the LPAD (Feuerstein & Falik, 2010), the issue of validity is acknowledged. Feuerstein asserts that during the test sessions, changes occur in response to mediational interventions.

However, the question to be considered is to what extent and under what conditions will modification achieved within the test situation predict later performance in academic and real-life settings? Tzuriel makes the point that indeed static intelligence tests have been consistently shown to predict up to 50% of future academic achievements. However, two

questions remain: One is when IQ predicts low achievement, what is necessary to defeat that prediction; and second, how can one explain the other 50% of the achievement variance (Tzuriel, 1992).

2.8.6 Reliability issues: (ii) Inter-rater reliability

A critical challenge to DA

It has been noted that some metric aspects of static/standardised tests cannot be applied in the same way to many DA models. However, there is one aspect of reliability that is more relevant to DA (and thus to the CAP) than some of the previously discussed reliability criteria, which is the issue of inter-rater reliability. Whereas test-retest reliability is not a useful concept when the method of testing includes interposed teaching, inter-judge/inter-rater reliability (IRR) of inferences derived from DA is critical (Haywood and Tzuriel, 1992). Vaught and Haywood (1990) found low levels of IRR on two tests of the LPAD. Samuels, Tzuriel and Malloy-Miller (1989) found much higher levels of agreement on deficient cognitive functions (DCFs), amount and type of mediation and certain non-intellective factors. Mediation was given only in order to correct performance. Analysis was carried out by video and written records. IRR was 87.6% for rating of DCF's and 91.6% for rating amount and type of mediation. Vaught's much lower IRR was based on observation of videos, but no direct tester activities were reported.

In a further study, (Tzuriel and Samuels, 2000), the reliability of three major domains of individual dynamic assessment (DA) was investigated: (a) deficient cognitive functions (DCF), (b) types of mediation given during DA, and (c) non-intellective factors. A sample of 35 young adolescents was administered eight tests from the Learning Potential Assessment Device (LPAD). The sample was composed of children diagnosed with learning disabilities and 'educable mental handicaps', (UK equivalent – Moderate Learning Difficulties), and normally achieving children. The DA procedure for each case was videotaped for 8 to 15 hours and later rated for the three main areas of analysis.

Results in general showed moderate reliability scores for DCF and mediational strategies and lower reliability scores for the non-intellective factors (NIF). Separate analyses were

carried out for ratings which included a 0 category (examiners could not observe a behaviour) and ratings without a 0 category. The results showed a general tendency for higher agreement among raters when the 0 category was removed. For type of mediation, ratings were similar with or without the 0 rating only in the training phase, when agreement was higher in approximately 10% of categories when 0 ratings were included than when not. These results were explained by referring to the interaction of type of task and phase of testing (situation) interaction. The Tzuriel and Samuels study raises some questions. Were the 0 ratings consistent between the DA users, which could indicate good levels of agreement that a specific DCF was not evident, or did different users use the 0 score quite differently? The CAP does not use 0 ratings, in order not to distort domain averages, but uses a rating of N (not observed or not applicable), as described in chapter 4.

In this researcher's clinical experience, lack of agreement on use of 0 (or in the CAP an N rating), may also indicate training and experience issues. That is, the DA user or observer may not actually know what the DCF means and what it looks like in practice. But it could also indicate that the cognitive functions as named in the LPAD are not always clear. This will be further discussed in chapter 4. Thus, examining inter-rater reliability of the CAP is one of the research questions of this study. In the current study, based on the most widely used forms of DA, the mediated learning models (Feuerstein, 2002; Tzuriel, 2001; Haywood and Lidz, 2007), it was felt that frequently raised concerns regarding reliability of the LPAD, specifically inter-rater reliability (Tzuriel and Samuels, 2000; Büchel and Scharnhorst, 1993) needed to be addressed (Deutsch and Mohammed, 2008, 2010).

It was hypothesised that if lack of adequate scores of agreement between highly experienced LPAD users in assessing cognitive functions was evident in situations of direct interaction with a child, then this would be even more of a concern when the model is used in consultation and observation without direct work with a child. This was confirmed in informal pilot studies conducted by Deutsch and Mohammed (2008), using an earlier version of the CAP (see chapter 5 on the development of the CAP) and although most of the EPs were not expert DA users, low-medium IRR led to substantial changes in the design of the CAP.

Research on the CAP as a consultation tool has an added complication, as replication by video analysis of a testing interaction or comparing ratings carried out by another teacher unfamiliar with the pupil is not representative of the CAP's intended use. Using adapting paradigms, this research will look at two Inter-rater reliability (IRR) studies.

Finally, authors and advocates of DA, regularly point out that DA tests are hardly used in practice by school or educational psychologists (Karpov & Tzuriel, 2009; Lidz and Elliott, 2000; Sternberg, 2000; Tzuriel, 2006; Hessels, 2006; Sternberg and Grigorenko, 2002). Availability of the more standardized DA tests is "close to zero" (Hessels and Hessels-Schlatter, 2013 p.118). This issue has been raised over a long period, for example by Wiedl (1984), who questioned whether Learning Tests are only an object of research [i.e. not useful in regular practice]. Some more clinical DA models may be more easily available, but without specific training cannot be used in an effective way. Hessels & Hessels-Schlatter (2013) argue that given the evidence of the ecological validity of DA tests and the limited reliability and validity of IQ tests with certain populations, these techniques should be included in the initial curriculum of educational psychologists and special class teachers in order to widen the use of DA in the classroom.

2.8.7 Reliability issues: (iii) Test-retest reliability

Büchel and Scharnhorst (1993) state that the LPAD lacks test-retest reliability because one cannot distinguish the mediator's contribution from the performance of the learner. Similarly, Lantolf and Poehner (2010) writing on the development of DA of second language acquisition (L2), state that the mediation/collaboration with the learner confounds the tests, methods and effects, i.e. the resulting performance is an artefact of the assessment procedure rather than a representation of the learner's true abilities. However, they also point out that from a Vygotskyan perspective the dynamics of development can only be understood during the course of transformation. Newman et al. (1989, p.68) focus on school settings as an example of a context in which cognitive change takes place through "the productive intrusion of other people and cultural tools in the developmental process". DA is the tool for studying development, which should not be the individual acting alone but the interpersonal functional system formed by people and cultural tools jointly, to bring about development (Poehner, 2008). Vygotsky argued (1978, p.45) that to understand

development as separate from the environment misunderstands the nature of development itself. There is general agreement that if test-reliability is aiming for the learner to show very similar results when given the same test soon after the first one, then DA not only does not fulfil this criterion, but aims for the opposite outcome, i.e. to demonstrate change from time one to time two on a test, even if tests are repeated in quick succession.

Haywood and Lidz confirm that in the most clinical DA approaches (e.g. the ML models) DA does not meet the usual psychometric standards for psychological tests. It is not clear that they should. They do not regard DA procedures as "tests" in the traditional sense. Areas of subjectivity include the amount and kind of mediation and identification of deficient cognitive and metacognitive functions. With so much subjectivity, Haywood and Lidz hold the view that it would be a mistake to try to quantify examinees' performances. Indeed, they state that they "embrace" the Mediated Learning model because of the flexibility that allows for true responsiveness to the individuals and the potential for generating clinical insights and information that promotes a real relationship between assessment and usual intervention (Haywood and Lidz, 2007, p.328). It can be concluded that, especially for the most individualised (mediated learning) forms of DA, which are used in everyday psychology practice, the search for traditional test- retest reliability is not compatible with this form of DA.

2.9 Summary of challenges to DA

The issues outlined in the previous sections point to consistently identified sources of challenge in using DA which also emerged in the Deutsch and Reynolds study (2000) and similar work carried out in the US by Haney (1999) and Lidz (2014). It is not research into DA that is the challenge; this aspect is growing and has produced valuable insights into the use of DA in many applications. This perhaps only serves to highlight the gap between experimental research in DA and practitioner use of DA, and as Lidz and Elliott commented (2000), there does not seem to have been substantial progress toward addressing this divide.

The CAP is an attempt to operationalise some of the goals of dynamic assessment and improvement of learning, whilst seeking to address some of the concerns about reliability of DA findings and the practical difficulties identified which include:

2.9.1 Training issues

- Mediated learning DA models (best known to UK practitioner psychologists) require more training, more supervision than is commonly allotted in EP training programmes.
- Difficulty in accessing basic DA training and tests, was noted by EPs in the Deutsch and Reynolds study.
- Interpretation of non- standardised tests has been challenging to less experienced DA users and points to the need for supervision and mentoring to be built into EP practice if DA is to gain a wider footing.
- DA practitioners may find themselves in Educational Psychology services where their seniors have had little DA experience and therefore cannot offer the expected mentoring by those in senior EP roles (O' Neill, 2012).

The CAP attempts to address these concerns by having relatively low training demands compared with some DA approaches. And because consultation is a widely used approach, this study aims to use of some DA principles within a consultation model to provide increased structure and reliability to existing processes.

2.9.2 Time issues

EPs in the Deutsch and Reynolds survey cited time allocation issues. Standardised tests have usually been carried out in a one- off session. This is not well suited to effective use of DA. Restricted hours allotted to EPs per school make it difficult to implement DA as recommended, which would imply in many situations, more than one session with a pupil. Haywood and Lidz regard the additional time needed for DA as valuable in order to gain important insights into the pupil's functioning and directions for future change. But this would have to be acknowledged at service level and built into practice. This study applies

the CAP process in a time -limited manner, which aims to be more realistic for EPs and teachers as compared to many hours of DA.

2.9.3 Shared understanding issues

Sharing understanding between an EP and classroom teacher or LSA of cognitive abilities and cognitive intervention strategies is a further challenge to DA users as training in cognitive development (thinking skills; learning how to learn) is not generally provided to teachers in initial or post graduate training. Because DA is fundamentally about learning and teaching, the role of the teacher is critical in carrying out DA recommendations. Taking a systemic approach to school development, supporting teachers to teach for strengthening cognitive processes alongside subject curricula, is recommended as a whole school goal (Burden, 2010). This study uses the interaction between an EP and a teacher (and/or LSA, parent, etc.) for the evaluation and rating of the pupil's cognitive profile and as the basis for planning intervention to meet their needs. The collaborative meeting between EP and teacher, which is central in this study, aims to bridge the gap between assessor and classroom teacher.

2.10 Summary

In summary, this first section of the literature review has focused on principles, applications and limitations of DA and provides the rationale for the structure of this study. In the Deutsch and Reynolds survey and in much of the research literature, many positive aspects of DA are noted as benefits for pupils and teachers. For this reason, Haywood and Lidz, (2007, p.326) conclude that the challenges facing DA practice are ones that should continue to be addressed because the effects of an appropriately applied and conducted DA can be valuable to all those involved. The CAP aims to deliver some of these potential benefits.

Chapter 3: Literature review (ii).

Consultation in Educational Psychology Practice

3.1 Introduction

This chapter focuses on the second key theme of the literature review, the use of consultation in EP practice, because of its central role in the CAP system. Using consultation in such a structured and specific way is one of the novel aspects of the CAP. It is thought to be one of the first, if not the first attempt, to use a consultation framework for the adaptation of DA concepts. This section begins with definitions of consultation, then applications in EP practice and then raises issues in implementation of consultation in theory and practice. This section links to the operational analysis of the use of CAP consultation in the CAP, which is set out in chapter 4 of this study. The body of literature on consultation in EP practice, which is growing, suggests that whilst consultation is acknowledged as important and many EP services state that this is their model of service, in practice there is much confusion as to goals, shared meanings with clients, methods of implementation and evaluation research. Within this context the CAP's use of a consultation framework will be evaluated in this study.

3.2 Conceptual bases of consultation and definitions

Henning-Stout (1999) described consultation as a service delivery technique that all school psychologists are expected to possess and use to good effect (p.73) and school psychologists themselves consistently identify consultation as a preferred activity (Reschly and Wilson, 1995). Caplan proposed that a consultant's style could move along a continuum that indicates the degree to which the consultant helped the consultees define their own solutions to problems versus the degree to which they provided expert assessments and recommendations (Caplan and Caplan, 1993). Caplan's model was developed within mental health services, where the use of consultation originated, later being applied to educational settings. The model allows for a flexible approach to consultation moving back and forth along the continuum of discovering and strengthening teacher skills for example, to providing more direct input. Through its origins in therapeutic work, there is emphasis in

the literature on verbal consultation as the primary means of communication (Gutkin & Curtis, 1981; Watkins, 2000; Wagner, 2000; Labram, 1992).

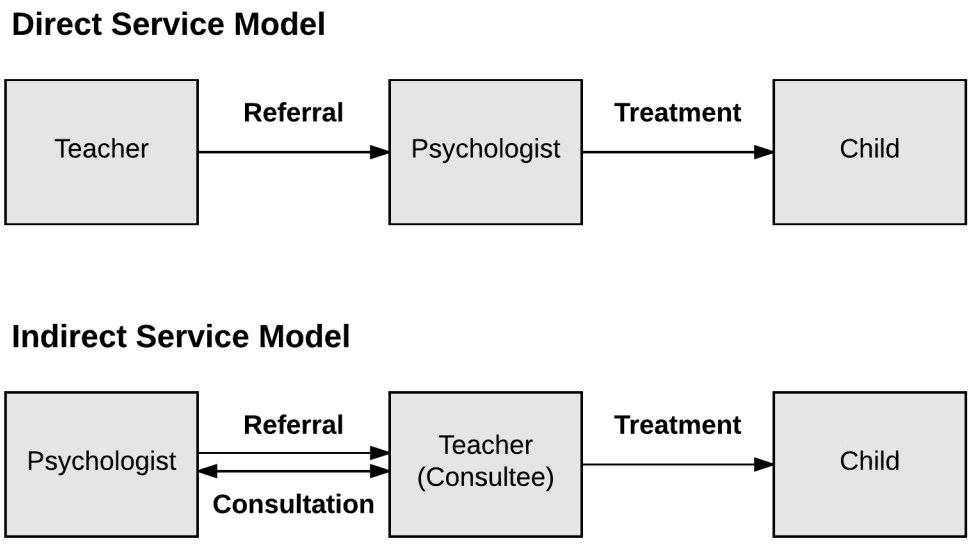
There are many forms of consultation with different theoretical underpinnings. Consultation in EP practice today was influenced by psychodynamic theory (Wagner, 1995) and also by behaviourist consultation in the USA (Fuchs et al., 1992). In the 1980's, concepts drawn from Systemic Family Therapy, such as the work of Minuchin (2011) and Haley (1966, 1987) and the brief therapy model developed by the Milan group (Boscolo, 1987) also influenced EP use of consultation. Other theoretical systems such as Personal Construct theory (Kelly, 1955), Symbolic Interactionism, based on the work of George Herbert Mead in the 1920's and Social Constructionism, are also present in some models of consultation (Wagner, 1995). These often-overlapping approaches, whilst not originating from educational research, are relevant to the context around the individual and regard the interaction of environment, family, school and community factors as essential to the understanding of presenting difficulties and affect the range of possibilities for supporting change.

3.3 Use of consultation by EPs

In surveying the theoretical influences in adapting consultation to school settings, it appears that traditional educational psychology practice issues such as the assessment of intelligence, school achievement and children with special educational needs, were not major influences in the development of EP consultation. Wagner (1995), Cording (2011) and Henderson (2013) all refer to social constructionism as a strong theoretical influence on consultancy practices in the UK. However, the literature does not appear to indicate that this shift was linked, for example, to Vygotsky's work on the social construction of cognition and learning. Nor are some of the reasons for which DA was developed cited as background factors influencing the development of EP consultation, such as children whose background and learning experiences place them at a disadvantage when being assessed with traditional standardised tests. However, some of these possible associations may be inferred by pointing to the dissatisfaction expressed by EPs with traditional psychological assessment, which was as a major impetus to the development of consultation as an alternative method of working (Wagner, 1995, 2000).

In the US, Conoley and Conoley (1990) were amongst those who actively promoted consultation in school systems, describing consultation as a problem-solving relationship, not about giving advice (p.85) and highlighting that consultation is an indirect model of service delivery (see Figure 2).

Figure 2: The direct and indirect model of service delivery
(adapted from Conoley and Conoley, 1990, p.85)



Gutkin and Conoley (1990) suggest that the *process* used when working in schools is at least as important as the *content* of the knowledge. In a later article Gutkin (1999b) reflects that without behaviour changes by those adults who surround the lives of children, psychology services will not be making a difference (p.105). Gutkin (1999b) acknowledges that in order to devise an understanding of consultation "we will have to examine (a) the behaviours of consultants and consultees, as well as (b) the intentions between them" (p.236). In summarising US studies, Gutkin and Reynolds (2008) further reflect on the consultant-consultee relationship, noting that it is viewed as pivotal to effective consultation, adding that without the cooperation of the consultee, the consultant is powerless to provide assistance to the client.

3.4 Consultation in Educational Psychology – the UK

Miller (1996) noted that consultation in Britain began to grow in the early 1980s, in response to frustration with the clinical nature of the then dominant casework model, particularly in relation to referrals and waiting lists. A framework was needed that would help to prioritise work if EPs were able to negotiate their work directly with individual schools, which Miller noted, was loosely based on the model of process consultation. Figg and Stoker (1989) drew to some extent upon Caplan's model of mental health consultation as a means by which referrals to an EP service could be managed. Farouk (1999) stated that although a move towards using consultation had begun with services understanding the qualities needed for effective consultation (drawing on models from mental health consultation, behavioural consultation, problem solving consultation and process consultation), there was no evidence of a coherent approach (p.253), which, he argued, needed to be developed across the profession.

In the UK, consultation is now regarded as the framework through which most educational and child psychology practitioners select and adapt information from the psychology knowledge base. They then apply this to problems faced by young people, significant adults in their life and those agencies providing support (Kennedy et al., 2009, p.607). Many, if not most, educational psychology services subscribe to the use of consultation, for at least part of their service delivery to schools (Bozic, 2004). Leadbetter (2006, p.19) describes consultation within the work of EPs as one of the fastest growing areas of practice in the UK.

One recurring theme is that the process of consultation involves working with the important people in the life of the child rather than by direct work with the child. This was designed to bring about a major shift from traditional EP practice, which focussed on direct work (mostly psychological testing) of a pupil, because of dissatisfaction with the limitations of static psychometric testing especially in bridging the gap between testing and interventions (Wagner, 1995). At a theoretical level, the traditional EP testing-oriented model was also challenged because of its view that the locus of difficulty was within the child. This shift was influenced by conceptual shifts in mental health counselling and family therapy approaches as they were broadened from the previous dominance of psychoanalytical models to family and systemic models of understanding and addressing emotion and behaviour, such as the

Milan group who developed brief family therapy models, as described by Becvar and Becvar (1998). The need to involve those around the child was considered a more valid way of understanding issues as interactions between individuals in a system, not just testing and focusing on the child, but working with the teachers and the whole school environment and seeking solutions by joint discussion with those actively involved within the system.

Whereas a number of theories influence the consultation approach implicitly or explicitly, the underlying theme of most of the UK literature is that of a broadly social constructivist approach (Hymer, Michel and Todd, 2000, p.49). In relation to social constructivist theory, the use of dialogue to reach higher levels of understanding and the questions used in consultation are consistent with the goal of opening up detailed discussion of the situation for which the consultation is taking place. Although a social constructivist approach is seen as guiding theory behind consultation, it does not appear to focus on aspects of social constructivism related specifically to educational issues, such as investigating learning in the ZPD to better understand functioning of the pupil.

The association of consultation with solution focussed approaches such as those described by Amjal and Rees (2001) relating to work in schools, is also seen as contributing to the question style used to gain mutual understanding of complex situations and the shared search for solutions. Wagner, whose school consultation model has been widely influential in UK EP practice, defined consultation in EP practice as ”a voluntary collaborative, non-supervisory approach established to aid the functioning of a system and its inter related systems” (Wagner, 2000, p.11). The move away from traditional within-child testing models which were dominant in EP practice, was promoted by emphasising the importance of systemic approaches, working with teachers’ perceptions and personal constructs, school systems and relationships, rather than work with children themselves. Wagner (1995) refers to the need to develop policies and practice from principles and that practice is derived from psychological models.

However, Leadbetter (2002) notes that the Wagner model does not place a great emphasis on outcomes, either for teachers or pupils (p.161). Although it does refer to effecting change through conversations that make a difference (Wagner, 2000, p.14), this difference

would appear to be referring to the change in perceptions of the teacher consultees. Indeed, Wagner (2008) discusses evaluation of consultation in terms of how effective teachers perceive the process. She does note that questions should address outcomes for children, families, staff and the school as a whole (p.155) but no further details are given regarding the information on which such evaluation would be based.

In studies of consultation, sharing information, listening to a variety of stakeholders especially parents and teachers, collaboration, the importance of considering diverse contextual variables, including multi-agency working, are all acknowledged as guiding principles (Henderson, 2013). However, little evidence was found that these concepts have been taken to the next level of practice, i.e. to form methods or techniques of consultation that directly reflect the theory behind the model. In this respect, it is not clear that the theoretical models described as underpinning consultation have been followed through, beyond establishing some general principles. This raises a question as to whether guiding principles without clarity of methodology are a sufficient base for effective practice and whether these can be evaluated. This may partly explain the confusion and lack of clarity even around the term, consultation, how it is used and how inclusive or exclusive it is as a practice (Leadbetter, 2006).

Some interesting similarities regarding DA theory into practice can be seen. For example, educational psychologists in training (EPITS) in the UK report anecdotally that in some training courses (e.g. Whitney, 2013), DA is introduced as a few general principles of interaction, i.e. an 'approach' but with little or no emphasis on methodological structure. In the absence of adopting a systematic approach, the processes are difficult to evaluate or generalise, leaving the DA work subject to individualised and clinical casework, one of the very issues for which some DA models are criticised. In the discussion chapter 8 of this thesis, this will be discussed in relation to methodological clarity in the use of the CAP.

Nationally, a large number of Local Authority EP services have adopted consultation as their proactive approach to service delivery and have published different approaches to the process of consultation (Hymer et al., 2002; Leadbetter, 2006; Turner et al., 1996; Wagner, 2000; Wright et al., 1995). Training in consultation skills is included in the UK core

curriculum for trainee educational psychologists. Although this theoretical shift and change of style of working implied that there would be little or no direct work with children and that this would be replaced by the consultation process, this is not a position that was adopted as a working practice in many EP services and consultation has been interpreted quite widely (Cording, 2011; Kennedy, 2009; Larney, 2003; Henderson, 2013; Farrell and Woods, 2015).

Although the development of consultation in EP work was not related to a search for complementary or alternative *testing* methods, a link with DA has been made by some services. Thus, applying a dynamic assessment framework to consultation emphasises the *process* of learning rather than the *product* (Hymer, Michel and Todd, 2000, p.50), but this link currently exists in general terms, such as using questioning as a form of mediation between teachers and EP in a collaborative consultation to elicit understanding, but not in more specific application of aspects of DA methodology.

3.5 Consultation in Practice – what do EP services do?

Leadbetter (2006, p.22) suggests that consultation is used in three ways in the UK: 1) As a model of service delivery; 2) As a defined task with agreed characteristics; 3) As a specific activity or skill. EP services would appear to have aspects and scope for all three, with major emphasis being on flexibility and seeing the teacher as the primary client. An example might be: 1) A local primary school is concerned about widespread bullying and arranges consultation with the school's assigned EP. 2) A consultation is held with the Deputy Head, SENCO and heads of infants and juniors. The issues are defined and action is agreed. 3) The Deputy Head and SENCO review the school's anti- bullying policy and decide to introduce small group work in certain classes and year groups, which is modelled by the EP, using time allotted to the school. Using these three aspects for conceptualising consultation, Leadbetter provides examples of each, as a structured approach to understanding and developing practice. She foresaw that the work of EPs is likely to involve multi agency work, which has been enshrined in the revised SEND Code of Practice (2015) and in the HCPC guidelines, for EPs, which will be discussed in chapter 4 of this thesis, as these principles relate to aspects of the CAP.

The emphasis on collaboration of equals rather than the EP as expert was emphasised in Wagner's consultation manual for EP services (1995) in an attempt to avoid EPs 'slipping back' into providing prescriptive answers, and although Wagner emphasises the systemic nature of consultation, over time, ambiguity on the role of the EP in consultation has been found (Cording, 2011).

Practice elements of consultation are described in some local studies, such as methods for gathering and recording information. Rating Scales have been used to document shared goals and specific target setting systems have been tried in educational psychology contexts (Bozic, 2004, P. 294). Dickinson (2000) describes the use of proformas during the consultation. Nash (2000) proposed the use of solution focused letters written by the EP after the consultation as follow up, suggesting that these can have a positive and powerful effect in themselves and to enhance therapeutic work. In this latter approach, there is reference to direct communication with a pupil, following consultation. Rhodes and Amjal (1995) make use of the same idea when letter writing to pupils as part of their brief solution focussed therapy in schools.

The notion of a combination of DA and consultation has been considered before: Some EP services described how DA taught in a brief (2-day) training course was difficult to apply and how they had begun to look for ways of combining ideas from DA with those from consultation (Hymer, Michel and Todd, 2000; Hart, 2000, p.7). They suggested that *using a DA consultation model* is likely to be consistent with the convergence of research evidence in support of formative over summative assessment (Black and Wiliam, 1998). However, an association between a DA approach and consultation was not found in any other literature reporting on consultation in UK EP practice, suggesting that the move toward consultation, although partly driven by expressed dissatisfaction with traditional measures, did not seek alternate methods for testing. Instead it sought to move away from testing altogether, focusing on systemic work with those working with and around the child.

3.6 How widely is consultation practised?

Commitment to EPs use of consultation in practice, may be much more limited than its theoretical adoption as a model of service. Jimerson et al. (2004) surveyed EP practices in

five countries and found between 5-20% of EPs spent time in consultation related activities. In a follow-up study Jimerson (2010) surveyed consultation practices in 48 countries and found that very few school psychologists identified using consultation to bring about organisational and systemic changes, which is a key objective of school based consultation. The vast majority of EPs do individual counselling and/or psychological assessments using IQ tests. In a US study, Castillo (2012) reported that only 10% of the National Association of School Psychologists (NASP) practise individual consultation and 6% reported systems-level work in schools. The majority devotes time to special education related activities based on individual psychometric assessments and practice direct work with children.

Farrell and Woods (2015) surveying the UK scene, state that evidence of the extent to which educational psychologists in the UK have incorporated consultation into their everyday work is perhaps more encouraging than in other countries. Cording (2011) whilst acknowledging the literature of examples of implementation of consultation in EP services, found that many psychologists are unclear about their skills and school expectations. The literature indicates that consultation is by no means embedded into everyday practice in the UK or elsewhere. Farrell and Woods analyse some of the barriers albeit subtle ones, which they regard as preventing EPs 'abandoning' traditional individual assessment (p.3). Their use of the term 'abandon' reflects their critical view of the over-use of traditional individual assessment. They are not advocating a total shift away from direct work with children, but rather, point to the continued use of forms of testing that may not be appropriate to all those with whom the tests are being used, an argument similar to the 'case' made for use of DA.

Throughout this thesis, this researcher has sought not to minimise the usefulness of traditional tests themselves, but rather to indicate the need, as researchers and reflective practitioners, to select what type of test, if at all, is appropriate for whom. This position views 'traditional' tests *and* DA *and* the use of consultation as complementary processes, all contributing to the overall goal of assessment, selected as fit for purpose.

3.7 Evaluating the effectiveness of consultation

Research in the UK examining whether espoused models of EP consultation are effective has been quite limited.

The dearth of conceptually and methodologically sound research in this area has been described as unsurprising given the involvement of at least three key individuals: the consultant, consultee and client. Defining measures of efficacy is considered challenging for both researchers and practitioners (Kennedy et al., 2009, p.606). Larney (2003) posed two questions in order to arrive at the evaluation question of whether consultation is an effective approach to service delivery? These are: what does it mean to offer consultation, and how is consultation practiced? In addressing the first question, it can be seen from the variety of definitions that have been noted above, that there is no agreed definition of what consultation is and what it includes in practice. Gutkin and Curtis (1982) for example, outline the key elements in consultation practice as a) Indirect service delivery; b) a trusting relationship between consultant and consultee; c) equal status, neither party having power over the other; d) the consultee is actively involved in the problem-solving process; e) consultees have the right to accept or reject any suggestions by the consultant; f) the relationship is voluntary; g) the relationship is confidential; h) the focus is on work related problems of the consultee and i) the consultation has the goals of remediation and prevention.

Brown, Pryzwansky and Shulte (2001) discuss methods of evaluating consultation and highlight that a large amount of research on consultation has become “cluttered with less than precise terminology” which create the perfect conditions for creating myths and disillusionments and that if there ever was an intervention strategy that was suited to practitioners closely monitoring the process and outcome – it is consultation which should lead to improvement in the effectiveness of the consultant (p.202).

The studies reviewed in this section, fall into two main groups. (i) Local small-scale studies of some facets of consultation, mostly in single EP services, which discuss attempts at developing local consultation goals and practices and some of which offer limited evaluations of aspects of service delivery. Some of these studies are not peer reviewed so

do not necessarily represent good quality evidence. On the other hand, they provide detailed insights into actual practice that is often missed by larger and more general studies. (ii) Overviews of research studies and proposals of further evaluation needs.

3.7.1 Local (small-scale) studies

Services differ as to whether they see themselves as working with individual children (Wagner, 2000). Dickinson (2000), for example, describes the local model as not being a casework service: "The young person is not our 'case'" (p.21). Other EP services, for example, one in South Wales (Cording, 2011), include schools in the prioritising of work at the start of the school year suggesting that the responsibility for the case shifts from the EPS to the school. Table 3.1 lists a number of small-scale, service-led studies that have looked at consultation processes.

Farouk (1999) conducted a wider study that looked at the effectiveness of EPs use consultation with teachers, by using questionnaires sent to 62 EP services in England and Wales, with approximately 120 questionnaires returned. It revealed that EPs see themselves as working in a collaborative way with teachers of children with emotional and behavioural difficulties (EBD). Farouk's study identified that EPs are aware of the personal qualities needed in an EP to engage in effective consultation, but there was no evidence of a coherent approach or enough time to engage in effective consultation. Farouk recommended that EP services subscribe to a particular service-wide form of consultation in order for it to become a part of its working practice. Overall, consultation was seen as a successful method of service delivery providing it is conducted properly. Several factors were identified to ensure a successful consultation. These include working collaboratively; avoiding the role of an expert/advice giver; allowing plenty of time to conduct the consultation and empowering the teachers to feel they have ownership of the solutions they come up with during the consultation process.

Recommendations for improving the use of consultation within EP services include in particular, that services should have a clear idea about what they mean by consultation, for example, whether consultation only, or consultation with an option for observation of a pupil or class; of direct work with pupils and that they are working with and a clear record

keeping system. Farouk is not suggesting, as indeed none of the researchers do, that a specific consultation format is to be imposed as the 'correct' one, rather that there needs to be clarity and consistency within each service.

Table 3.1: UK small-scale studies of consultation

Author/Date	Location	Target group	Method	Results	Recommendations
Dennis (2004)	Kirklees	SENCOs at 22 local schools	Interviews: grounded thematic analysis	Need for more collaborative working with school staff and families & more positive relationships of EPS with schools	Need to publicise what exactly consultation has to offer service users
MacHardy et al. (1996)	Aberdeen	Teachers and parents	Rating experience of consultation	Positive change in teacher perceptions and parents felt positive. No evidence re: pupils	Need to investigate how and whether following consultation with an EP, behaviour changes, and if there are any other contingent changes in pupil behaviour.
Christie, Hetherington and Parkes (2000)	Wandsworth	EP team approach	Description - not evaluation		
Dickinson (2000)	Lincolnshire	EP team consultation approach: not a casework service	Description	Identified EP increasing pressure to become more accountable, but to whom?	Accountability requires: - Clear shared understanding of who the client is; - What the purpose of the consultation is; - EP needs to be clear what they agree on doing and why; - EP also has to plan effective outcomes in a real-world context.
Gillies (2000)	Surrey	EPS description of teacher training	Evaluation method not specified	Benefits to the EPS: increased thinking about their goals; role clarification; increased time in	

				schools; increased joint working by EPs; increased team working; enhanced school and parent rating of the service	
Munro, 2000	Bucks. UK	Description of dev. of consultation service	'360' degree appraisal, self, peers, admin. Staff and schools	Benefits: preventative work; more time for schools & organisational work	Team approach. Consistency; managing workloads by admin, staff

Henderson's study (2013), although also based in a local EPS, sought to address an identified gap by evaluating client perceived outcomes of consultation. Henderson (p.29) argues in contrast to some other services that the *child* is the primary client and that the impact of consultation on the child's progress should be taken into account. The research aimed to explore the impact of consultation in relation to four areas, namely teachers' perceptions of their ability to make a difference with regard to progress of the pupils about whom they are concerned; parental perceptions of whether consultation had made a difference to their child's subsequent progress; pupil perceptions of whether/how actions undertaken following EPs' consultation with school staff and/or their parents had made a difference to their progress; and what educational psychologists considered to be the key factors enabling consultation to contribute to pupil progress. The educational psychologists used consultation in school with teachers, using Target Monitoring and Evaluation (TME) in order to set targets and monitor progress. Semi-structured interviews were carried out in order to ascertain perceptions regarding the consultation process.

Findings suggest that although those to whom they offered consultation perceive consultation as a helpful approach, review and further development of the service's approach to consultation is needed to ensure the greater involvement of parents and pupils in determining and monitoring targets set. The Henderson study is the first piece of evaluation research in the UK, which I found, that has chosen to identify the child as client and to evaluate the impact of consultation on children and young people.

3.7.2 Overview of studies

Cording (2011) reviewed UK studies on consultation to date, the majority of which have been accounts of how consultation has been developed in local authorities, their experiences and what they have learned, but which contain very little evaluation. Others have used more qualitative approaches such as the use of grounded theory (Dennis, 2004 (as noted in the table above); Kennedy et al., 2008). Seeking to fill a gap in evaluation of consultation, Cording chose a qualitative approach for his study in order to get at EP and teacher perceptions of the meaning and use of local consultation services.

The study uses a thematic analysis of interviews with EPs and accounts of the practice of consultation in a Welsh Educational Psychology service as examples of how consultation is used. Data analysis revealed that EPs' practice is dominated by the influence of Wagner's model of consultation, which is a result of both university and service based training and not because they feel as a service, that it is necessarily the best way of working and EPs were vague about their reasons for using this approach. Evidence also emerged to suggest that EPs confused service delivery models with models of consultation and that EPs are unclear about their unique skills and role when using consultation and feel that schools do not understand the work they are trying to achieve when working in this way. EPs also considered that schools want more time with them, but bureaucracy hinders this. Whilst Wagner's model of consultation is, at present, the most well-known model in UK EP services, Wagner's definition of consultation is broad and there is little evidence available in the literature about the level of influence her model has over the practice of individual EPs or how effective the work is in practice.

Larney (2003) points out that most studies she reviewed were qualitative, seeking the views of consultees via questionnaires or interviews. Despite this, few sought the views of the consultants and no studies examined client effects. Larney highlights this as a significant flaw in consultation research and that there have been few studies using both quantitative as well as qualitative measures with triangulation of evidence. This has resulted in a "hazy picture, with few objective indicators used to measure success" (p.15). Future research will need to address this problem (Larney, 2003, p.15). Indeed, two decades earlier, Medway (1982) had identified similar methodological weaknesses in school consultation research.

These included omission of control/ comparison groups; use of inappropriate control/ comparison groups and use of only one consultant or only one dependent variable. Larney concluded that little appears to have changed and that there is a need for more experimentally sound studies. Summarising several smaller studies, Kennedy et al. (2008) recommended that future research include client outcomes and variables, follow up consultation outcomes and the use of both quantitative and qualitative research techniques.

The research reveals that UK EP services have responded to adopting and implementing consultation practice in a variety of ways (Dennis, 2004; Dickinson, 2000; Farouk, 1999; Kennedy, Frederickson and Monsen, 2008; Kerslake & Roller, 2000; Larney, 2003; Leadbetter, 2006; MacHardy, Carmichael and Proctor, 1998; Wagner, 2000; Watkins and Hill, 2000) and share many findings and recommendations. The key message is that it is important for any service introducing consultation to have a clear idea about how they intend to use it and should have a clear plan and idea about the model of consultation they intend to use e.g. Farouk (2004) and Wagner (1995, 2000).

There are implications for the training of EPs in consultation both at pre-qualification stage and as CPD for practising EPs and competencies for such training need to be research based (Watkins, 2000; Kennedy et al., 2009). Wagner (2000) raised the issue of barriers to the widespread use of consultation. One barrier is attributed to the continuing legislative focus in the UK on individual assessment, which is not highly conducive to consultative and preventative work. The second, and in her view, more fundamental barrier, is that despite some indications of effective and valued use of consultation, the implementation of consultation in UK educational psychology services is still lacking in sufficient evidence. It has the potential to be a realistic alternative to traditional testing, but needs to prove itself as an effective and reliable model of working through more rigorous research. One factor in this lack of evidence might be the relatively unstructured and undocumented nature of most consultation practice.

To conclude this section on evaluation of consultation, Farrell and Woods (2015) offer explanations as to why consultation is by no means fully embedded into the everyday

practice of school and educational psychologists worldwide. Their view is that consultation in EP services demonstrates espoused theory but inconsistent and ambiguous practice and that EPs predominantly conduct individual assessment [testing] of children (Farrell and Woods, p.3). They suggest that EPs may be using some consultation within traditional ways of working, but not in the way consultation is often defined in the literature. It may be simplistic to say that EPs are either working or not in a consultative way, as in reality EPs probably use consultative methods to some extent in all their work, but highly varied in commitment and confidence to use this approach.

Farrell and Woods identify three possible explanations as to why consultation is not more embedded in EP practice. These are (i) the impact of the history of the EP profession in the UK, (ii) the role of the professional associations and (iii) the age of entrants to the profession of educational psychology.

(i) In the UK, educational psychological services were only established in the 1960's, for administration of intelligence (IQ) tests and the assessment (evaluation) of children requiring special education provision. Agreement to 'close' the tests to all but trained psychologists greatly contributed to the development and identity of the profession (Farrell, 2010). This was enshrined in legislation and hugely influenced the defining role of the EP and what employers could expect from them. These tasks may be counterproductive to the development of consultative approaches to families and schools and it can be argued that IQ testing is rooted in the medical model of disabilities emphasising a summative rather than a formative role for the EP. The findings of the psychometric tests tend to be accepted as valid and as Farrell and Woods (2015 p.4.) state, EPs are reluctant to abandon IQ testing and that it remains a core part of the educational psychologist's role. This analysis would appear to have relevance to issues raised in chapter 2 on the uptake of DA. Farrell and Woods question whether fear of moving away from the EP traditional testing role represents a major barrier to change.

(ii) National associations, for example the Association of Educational Psychologists (AEP) and the Division of Educational and Child Psychologists (DECP) in the UK, played a major part in establishing the profession. Within their roles, they defined who can

and cannot enter the profession. This task is now under the supervision of the HCPC. In doing so they reinforced the view that the key tasks mentioned above, especially using IQ tests can only be carried out by EPs, although it is the test publishers who actually determine access to their tests. In contrast, consultation is not viewed as limited to the protected title of EP. A school can invite non-psychologists to carry out consultations. It is suggested, therefore,
that the role of EPs that national associations are most keen to protect is individual testing.

(iii) A third factor raised by Farrell and Woods, that may impact on the lack of embedded consultation in EP services relates to the knowledge and expertise required for effective consultancy work and the age profile of the majority of trainees completing EP training. Skills and expert psychological knowledge are essential; and schools would not invite consultation unless they felt that these professionals possessed expert knowledge. Another key area required for a consultation approach is expert interpersonal skills, which include the ability to work with other adults; share expertise; facilitate meetings; empower decision-making; synthesise complex and sometimes contradictory information and help formulate a plan of action (Farrell and Woods, p.5). They suggest that it is not surprising that young EPs anxious to please schools and teachers will spend most of their time responding to teachers' requests for them to work with children on a 1:1 basis. It is then harder to change their practice and to increase the amount of time they spend on school-based consultation.

Finally, Farrell and Woods propose that 1: 1 assessment (testing) and consultation should not be seen as incompatible. The way forward is to ensure that EPs are adequately skilled to work in a flexible way, incorporating individual child assessments within a school-based consultation model, as some EP services offer, recognising that each has a part to play in meeting the needs of the child, family and school. The skilled EP will select and combine processes to best respond to the referral issues. The selection and use of the CAP as part of assessment is viewed in similar terms.

3.8 Summary

Chapter 3 has focused on the use of consultation in schools as promoted and practised by educational psychology services. Confusion of definitions and the methods resulting from these, has affected practice and the quality of intervention studies (Larney 2003; Kennedy, 2009). The paradox of recognition of the value of consultation, but the reluctance of EPs to move significantly away from 1:1 individual testing is highlighted. The literature appears to indicate little evidence of specific methodologies being adopted to deliver certain kinds of consultation, making it more problematic to define client satisfaction and to evaluate outcomes.

The CAP is a novel attempt to deliver a specific method of assessment of learning and development via consultation based on an articulated theoretical framework. This study examines aspects of validity and reliability of the CAP and how users perceive the CAP, thus aiming for a combination of quantitative and qualitative evaluation, which has been repeatedly suggested in evaluation of school-based consultation practice. Inter-rater studies adding to evidence of reliability of findings as part of evaluation of consultation, do not appear to have been trialled to date and this is a novel aspect of this study: the CAP consultation model is examined in terms of its validity and reliability and in relation to its theoretical underpinnings and structure.

Herein lies the challenge of the CAP. Both novel aspects of the CAP – use of DA based principles without direct testing and use of a consultation framework – means that these two practices do not as yet have a shared evidence base. Thus, investigating psychometric properties of a combination of these two approaches in this research is recognised as a complex and challenging aspect of this study.

Chapter 4: The Cognitive Abilities Profile- Part 1

4.1 Introduction

This chapter describes the Cognitive Abilities Profile (CAP) in detail. The chapter is divided into three sections:

Section 1 briefly summarises the rationale for the CAP, which has been discussed in greater detail in chapters 1-3.

Section 2 describes the structure and components of the CAP.

Section 3 provides a more detailed rationale of the theoretical underpinnings of the CAP.

4.2 Section 1: Rationale for the development of the CAP

4.2.1 Addressing unmet needs

As outlined in previous chapters, the existence of unmet needs in the realm of the use of DA and consultation in educational evaluations provided the motivation for the development of the CAP.

The CAP, by combining two fields, namely Dynamic Assessment and Consultation in EP practice, attempts to create from both a novel quantitative tool.

The main goals of the CAP are as follows:

- To provide psychologists, specialist teachers and therapists with a means of assessing and rating the cognitive abilities of a student, in order to assist in the identification of underlying cognitive processes that may affect progress in learning.
- Such identification then serves as a basis for planning appropriate cognitive interventions to be carried out by those working with the student and for monitoring progress.
- The CAP was designed to provide a framework for thinking about learning and development within a classroom or other learning contexts. The framework of

enquiry, consultation, formulation of learning and developmental goals allows for use of the CAP across a wide range of ages, abilities and situations, from early childhood to adults and for a range of participants. Typically, the CAP may be used in the school years, when teachers and other professionals are concerned about progress in curriculum and other areas of functioning. However, the CAP is not limited to use in school years and may also be used in pre-school and post-secondary school situations. Because the CAP is not age normed, it may be used as a consultation tool within the recently extended professional framework for UK EPs, namely from birth to young adults, age 25 years. This is further addressed in the discussion brought in chapter 8. The term *cognitive abilities* is used here to encompass a broad holistic approach not limited to school achievement and includes a number of associated areas of functioning all of which affect development, such as emotional and motivational factors, which are often referred to in DA literature as 'non-intellective' factors, as well as core cognitive functions such as attention, perceptual processes, memory, reasoning, language and strategic thinking (Lidz, 1991; Haywood and Lidz, 2007; Lezak, Howieson and Loring, 2004).

- The CAP is not a normative tool. It does not seek to score performance in comparison, for example, to same age peers or to some other diagnostic criteria. In order to incorporate the active mentoring/ mediating role of the teacher into the CAP model, this being a basic feature of DA, the CAP actively involves the 'team' around the child; teachers, parents, learning support assistants etc. In this way, the ongoing teaching/learning role should be well represented and ratings of cognitive abilities and decisions on interventions are not based on a one-time static assessment or a one-time observation by someone not involved regularly with the pupil.
- The CAP is not a test. By means of gathering information, via observation and consultation, the CAP gets 'underneath' manifest functioning in order to explore and identify blocks in learning and development in depth. The CAP can incorporate information from normative tests whether administered by psychologists, teachers or therapists. Test results may contribute some evidence to the consultation, but are not its goal. The information gathered is primarily by consultation between the key stakeholders and through observation by those who are familiar with or work with

the pupil. The pupil is a key participant, although not necessarily at the same time as the full consultation. The pupil's own evaluation of their needs and learning goals is always sought in the most appropriate way. The Education, Health and Care Plans (EHCP's), which have replaced the former SEN Statements (Department for Education, 2014), place increased emphasis on the voice of the parents and the voice of the individual concerned.

- The CAP as a form of assessment of cognitive abilities via consultation is not dependent on the use of direct tests with a pupil, whether standardised or dynamic. The CAP was created and developed by the current author, is published by Real Group (2010), and is presently in use by a number of educational psychology services across the UK and elsewhere.

4.2.2 Summary of identified needs, which lead to CAP development

The CAP was developed in response to an identified need to find methods for assessing pupils without the use of traditional norm-referenced EP tests (see, for example, Wagner, 1995, 2000). Furthermore, the CAP was developed in response to identified difficulties in using DA and consultation in practice, notwithstanding acknowledgment of the potential usefulness of both of these approaches, as discussed in chapters 1 and 2. Common challenges to the use of DA and consultation are presented below, alongside ways in which the CAP is intended to address these challenges.

Challenge (i). Limited access to and length of training for DA; limited availability of support for EP practice of DA.

The CAP's response to challenge (i)

The intended novel contribution of the CAP is that through consultation, those who know the pupil well can access information about cognitive functioning and response to intervention (mediation), which might usually be obtained by doing a direct DA. CAP users may not require information from static psychometric tests, provided that the quality and usefulness of the information they can gather from the CAP provides a sufficient basis for planning and intervention without further testing. For some educational psychology services

that have taken a policy decision not to use standardised psychological tests, the CAP may be a useful contribution to assessing need in a structured systematic way, without the use of such tests.

Although the CAP cannot be administered without some prior training (Deutsch and Mohammed, 2008) the training may be shared by EPs, skilled specialist teachers or therapists who have a background in cognitive and other assessments. At the review stage, a specialist teacher may lead the CAP review, thereby saving time for the EP involved.

Challenge (ii). Issues of prioritisation, time constraints and resources create tensions for EPs.

EPs have expressed difficulty in bridging the gap between their knowledge when using DA and how to translate cognitive concepts for teachers unfamiliar with these ideas into meaningful classroom targets.

The CAP's response to challenge (ii)

The CAP enables incorporation of the findings of a DA if this is available, but this is an optional source of information, not essential to the CAP process. Similarly, observation of the pupil is strongly advised, but there is flexibility[3]. Becoming familiar with the cognitive abilities rated in the CAP is essential to its use (for sections A and C), as well as concepts of mediated learning (for Section B) and elements of task analysis (for Section C). These are taught specifically in CAP training.

Challenge (iii). Reports of teacher dissatisfaction with standardised test results, not translating into practical classroom strategies Wagner (1995, 2000).

[3] This researcher has been working with teachers on supplementary CAP forms to be used with students of different ages and levels of ability, to incorporate the voice of the child in a structured way.

This was a major reason that contributed to the development of consultation models within EP practice as a framework for EPs to support assessment and teacher interventions. Linking assessment and intervention is one of the concerns raised by psychologists who expressed dissatisfaction with the traditional referral model of EP service (Wagner, 2000). McNab (2009, p.42) describes the traditional referral model as one in which "EPs work almost exclusively with children; test them; chat with the teacher; write a report and give advice". In that model, it is difficult for the EP and teacher to link recommendations to their everyday practice.

The CAP's response to challenge (iii)

The CAP is designed to facilitate and strengthen such links, by building realistic and measurable objectives into the CAP structure.

Challenge (iv). As discussed in chapter 3, consultation is a widely used practice amongst EPs in the UK (see, for example, Leadbetter, 2006, p.246). However, no evidence has been published demonstrating how psychological theory underpinning consultation models has been formulated into a specific framework for consultation.

The CAP's response to challenge (iv)

The CAP seeks to bridge the gap between theory and practice in consultation, by providing a specific framework for consultation, which is explicit in its operationalisation of the theories underpinning this approach. This study will aim to add to the evidence base on consultation processes.

Challenge (v). Difficulty in bridging the gap between cognitive assessment and intervention.

Emerging studies on summative and formative assessment, for example, Black and Wiliam (1998) and Hattie (2009) add to the body of evidence of the need for more process-oriented education, which is central to the DA approach and the cognitive skills identified and promoted in the CAP.

Emerging studies also add to the need for a more holistic framework for identifying and addressing pupils' needs, combining Intellective and emotional aspects of learning, for example, Dweck (2006).

The CAP's response to challenge (v)

The CAP seeks to address some of the defined roles and duties of EP practice in the UK, as set out by the Health, Care and Professionals Council (HCPC) standards of proficiency (2015). These include being able to use frameworks to assist multi-professional communication (section 8.14, HCPC, 2015); The need to understand factors that facilitate or impede the provision of effective teaching and learning (section 13.30); Understanding contributory factors in learning, including cognitive, social, emotional and behavioural and the influence of social and cultural factors on development, as well as biological, neurological, psychosocial and mental health aspects affecting functioning. In HCPC guidelines, consultation is described as having become embedded in EP practice and is reflected in the "need to understand the theoretical basis and the variety of approaches to consultation and assessment in Educational Psychology" (13.38, HCPC, 2015).

Thus, several key elements of professional psychology practice, as described in HCPC criteria, are ones that the CAP seeks to develop and make explicit. These address issues of assessment; consultation; advice and recommendations; direct and indirect intervention; monitoring and review; evaluation of outcomes and forward planning. These areas are noted here, in order to clarify the CAP's rationale and potential contribution to key areas of EP practice.

4.3 How is CAP consultation different from other uses of consultation by EPs?

Studies of consultation processes in the UK, as discussed in chapter 3 (Larney, 2003; Dennis, 2004; Corney, 2011; Hamilton, 2013), indicate that the CAP consultation differs in emphasis from methods used by EPs in schools in that whilst EPs typically take up school/teacher or parental concerns as a starting point for a consultation, the CAP adds a specific method and

structure for the consultation. The method and structure of the CAP aims to provide a comprehensive analysis of key areas of cognitive functioning.

The difference in the way consultation is used in the CAP may be illustrated by reference to a common situation where a class teacher refers a pupil to the Special Educational Needs Coordinator (SENCO) and then to the school's EP. In the absence of the CAP, the EP would conventionally focus on the presenting problem and offer advice for managing the presented difficulties. In contrast, in the CAP framework a perceived difficulty would be viewed as *a presenting symptom* of a possible number of underlying and contributory processing factors. Each area of cognitive functioning would be explored in order to carry out a systematic evaluation of the issues. The CAP framework uses objective criteria and thus aims to take the discussions beyond the immediate referral issues. When a pupil is referred, for example, for specific subject difficulties such as in reading or mathematics or for behavioural issues, the CAP would not directly address the subject being taught, i.e. the *content,* but rather focus on the underpinning *processes,* which may be contributing to the evident difficulties.

Without oversimplifying the differences in approach, these differences may be summarised thus: whereas general educational consultation focuses mainly on improving the *products* of learning, the CAP focuses on identifying and improving the *processes* that underpin the learning. There is no intention in this study to suggest that one approach is 'better' than the other. What the CAP seeks to contribute is analysis of contributory factors that may enhance or impede learning and teaching, including the learner's approach to problem solving that may also shed light on behavioural difficulties (HCPC, 13.30). One of the primary contributions of dynamic assessment and cognitive approaches in educational settings is the provision of information that optimises the match between students and the tasks they are asked to perform (Haywood and Lidz, 2007, p.176).

The CAP is not designed as a stand-alone, one off, diagnostic tool. The CAP aims to bring concepts and practices from DA and cognitive education into the classroom, that is, into the practice of mainstream teachers, Learning Support Assistants and all those concerned with a pupil's development of thinking and learning.

4.4 Section 2: The Structure of the CAP

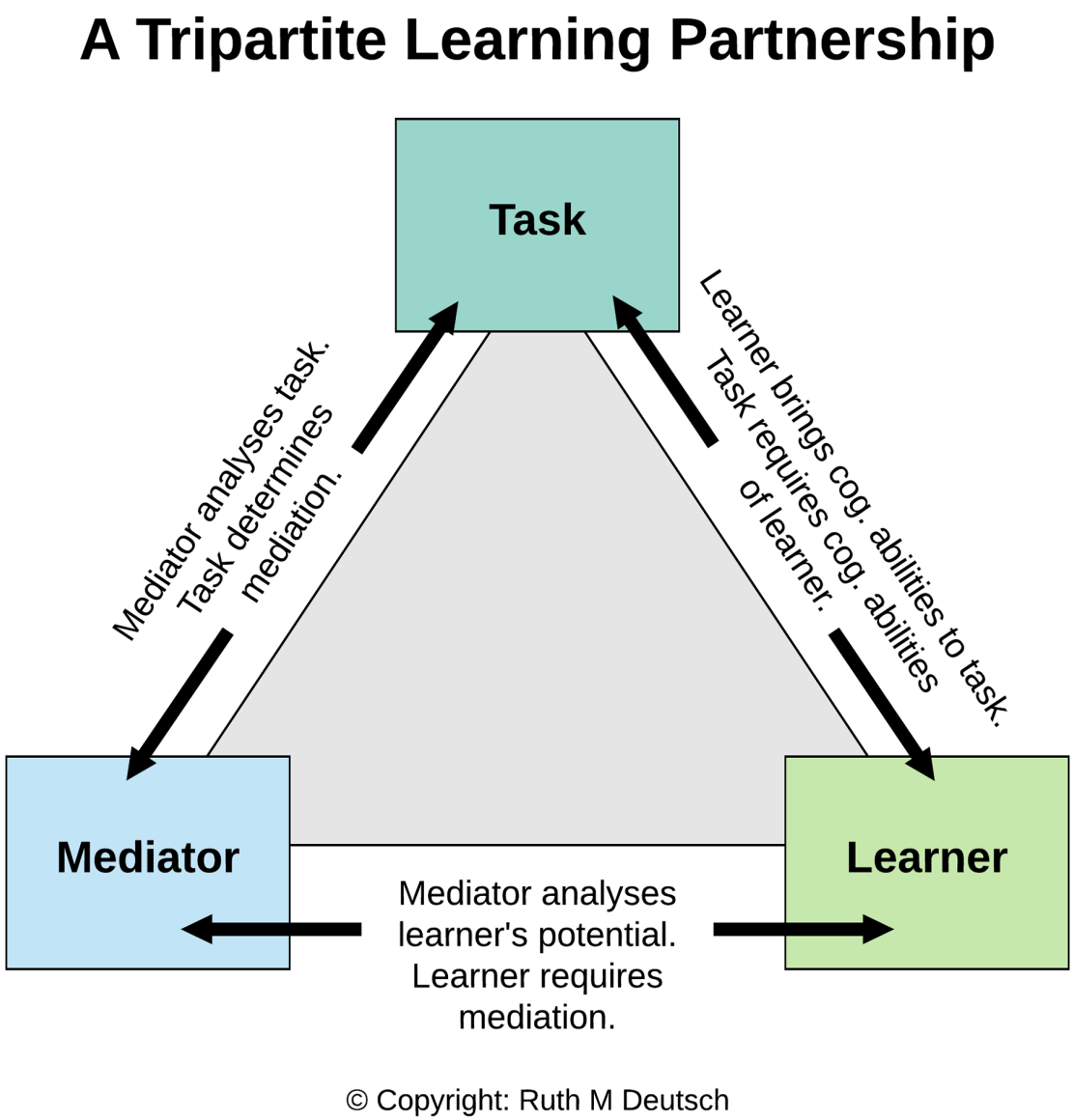
4.4.1 Three sections of the CAP – The learning triangle

The CAP comprises 3 sections termed Section A, Section B and Section C. Section A of the CAP relates to the rating of the cognitive abilities of the pupil in various domains of cognitive functioning. Section B of the CAP relates to the pupil's response to intervention strategies provided by teachers or others in a learning context. Section C is a system for analysis of tasks undertaken by the pupil within or outside of the classroom.

Section A of the CAP is the focus of this study. Section B and C are only briefly introduced herein so as to explain the structure of the CAP. An outline of sections B and C can be found in the Appendix, for the interested reader.

Sections A, B and C of the CAP correspond to the three interactive parts of a DA called the Tripartite Learning Partnership (Figure 3 below) which has been adapted from the structure of the DA model of Feuerstein, the Learning Potential Assessment Device (LPAD) (Feuerstein, 1979; Feuerstein, Falik and Rand, 1995; Feuerstein, Feuerstein and Falik, 2008).

Figure 3: The three constituent parts of the Tripartite Learning Partnership



As seen in Figure 3, the three 'partners' are the Learner, the Mediator (the assessor) and the Task itself. In the LPAD each element is analysed in relation to the other parts of the model. A comprehensive LPAD would include investigating all three aspects of the model and would be reflected in written or verbal feedback (Haywood and Tzuriel, 1992; Lidz, 2003; Tzuriel, 2001; Feuerstein, Falik & Rand, 2002; Haywood and Lidz, 2007).

In Section A of the CAP, the cognitive abilities of the pupil are discussed and rated in the consultation. If the pupil is observed, in class or elsewhere, the learning tasks or other

activities observed are systematically analysed using Section C of the CAP. The mediator, who is typically a teacher together with the CAP facilitator, who is typically, but not necessarily a psychologist, discuss and rate elements of mediational interactions using Section B of the CAP. CAP users can choose which components to include as the most relevant information about the pupil and in what order they wish to gather the information.

4.4.2 How does the Learning Triangle model translate into the CAP model?

The Learning (tripartite) model shows the transactional relationship between learner, mediator and task in a DA, but is not restricted to situations involving direct testing. These learning interactions are equally applicable in a teaching or therapy context. For CAP purposes, Section A is the detailed analysis and rating of the cognitive abilities of the learner, but in place of accessing that information from direct testing, it is accessed via the collaborative input of teachers, therapists, parents etc. within the consultation. Section B of the CAP, the discussion and analysis by the mediator of interventions in the classroom or elsewhere, is also rated, according to how the pupil responds to different types of intervention. Such insight does not have to be gained from 1: 1 testing. This is where the consultation structure of the CAP either complements or even does away with the need for direct testing. The items rated in Section B were influenced by Lidz's Mediated Learning Rating Scale (1991, 2003) and a number of studies of what constitutes effective classroom practices, for example, Black and William (1998); Hattie, (2009). Section C is an adaptation of the LPAD Cognitive Map concept, a brief description of which can be found in the Appendix. It is termed Task Analysis in the CAP and sets out parameters for observation, which is often carried out by psychologists and specialist teachers as part of their consultation (See the CAP manual, Deutsch and Mohammed, 2010; Feuerstein, 1995, 2003). In section A, which focuses on the child's abilities, seven different cognitive domains are assessed via consultation using Likert scales ranging from 1-4. These will now be discussed in more detail.

4.5 The CAP Rating Scale

In Section, A of the CAP a number of cognitive abilities (CA) is investigated in the form of questions in each of seven domains of cognition. The seven cognitive domains rated in the CAP are as follows: Attention; Perception; Memory; Language; Reasoning; Metacognition and Behaviours Affecting Learning. These are derived from concepts of Luria, which will be discussed below and are also adapted from similar categories used by Lidz in her Curriculum Based DA model, which is described in detail in Haywood and Lidz (2007). The resulting CAP framework was developed by Deutsch and Mohammed (2010). Within each domain are various items, which are discussed in further detail below. The questions in each domain are intended to serve as prompts for discussion and rating in the consultation. CAP users score each CA using a rating scale, which will now be explained.

The CAP uses a Likert scale with scores from 1-4, with the possibility of half-scores. It is an ordinal scale with whole and half numbers. In contrast to scoring on some standardised educational psychological tests, the rating scale used in the CAP does not measure subject knowledge and achievement. It is not a summative scale that scores wrong or right answers. Instead, the theoretical basis for the scale is Vygotsky's concept of the Zone of Proximal Development (ZPD) (1978, 1986). The CAP rating scale represents the student's 'journey' in each CA from being 'completely unable' to demonstrate use of the specific CA at this time, which would be recorded as the lowest score of 1, to the highest score, 4, which is given when the student is able to demonstrate full independent mastery in that cognitive ability. The CAP rating scale measures levels of emergent use of a CA, in contrast to traditional test scoring of independent ability which only scores the student's ZOA (Zone of Actual Development). In the CAP scale, the intermediate steps show emerging cognitive processes and are scored as a 2 -very intensive support required – or 2.5 – constant support required- or a 3 – some support required – or 3.5, in which a student can demonstrate partially independent, but not entirely consistent, competence. A fully mastered and independently used cognitive ability, which is scored as 4, is evidence of the student's Zone of Actual Development (ZOA) (Lidz, 2011). CAP scoring in relation to Vygotsky's ZPD theory is shown in Table 4.1.

An **N** score is used when the CA is either not observed or there is lack of information such that it cannot be rated, or if the ability is not age appropriate, for example when rating a very young child.

The scale aims to be consistent both with Vygotsky's and Feuerstein's later approach to understanding and interpreting evidence of emerging cognitive processes. CAP scores aim to pinpoint in which areas the student will require more support to achieve acceptable levels of functioning and are therefore more akin to formative assessment.

Table 4.1: The CAP rating scale

SCALE Score	**Evidence of use of the Cognitive Ability**	**Zone of Actual Development (ZOA)**	**Zone of Proximal Development (ZPD)**	**Lowest level of independent performance to Highest**
1	None, even with highest level of support	✗	✗	
2	Requires intensive and ongoing support	✗	✓	
2.5	Fragile; Requires a high level of support	✗	✓	
3	Requires some support	✗/✓	✓	
3.5	Emerging, partly independent. Requires infrequent support	✗/✓	✓	
4	Fully independent use	✓/✓		

In contrast to procedures used in static assessments, the 'team' around the student, including teachers, parents and other professionals, rates each cognitive ability on the CAP

collaboratively. The scoring process can be strengthened by independent ratings by different contributors (triangulation) as well as joint discussion and negotiation between those who best know the student. The present four-point scale with half points was the result of feedback from pilot groups on user friendliness and clarity of the scale, as discussed in chapter 5 below and in Deutsch and Mohammed (2008, 2010).

4.6 Section 3: Cognitive abilities of the CAP – theoretical sources

This section describes the theoretical bases for the domain structure of the CAP and the rationale for the choice of items in each of the seven domains.

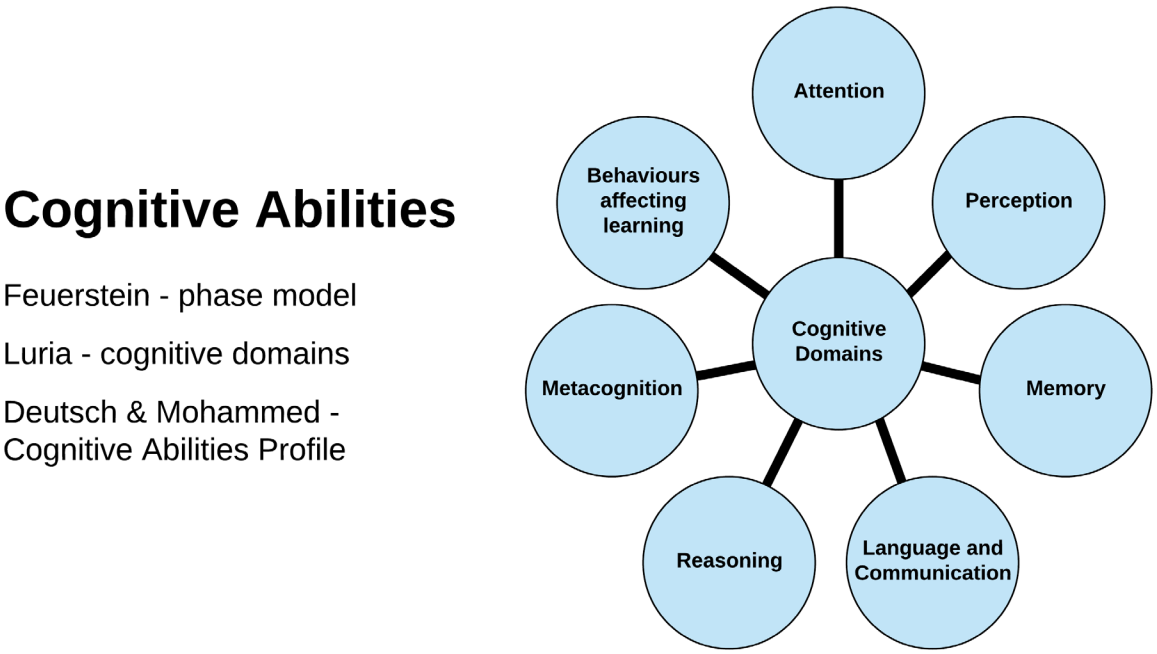
4.6.1 From the LPAD phase model of deficient cognitive functions to CAP cognitive domains

As show in Figure 4, two major theoretical influences on the construction of Section A were the concepts of Feuerstein and those of Luria, each of which will now be discussed.

4.6.2 Feuerstein: Concepts influencing the CAP

Although Feuerstein's list of deficient cognitive functions has been challenged on theoretical grounds, for example by Büchel and Scharnhorst (1993) and Frisby and Braden (1992), as not being based on a theoretically grounded model of development, but rather an eclectic collection of observed difficulties, it was used in an early version of the CAP, because of its central place in the LPAD system. The developmental work on the CAP, which preceded the current CAP model, is explained in the next chapter. Lidz (1987, p.445) observed that Feuerstein proposed not so much a theory of intelligence as an approach to remediation. The DCF list (Feuerstein, 1979, 1980) was originally derived from clinical observations of deficient cognitive functioning of adolescents, but was later adapted to describe emerging cognitive functions in young children, using the same phase structure as had been used for adolescents, when Feuerstein and colleagues developed a downward extension of the LPAD, the LPAD-Basic (Feuerstein et al., 2003).

Figure 4: The domain structure of Section A of the CAP and its sources



However, reversibility by extrapolating from what *does not* appear to be working well in older learners, in this case, based on poor cognitive performance in deprived adolescents, to an early years developmental model of cognitive functions, is not necessarily supported by the evidence for more generic, non-specific brain development in the early years and the gradual development over time of more specific areas of functioning. Research in early years cognitive development associated with certain diagnosed disabilities (Karmiloff-Smith, 2012; Gillberg, 2012; Lidz, 1991, 2003; Tzuriel, 2000; Kemp, Kirk and Korkman, 2001), would appear to question the use of a phase model for describing emerging cognitive functions in young children, in favour of a range of cognitive processes not assigned to specific phases or single domains, especially for the under 5's where brain development and plasticity is at its most rapid and diffuse.

Feuerstein's description of DCF's was based on Piaget's fourth level of cognitive development, the adolescent stage of formal operational reasoning, but cannot be simply applied or reversed to describe younger learners, especially those with developmental difficulties. Furthermore, in order to support the use of his three-phase model of INPUT, ELABORATION and OUTPUT to which adolescent DCF's were assigned and applying it to

young children, there would have to be evidence of at least some aspects of its validity. This observation also relates to one of the challenges frequently noted in neuropsychological testing of children, in that adult models of brain functioning and tests that have been developed accordingly, do not necessarily reflect child neurological structure and functions.

As a result of informal studies of an earlier version of the CAP (Deutsch and Mohammed, 2008 and the next chapter) which showed unsatisfactory levels of inter-rater reliability when rating a child via observation only, when using Feuerstein's three-phase model of Deficient Cognitive Functions (DCF), the current CAP has adapted a different framework for assessing and rating cognitive abilities based on the neuropsychological analysis of brain functioning of Luria (1973, 1980) and Lidz, in Haywood and Lidz (2007). Domain descriptions of cognitive abilities were felt to be better suited to the CAP's methods, which are primarily consultation and observation than a phase model, which was designed for direct intervention in a DA (as in the LPAD). The CAP's use of domains enables identification of specific cognitive processes singly and in groups, in areas of cognition identified in psychological and neuropsychological literature, for example, Lezak (2004). Evidence from research, especially with very young children who have developmental disorders or specific syndromes, indicates the need to assess and intervene in development across interrelated domains of functioning (Gillberg, 2012; Karmiloff-Smith, 2012, 2013; Lidz, 1991, 2003; Lezak, 2004). Thus, rating all domains of the CAP and not limiting the consultation and ratings to the specific referral concerns, develops a comprehensive profile of a pupil's needs and is a central feature of CAP use.

However, some of the cognitive functions named by Feuerstein in his DCF phase model were adapted and incorporated in various CAP domains. For example, in place of Feuerstein's INPUT item of "blurred and sweeping perception" it was decided that perception needed to be broken down into smaller units of analysis, by asking specifically about visual, auditory, tactile, spatial and sequential perception (see the CAP domain of Perception, described in detail below). This example illustrates the CAP's elaboration of some items of cognition (Luria, 1980; Lezak, 2004) and also illustrates how the CAP seeks to address one of the reported difficulties of EPs using and interpreting DA, given that the

LPAD and similar models were, at the time of the Deutsch and Reynolds survey (2000) and remain (Green, 2015), the best-known forms of DA in use by UK Educational Psychologists.

Thus, the CAP domains can be described as using a Luria-based domain structure, blended with some of the concepts used in Feuerstein DCF's. The resulting model (that of the CAP's authors (Deutsch and Mohammed, 2010) is tested in this study. Behaviours affecting Learning, Domain 7 of the CAP, is not based on Luria's concepts, and has been added to describe some learning behaviours, which lie in the area of affective/motivational aspects of learning.

The following Table 4.2 summarises which elements of DA (MLE models) have been used for the CAP and where the differences are. This table does not refer to any specific consultative model, because, as discussed in the literature review in chapter 3, there is no 'consultation model', rather an eclectic collection of ideas about consultation, even the principles of which are not agreed (e.g. Leadbetter, 2006).

4.6.3 Luria's model – the main principles

As Luria's concepts are the basis for the domain structure of the CAP, the next section discusses these concepts in some detail and relates aspects of Luria's approach to DA theory. The domain structure of the CAP adapted from Luria's work is a significant departure from the deficient cognitive functions model of the LPAD, and constitutes one of the novel aspects of the CAP. As mentioned above and in the next chapter, Luria's concepts were felt to potentially be able to address issues of validity and reliability for the CAP structure. Luria linked neurological functioning and cognition, within a socio-cultural model, insisting that brain functioning, especially higher order cognitive processes, cannot be studied in isolation from the social and cultural environment in which cognitive processes develop. He was greatly influenced by Vygotsky with whom he collaborated in some of Vygotsky's socio-cultural studies in the early 1930's (Luria, 1976). Luria's work was wide-ranging and has an evidence base in diverse neuropsychological and clinical applications, for example, in rehabilitation of brain injury patients (Christensen et al., 2009) and in the study of cognitive disturbances and structural and functional brain alterations in schizophrenia (Zaytseva, Chan, Pöppel & Heinz, 2015).

Table 4.2: CAP components – similarities and differences to DA

DYNAMIC ASSESSMENT: (MLE models)	**COGNITIVE ABILITIES PROFILE**
Change Model – Opportunity to enhance cognitive skills.	Change Model – Opportunity to enhance cognitive skills.
Analysis of (deficient-LPAD) cognitive functions – intellective and motivational.	*Analysis of cognitive abilities – intellective and motivational.*
Analysis of Mediation/Intervention.	Analysis of Mediation/Intervention.
Recommendations for improvement of (deficient) cognitive functions.	Recommendations for improvement of cognitive abilities.
1:1 direct testing – could be over several sessions/hours. *Scoring – optional. Observation – optional.*	*Multidisciplinary analysis – consultation model. Initial joint consultation. Scoring essential – by group consensus.*
Mediation/Intervention is analysed within the DA. The mediation is described qualitatively, but is not usually scored.	*Mediation is analysed at baseline and review, through discussion of ongoing classroom/group or 1:1 intervention.*
Deliberate change is facilitated by mediation within the DA. *Recommendations shared with teachers and parents.*	*The CAP team plans deliberate changes. Mediation targets result from the CAP profile and are monitored, rescored and adjusted over time.*
Recommendations shared with teachers/parents who are (usually) not involved in the DA. Challenging task to share and implement with others. Mediation not usually scored when reviewed with teachers.	*Recommendations are developed jointly, rescoring at review time. Aim to increase opportunities for joint ownership and generalisation of cognitive skills.*

(Differences shown in blue italics)

However, Luria's work remains a theoretical model and although evidence for different cognitive domains exists in separate literature bases (e.g. memory research; studies of attention processes), the model itself has a less extensive research literature. The findings on the CAP from the present study might serve to add to this evidence base. This is related to a broader issue within cognitive neuroscience, which – according to Pöppel and Ruhnau, (2011) – still lacks a validated taxonomy of cognitive functions. Their view is that a strong

theoretical framework is needed to make solid inferences about cognitive processes from structural and functional brain findings. Luria's system of categorising cognitive functions into three functional blocks, in which each makes its equal and unique contribution to the cognitive system, was utilised for many years as a basis for analysing cognitive distortions in neurological patients and proved to be informative and predictive in terms of outcomes (Ardila, 1992). His model is now briefly explained and the existing evidence for its validity is discussed.

In "The Working Brain" (1976) Luria proposed a model of cerebral organisation which assumed distinctive functions operating as components of functional systems. He conceptualised the brain as divided into three principle blocks. The first block regulates arousal and the state of vigilance, providing the brain with a stable basis for the organisation of its various processes. The second block processes the receipt, analysis, and storage of information. These perceptions contain information coming from various sensory modalities. The third functional block addresses the formation of intention, programming, regulation, and control of behaviour. Luria claimed that any form of psychological activity involves the simultaneous operation of the three functional units and he stressed that each behavioural task requires the coordinated and integrated activity of a number of cortical and subcortical areas, all contributing differently to the execution of the task. In other words, the psychological functions are not restricted to a single location in the brain but rather are distributed as different components across the system. The pattern of interacting factors responsible for a given behaviour is called a functional system. Each area of the brain participates in numerous functional systems, and evidence for this has been demonstrated in studies using imaging technology, such as functional magnetic resonance imaging (fMRI), (Lezak, 1992; Zaytseva et al., 2015).

The strategy of isolating particular cognitive processes from one another is a methodological one, which is pursued in order to facilitate systematic study. Cognitive psychologists agree that the mind is fractionated (Braisby and Gellatly, 2012), containing multiple interacting components that acting in concert appears [to us] to be a unified mind. For example, cognitive psychologists will consider *perceptual processes* in isolation from *language comprehension* partly for methodological convenience and partly because of the belief that

each domain calls upon unique cognitive processes (Braisby and Gellatly, 2012). Case studies of the functioning of people who have experienced brain damage provides evidence that if cognition is truly fractionated then it should be possible for certain processes to be damaged whilst others remain intact (Luria, 1980; Lezak, 2004; Christensen et al., 2009). Such disassociations have been observed in many areas of cognition in adults, but has been challenged in relation to neurodevelopmental difficulties in children (Farran and Karmiloff -Smith (2012), Bishop, (2010). However, as Luria maintained, there is no consistent link of one type of cognitive functional impairment with one specific area of the brain (Ardila, 1992). In other analyses, which are focussed on specific processes, rather than the interrelationship between several domains, Baddeley (1996), for example, discusses the fractionation of working memory, which is split into items that need to be identified.

For purposes of the CAP model, which focuses on understanding an individual's cognitive functioning for goals of remediation and education, cerebral locational specification is not required. However, the issue of cognitive domains is still pertinent. Luria examined the issue of fractionation of cognition, through individual clinical studies of patients who had suffered brain damage. He described a symbiotic relationship between clinical and academic factors and illustrated this in the way in which higher order cognitive functions are integrated (Braisby and Gellatly, 2012).

Thus, it might be expected in using the CAP's cognitive domains and items, that cognitive functions can be identified both at domain and subcomponent level. Items should represent the domain construct in which they are located, but they are not discrete, in that they will also be evident in combination with items of other domains. Patterns of identified CA's will vary according to the demands of the task, as well as the variation brought about through social-cultural aspects of cognitive functioning. An implication of the concept of fractionation of cognitive functions, is that in assessment systems based on Luria's model (and his is not the only one), cognitive functions are assessed and rated at the subsystem level and are not combined or scored in clusters, as in some traditional cognitive tests. This implies that CAs are not 'hard-wired' biologically determined elements, which can be universally and independently identified, but they are manifest in relation to both the type of task and environmental experiences of the individual. Hence, Luria's emphasis on the

combination of socio-cultural and neuropsychological features, in assessing and understanding the individual. Although the CAP is not designed as a diagnostic tool, this has implications for the recognition and description of certain disabilities and for intervention.

Luria's model, developed primarily for clinical use and diagnosis, has been tested mainly through its diverse applications rather than direct research on the model itself. He did not propose a theory, as such, rather a working model, to account for the evidence of a large number of clinical case studies that he recorded in detail (Luria, 1980) and on which some neuropsychological research has been based (Damasio & Damasio, 1989; Kertesz, 1983; Rosselli, Ardila et.al., 1990).

4.6.4 Luria's work: From clinical origins to educational applications

In the discussion on Luria's work above, the main emphasis has been on Luria's clinical case study approach mainly with adults with cerebral injuries and syndromes. Is there evidence that supports Luria's model of brain functioning when used for educational applications? Tests of neuropsychological functions were used or not, as a small part of Luria's clinical analysis approach. Nevertheless, Luria's model has influenced several modern psychological theories of intelligence and tests used by educational psychologists for normative populations in educational rather than clinical contexts.

Three evidence-based measures based on Luria's work are listed as demonstrating well-established levels of validity and reliability (Campbell et al., 2008). These are the Cognitive Assessment System (CAS) developed by Das and Naglieri (1996); the NEPSY, Developmental Neuropsychological Assessment (Korkman, Kirk and Kemp, 1998, 2007); and the K-ABC, Kaufman Assessment Battery for Children (Kaufman and Kaufman, 1984, 2004). Analysis of these three Luria-based standardised psychological tests is now briefly presented, to demonstrate the application of Luria's approach to the field of standardised educational testing, which remains a central feature of EP practice (Farrell and Woods, 2015). Research into these applications of Luria's model, particularly in their inferential and predictive validity, would seem to provide some support for the adaptation of his model of brain functioning to educational contexts.

4.6.4.1 Cognitive Assessment System (CAS)

Luria's research formed the basis of the PASS theory (Planning, Attention, Simultaneous, Successive processing), initially described by Das et al. (1994b) and operationalised by Naglieri and Das (1997a, b) in the Cognitive Assessment System (CAS) (Naglieri et al. 2014a). The four psychological processes identified by the PASS theory (Naglieri and Das, 1997b), are consistent with the brain systems described by Luria and represent a fusion of cognitive and neuropsychological constructs including executive functioning (*planning*); selective, sustained, and shifting attention (*attention*); visual-spatial tasks (*simultaneous*); and serial features of language and memory (*successive)* (Naglieri and Das, 2005). The PASS/CAS system became an alternative approach to cognitive testing which had traditionally included only verbal, nonverbal, and quantitative tests. Their efforts, which show good psychometric properties and ability to distinguish different learning difficulties, provided some support for Luria's approach (Pöppel et al., 2011).

Otero (2015) describes PASS theory as an essential guide to develop effective intervention. PREP - Pass Reading Enhancement Programme (Das, 1996), is an example of an intervention programme using the PASS model to enhance reading, while at the same time avoiding the direct teaching of word reading skills. PREP is also founded on the premise that the transfer of principles (called *bridging* in the programme) of information processing strategies – namely, simultaneous and successive processing is best accomplished through inference and application – a point made by many researchers, for example, Carlson and Das (1997) and is similar to principles used in mediated learning-based programmes, such as Feuerstein's Instrumental Enrichment.

Luria (1980) noted, following Vygotsky, (1978) "…the child learns to organize his memory and to bring it under voluntary control through the use of the mental tools of his culture" (p.83). This is the foundation for all higher cognitive processes, e.g. controlled attention, deliberate memorisation and recall, categorisation, planning and problem solving. Naglieri (2003) summarised research that showed that the influence of social interaction on children's use of plans and strategies resulted in improvements in performance on academic tasks. Naglieri (1999) and Naglieri et al. (2014a, b), provide considerable evidence that the PASS processes associated with Luria's concept of the three functional units could be

measured and that once measured, these processes have considerable reliability and validity. In the same way that it has been argued above, that models of adult or developed cognitive processes cannot simply be reversed and used as developmental models for young children, developers of psychological tests based on Luria's concepts were aware that not only was his model based on clinical findings in neurologically damaged patients, but the model was not based on work with children, either clinically or educationally. This meant that all tests had to adapt Luria's structure and components and test their validity for application to educational contexts and for children.

Luria (1976) emphasised that cultural experiences accelerate the use of planning and self-regulation and the other cognitive processes. Goldberg and Bilder (1987), following Luria, have proposed that *planning* as a function of the frontal lobes is high up in the hierarchy of control systems for cognitive functions. Considered in conjunction with Sternberg's (1985) argument that intelligence is more related to the solution of novel rather than automatised problems, this suggests a very central role for planning in any theory of cognition. The absence of planning constructs or measures in traditional approaches to cognitive testing is, according to Kirby and Das (1990) surprising and unfortunate. Rating the pupil's ability to plan is an item in the CAP domain (6) of Strategic thinking and metacognition.

Limited research has been conducted examining the relationship of PASS processes to behaviour. Clinically, the connection between PASS processes and a child's behaviour is often observed. Several researchers have examined the relationship between the behavioural difficulties seen in children with ADHD and PASS profile scores (Naglieri and Goldstein, 2006). They found that groups of children who met diagnostic criteria for ADHD earned significantly lower mean scores on the planning scale of the CAS. Thus, although CAP Domain 7 (Behaviours associated with Learning) was not derived from Luria sources, correlations between scores on planning and strategic thinking, prominent items in domain 6 of the CAP and domain seven will be reported in the results (chapter 7) of this study.

In summary, the PASS-CAS system, has been described here because extensive research and application has been conducted on it and consistently shows good levels of validity and

reliability, appearing to offer some support for the Luria model of brain functioning from which they were developed.

4.6.4.2 The NEPSY

A neuropsychological battery for children based on the Luria approach is now discussed. The NEPSY, (now NEPSY–II), a developmental NEuroPSYchological Assessment (Korkman, Kirk and Kemp, 1998, 2007) is well known to practitioner psychologists other than neuropsychologists and not infrequently used in educational testing. It is composed of a series of neuropsychological tests that are used in various combinations to assess neuropsychological development in children ages 3–16 years. NEPSY was designed to assess both basic and complex aspects of cognition critical to children's ability to learn and be productive in – and outside of – school settings. It is designed to test cognitive functions not typically covered by general ability or achievement batteries.

Korkman (1999) points out that Luria's model was adapted for the NEPSY for two main reasons: firstly, to reflect its use for children, as Luria's model is based on evidence from clinical syndromes in adults, addressing localisation of lesions and developmental functioning (or the effects of damage) is not the same as with adult brain functioning, and secondly, that his model was a clinical neurological tool, not designed for educational testing. Korkman noted that Luria's conclusions about primary and secondary deficits might not apply to children, who are more accurately described in terms of strengths and weaknesses of functions and processes. Limitations of any list of functions typical of a neuropsychological assessment is that they do not have the same meaning for young children as for adults (Aylward, 1988). Many existing norms were not appropriate for younger populations, especially the under 5's.

The NEPSY allows for some sampling of the child's functional systems as well as observing qualitative functioning. Its six functional domains include Attention and Executive Functioning; Language; Memory and Learning; Sensory-Motor; Social perception and Visuo-spatial processing. Despite some limitations it offers simultaneous standardisation of all tests on a single normative population and normative information across an age span of 3-13 years. Another characteristic of the Luria based batteries is analysis at the subtest level

and not necessarily across all subtests that may represent a domain, because each of these areas is complex and differentially represented in the central nervous system. This issue will be further discussed in chapter 6 (Method), when describing the choice of standardised tests used with pupils in this research and the complexity of 'matching' any specific test to one domain of functioning. This issue will also be returned in the discussion chapter 8, summarising the findings of this study.

The NEPSY was classified as a ''well-established'' assessment by the CAWG (Cognitive Assessment Working group) task force (see Campbell et.al 2008). Given the NEPSY's assessment of multiple areas, reviewers opted to review it in a separate category. The NEPSY was developed, in part, in response to the weak standardization and norming properties described for other cognitive measures used with children. The NEPSY standardization sample consisted of 1,000 children representative of 1995 US census data. Internal consistency reliability ranged from .70 to .91 for the five domain scores and subtest scores ranged from .50 to .91. Temporal stability ranged from .67 to .90 for domains and .42–.89 for subtests. The test manual provides concurrent and criterion-group validity in support of the NEPSY; however, the hypothesized factor structure of the NEPSY was not evaluated and some of the concurrent validity findings (NEPSY 1) were found to be weak. For example, the NEPSY Sensorimotor Domain was only slightly correlated with the Bayley-II Psychomotor Development Index. Independent evaluations have provided initial support for the NEPSY. For example, NEPSY performance differs among children with neurological impairment, children with academic problems, children with autism, and comparison controls (Hooper, Poon, Marcus, & Fine, 2006; Schmitt & Woodrich, 2004). In contrast, however, Stinnett, Oehler-Stinnett, Fuqua, and Palmer (2002) provide evidence for a single factor for the NEPSY as opposed to the proposed five-factor structure outlined by the author. Summarising the evaluation of the psychometric properties of NEPSY, it was classified as meeting ''well-established'' criteria, but the CAWG recommended that efforts to validate, revise and improve the NEPSY should continue. NEPSY -II has sought to address some of these issues and shows good to very good subtest reliability for most subtest measures (Korkman, Kirk & Kemp, 2007, pp.83-10).

The fact that NEPSY now has strong psychometrics may be seen as indirect support for the principles of Luria themselves.

Of interest in the educational context of the CAP, is the relationship between the NEPSY and the WISC and WIAT and the BAS (US version, DAS-II), frequently used standardised measures by EPs. The highest correlation is between Verbal Comprehension of the WISC and the language domain of the NEPSY (.58). Sensory-motor subtests were unrelated to academic achievement. Moderate correlations were found between the composites of the DAS-II and domains of the NEPSY (Korkman, Kirk and Kemp, 2007). Two points in the NEPSY research are of particular interest in relation to CAP. One is that the highest association between a NEPSY domain and a DAS cluster, is in the area of language. A similar association was found to be the strongest in the CAP, between independent language tests and the CAP domain of Language. Secondly, it can be seen that overall a neuropsychological battery shows only modest correlations with the DAS, indicating as found and reported later in this study, that standardised tests of acquired subject knowledge together with cognitive processes, do appear to measure different elements of functioning and are thus not interchangeable.

In summary, as with the CAS, the NEPSY is scored either as single subtests or at domain level, but does not seek to provide average scores that are normed to intelligence or achievement. Its neuropsychological profile of the child ascertains areas of strength and weakness to plan for remediation. The CAP's goals are similar. The NEPSY provides evidence that sub-skills and domains can be scored separately; that they associate in profiling children's neuropsychological and cognitive processes and that they can demonstrate moderate to high levels of reliability and validity. Thus, it can be considered to provide some evidence for the validity of Luria's model of brain functioning.

4.6.4.3 The Kaufman Assessment Battery for Children-K-ABC

Kaufman and Kaufman's (1984, 2004) Assessment Battery for Children, K-ABC (age range 2.6-12.6 years), is a test of cognition *and* achievement. Although the K-ABC has not been normed for use in the UK, it is included here as it is a well-known battery, which is based on parts of Luria's model. It uses tests to measure sequential (successive) and simultaneous

processing. Planning and arousal/attention are not assessed, though several achievement skills are. The test's authors cite an array of evidence that the two processes as measured by the K-ABC are strongly related to scores obtained from the tests used by Das. Kaufman and Kaufman (1983) refer to simultaneous and successive processing as one of the theoretical bases for their battery, but also cite research on brain laterality differences. Das and Kirby (1990) criticise the K-ABC as an incomplete operationalisation of Luria's theory, because it does not include *planning* and *attention* measures (Das, 1984c). Das and Kirby have argued (see above) that planning in particular, is a crucial component of Luria's model and that planning has been shown in many studies to be one of the most important executive functions.

Finally, they criticise the K-ABC for "slipping back" to the assessment of *g*. In addition to scores for simultaneous and sequential processing, the K-ABC provides a mental composite score that ignores the separation of simultaneous and sequential (successive) processing, and resembles an IQ test. In this way the K-ABC attempts to satisfy both traditional and cognitive approaches to intelligence, and in their view, succeeds in satisfying neither (Kirby and Das, 1990, p.328).

Lidz (2003) takes a more positive view of the K -ABC and describes it as "a genuinely different model of intelligence" (p.141), derived from the neuropsychological descriptions of Luria. Evidence for validity is provided regarding construct, concurrent, criterion and discriminant validity. The authors of the K-ABC also sought to minimise the effects of cultural differences by subjecting items to a variety of examinations regarding bias and test results related to race difference were greatly reduced. Whereas Lidz regards the combination of achievement and intelligence test items with sequential and simultaneous processing tests, as useful, Das et.al take a more purist approach to the adaptation of Luria's model and do not regard the omission of tests on planning and attention as adequately representing Luria's concepts. Inasmuch as the K-ABC uses at least part of Luria's model, it may also be considered as providing a further source of evidence of the validity of some of his concepts.

4.6.5 Other test applications of Luria's concepts

In this chapter, thus far, some adaptations of Luria's concepts for educational testing purposes have been described, because of the CAP's adaptation of similar principles of neuropsychological assessment. However, these are not unique.

Similar concepts are evident, for example, in the process approach of Kaplan (1988), as demonstrated in The California Verbal Learning Test (CVLT) (Delis, Kramer, Kaplan & Ober, 1994). The CVLT is a widely used word memory test, which analyses sources of errors and different underlying cognitive processes, which may be involved in memory performance difficulties.

Furthermore, when describing their DA models, Haywood and Lidz (2007) state that they "rely heavily" on a Luria- based perspective in which mental processes are seen as specific mental functions such as attention, perception, memory, language, conception and metacognition (p.24). This is especially evident in Lidz's Pre-School Learning Assessment Device, the PLAD (Lidz, 1991, p.122-123) and Curriculum Based DA model, the CBDA, which is applied with school age children (Haywood and Lidz, 2007, p.177).

In assessing children's development and presenting difficulties, one needs to consider the product of the interactions of individuality, experiences and brain-behaviour relationships. "Children bring their families, their cultures, their communities and their experiences to an assessment as well as their nervous systems" (Lidz, 2003, p.192). Hynd and Willis (1988) conclude that behaviour and neurology are inseparable. Authors of neurologically based assessment systems point out, that there is no necessary direct correspondence between the behaviours we observe and their underlying neurology (Lidz, 2003; Korkman, 1999). Similarly, the adaptation of domains of cognitive abilities based on Luria's model for the CAP, would not necessarily demonstrate direct correspondence with observed learning behaviours.

Authors of the three psychological assessment batteries discussed here, emphasise that the purpose of this type of assessment is to help teachers and parents facilitate learning and coping at school and at home. The younger the children being observed or assessed (and in

terms of the use of the CAP, observed and rated, rather than tested), involvement of neurological issues is even more likely than for older children (Deysach, 1986). This has implications for practitioner psychologists in the UK who are now required to apply their professional skills from birth on and to consider how different interventions would be, when observing behaviours associated with cases of attention deficit disorder, anxiety, inadequate language development or sensory processing issues linked to attention, perceptual processes, memory and learning.

Beyond adaptation of Luria's concepts for educational psychological or neurological testing of children, the theory has also formed the basis for some cognitive intervention programmes, an example of which is Ashman's research and educational programme of cognitive intervention Process Based Instruction (PBI) (Ashman and Conway, 1997; Ashman & Conway, 1993) measured students' independence in learning and problem solving by providing a structure into which curriculum activities can be placed. The PBI students outperformed their peers on measures of reading, mathematics and on one measure of planning ability. Overall, teachers reported that PBI led to positive changes in their teaching approaches and positive learning outcomes for their students.

4.6.6 Luria's approach to assessment – some synergy with DA?

In Luria's view it is not enough to know how to apply some more or less standardised tests. For Luria, the most important observation when testing a patient is the analysis of errors and how such mistakes could be explained. The qualitative *analysis of errors* is particularly important and informative. It is not enough to know that a patient cannot understand language or cannot write. The actual errors produced by patients will be different. Failure on the same task maybe for totally different reasons and the errors will be the key clues for understanding the underlying deficit. Luria presented an extensive range of tests for evaluation, the critical factor was not which tests he used, rather what type of psychological processes are involved.

In his clinical work and emphasis on error analysis, one can see some similarities between Luria's approach and that of Feuerstein. Feuerstein's *deficient* cognitive functions,

demonstrates his emphasis on error analysis in the LPAD, and individualisation of assessment and remediation, via individual case studies.

Luria never rejected the normalisation of tests (Ardila, 1992). He studied the development in normal children of abilities tested in neuropsychological examinations, an example of which is Luria's 10-word memory test (Ardila, Rosselli, Ostrosky and Puente, 1992). For Luria, however, the availability of norms was useful for the beginner, not for the experienced examiner who would know what normal functioning looks like. The availability of norms is no substitute for clinical ability to perform analysis. In addition, norms require very careful interpretation and are of limited value when assessing culturally or linguistically different populations. Here, too, are some similarities to Feuerstein's views.

In summary, for Luria, assessment is performed (1) to describe the general pattern of changes taking place in cognitive ability of a patient; (2) to identify fundamental defects, i.e. factors underlying the signs and symptoms and (3) to propose therapeutic procedures. His main contribution does not lie with the development of specific tests, but in his individualised clinical approach (Ardila, 1992, p.42). Regarding points (2) and (3), Feuerstein's goals were similar. Perhaps because Feuerstein was not operating within a clinical and neuropsychological context, but was addressing the educational world, his primarily clinical approach fitted poorly with the dominant standardised testing methods in use in educational psychology.

4.7 Recent developments in the field of educational psychology and neuropsychology based on Luria's concepts.

To what extent have Luria's concepts influenced current theories and practices in neuropsychology and education?

Luria's work has had significant worldwide influence on neuropsychological theorizing and practice (Solso and Hoffman, 1991; Tupper, 1999). It is evident that neuropsychology is practised somewhat differently across the world, and—on the basis of the amount of written literature available—the most prominent influences come from the United States, Great Britain, and Russia. Clearly, Luria's neuropsychological approach has been the major

identified approach associated with recent Russian neuropsychology (Akhutina and Tsvetkova, 1983; Diamant, 1981). In fact, in many ways, Luria's more theoretical Russian approach has often served as a counterpoint to North American psychometric approaches to neuropsychology (Glozman and Tupper, 1995). Luria's assessment methods and conceptual framework have been not only been codified into more formal batteries of test devices (as described above) but are also seen in recent educational neuroscience.

One key theme in this work is research focusing on the overlap between cognitive domains and its implications for both diagnosis and intervention. For example, in challenging the validity of discrete diagnoses and labelling of specific conditions, Gilger and Kaplan (2001) argue, as does Gillberg (2012) that the search for one or two distinguishing diagnostic features risks missing the complexity and overlapping presentations of difficulties especially in younger children. The idea that comorbidity is the rule rather than the exception in developmental disorders is essentially a Lurian principle. Recent neuroscience evidence indicates that different developmental disorders co-occur at rates much higher than chance. For example, dyslexia and dyspraxia have a co-morbidity rate of 60 – 70%; Some 40 – 45 % of children diagnosed with dyspraxia would also meet diagnostic criteria of ADHD, ASD or dyslexia (Bishop 2010).

Increased recognition of co-occurring difficulties in educational neuroscience has led to the suggestion that even the use of the term comorbidity may be too restricted and the more recent broader descriptions of difficulties as multi -faceted, and multi-variate, moves away from discrete diagnostic labels of disorders (Kaplan et al. 2001). The concept of neurodevelopmental disorder, or neuro-developmental disability (Bishop, 2010) may be useful in replacing simplistic and restrictive diagnostic labels. Overall these more recent approaches have been described as neuroconstructivist (Karmiloff-Smith, Thomas & Johnson, 2018). The relevance of these concepts has been mentioned earlier, (for example, see page 93) and will now be elaborated on further in relation to the CAP.

Neurodevelopmental research such as the work of Karmiloff–Smith and Gillberg cited above, challenge the notion of discrete conditions especially in early childhood, suggesting that different causal conditions and attempts to identify specific cerebral location of various

manifest difficulties is an incorrect understanding of a-typical development. This critique was raised in relation to Feuerstein's adapted model of cognitive dysfunctions in young children. Evidence suggests that a more complex and dynamic neurodevelopmental model leads to the identification of related areas of difficulty and more importantly, points to the need to intervene across several areas of development concurrently. This accords with Luria's approach that similar presentations i.e. manifest difficulties can be caused by different contributory causal mechanisms.

Bishop (2010) has proposed the use of the term neurodevelopmental disability emphasising the generic nature of difficulties, as a possible alternative to separate diagnoses. This would prevent the current compartmentalisation, placing children in diagnostic boxes and reduce the use of arbitrary cut off points for diagnoses, thus addressing a full range of the child's difficulties. Bishop acknowledges that adopting this approach more widely would require substantial changes in the structure of health, education and social services, but could improve awareness of teachers and therapists to think more broadly about a-typical development and adopt multi -pronged interventions. Earlier in this thesis, work of Karmiloff Smith was mentioned, (Karmiloff Smith, 2006) citing her research comparing presenting difficulties and problem-solving strategies in children with Down Syndrome and William Syndrome (Karmiloff- Smith, 2012). It is argued that one dominant position in psychology, linguistics and neuroscience about how genetic disorders point to the innate specification of disassociated modules in the human brain should be replaced by a dynamic neuroconstructivist approach in which genes, brain, cognition and environment interact multi- directionally (Karmiloff – Smith, 2009). The brain specialises over time, such that disturbance in one local area in the early stages of development can have a cascading effect on a range of cognitive domains. Thus, manifestations of disability cannot be understood outside of a developmental perspective. A detailed analysis of neuroconstructivist theory and its implications for diagnosis and intervention is beyond the scope of this study.

Luria's approach has also influenced wide ranging educational neuroscience that examines academic skills and interventions. For example, Varma and Schwartz (2008) review the benefits of a Lurian-based network focus for research investigating maths skills; Sare and colleagues' work on verbal reasoning is informed by Luria; and his framework has also been

instrumental in experimental research on the effects of exercise on children's cognition (Davis et al, 2007).

Luria's influence in education also stretches across the lifespan with Veraska & Veraska (2014) outlining the ways in which Luria's work has informed the use of visual models in pre-school education, whilst Kotik-Friedgut, Schleifer, Golan-Cook, & Goldstein (2014) also apply Lurian principles to interventions aimed at illiterate adults.

One widely used early years intervention programme developed from Vygoskyan concepts as well as crediting their conceptual and practical base to Lurian principles, is the Tools of the Mind programme (Bodrova and Leong, 1996) which has shown to be effective for educational achievement in young children (Barnett et al, 2008) thus supporting Luria's ideas further.

Despite the fact that a body of Lurian-based work exists, Arsalidou and Pascal-Leone (2016) have recently called for an increased focus on neurodevelopmental models in experimental developmental research in order to progress the field.

These recent developments both in theory and implications for intervention are consistent with the goals and structure of the CAP. Assessing the child is never limited to one domain, even if the main *presenting* problems seem to lie in one particular area (for example a reading disability). Consultation and rating are carried out both at the domain and subcomponent level, reflecting multiple features and complexity of the system and subsystems underlying individual presentations. CAP consultation is carried out across all domains including emotional, motivational and behavioural features affecting learning (domain 7). Intervention is designed to target several areas concurrently and changes are looked for across different domains (see recommended use of the CAP review system, described in Chapter 5 of this study and detailed in the CAP manual, chapter 6), not restricted to the specific time- bound targets. This does not discount or contradict the identification of specific conditions but sees them as part of complex interrelated developmental disorders of multi-variate origin. Likewise labelling and diagnosis is not the purpose of the CAP. CAP focusses on addressing contributory cognitive elements and avoiding the search for a specific narrowly defined disability. In this way, the CAP's approach

and processes, is consistent with the current more dynamic neuroconstructivist view of remediation, irrespective of label and cause. Early intervention- the earlier the better- is strongly emphasised in use of the CAP.

In the CAP system, although domain scores are presented as averages, to show the learner's overall pattern of stronger and weaker cognitive areas, the averages are based mainly on qualitative, inter-rater analysis of cognitive abilities by all those involved, resulting in an individual profile, not for normative purposes. Intervention is not carried out at the domain level, but at the subcomponent (item) level and often across different domains, in recognition of multiple cognitive elements that may be needed in one activity, and the need for diversity and flexibility (Deutsch and Mohammed, 2010).

The above discussion serves to emphasise that:

- The CAP is not a neuropsychological tool, although based on Luria's conceptual model;
- The cognitive abilities rated by the CAP overlap with some aspects of executive functions but are not identical with executive functions (EF).
- The independent, standardised tests selected for this study are taken from educational, not neuropsychological assessments (as presented in chapter 6 of this thesis on methodology used in this study).
- No single test would be expected to capture all cognitive items of a domain and there is likely to be overlap in cognitive functioning that shows across a range of activities.
- Challenges to the use of standardised testing of some neuropsychological processes, (especially those associated with metacognitive and executive functions) are partially addressed in the CAP by the use of consultation in place of direct testing, i.e. focusing on children's functioning in the naturalistic contexts of everyday activities at home and in formal learning in school using the perspective of those working with the child over time.

4.8 How does the rating of cognitive abilities in domains support assessment?

Although evidence for relevance and utility of Luria's concepts has been presented above, it should be noted that Luria's model is not empirical and is not a proven structure. Nevertheless, it was felt that a cognitive domains categorisation based on these concepts would enable psychologists and teachers to identify observed processes quite confidently, by associating different CA's with certain tasks, in or out of the classroom. However, there are certain limitations and caveats in the use of this cognitive domain structure.

- Firstly, it is not claimed that every possible aspect of cognitive functioning is listed within each CAP domain. As discussed in the detailed description of CAP items in the next chapter, a conscious effort was made to balance detail and accuracy with user friendliness and realistic time constraints. Further investigation can be undertaken if needed.
- Secondly, although neuropsychological theory identifies specific functions, assessors always need to be aware that problem solving cannot be relegated to isolated abilities or deficits within a single domain and that one is comparing within and across domains. They are associated and interconnected. This is observed within neuropsychological evaluations and is a major postulate in Luria's model. Performance requires the use of many CA's, simultaneously and sequentially, and there are many recorded differences between daily life problem solving and performance in experimental/testing conditions. In the CAP this is addressed by emphasising the need for CAP users to assess CA's within and across domains at baseline and at review. And the importance, whenever possible, of CAP ratings by multi -disciplinary team work to capture functioning seen from different perspectives. The flexibility of group consultation across contexts and over time may also help address concerns about ecological validity in the use of standardised tests for assessment of cognitive functions.
- Thirdly, there is no attempt in the CAP to link difficulties in CA's directly to specific neurological brain locations. As discussed, whilst identifying locations of brain damage associated with different syndromes, Luria recognised that various

combinations of cognitive functions can be related to different areas of the brain and alternatively that damage to a specific region of the brain, may show itself in different patterns of cognitive dysfunction. Thus, although the CAP is based on a neurological model, it separates manifest cognitive functioning from any direct link with brain functioning. This separation has functional implications in that it allows for a remedial approach to improve cognitive processes, in the presence of, or despite developmental and neurological difficulties.

- A fourth reason for adopting a domain model of cognitive abilities is the potential for assessing the relationships between the student's functioning across different domains, both as a theoretical aspect of the CAP and for functional use to guide interventions. It is expected that different tasks will tap into different domains and items in different ways. Associations between the various domains of the CAP should be found when rating the cognitive abilities of an individual. This is tested and reported in the Results chapter 7.

4.9 Summary

This chapter has described three aspects of the CAP: (1) the rationale for its development, as a response to evidence of several sources of difficulties in use of DA, both conceptually and in practice. (2) The CAP's structure showing how conceptual and practical elements drawn from DA sources have been incorporated into the CAP model, and (3), a detailed presentation of the CAP's main theoretical sources, especially relating to Section A of the CAP, used in this research. Some of these are DA based, such as from Feuerstein's LPAD model and others, from non-DA sources, including Luria's neuropsychological concepts. The latter has been set out in some detail in this chapter, because this is one of the novel aspects of the CAP, i.e. application of Luria's concepts into a consultation, observation and educational framework. It is this resulting CAP model which is a central focus in this research.

Chapter 5: The development of the CAP

The previous chapters have outlined both DA and consultative approaches, and have then discussed the theoretical influences of the CAP tool. In this chapter a more detailed description of the CAP is provided, including additional rationale for the domains included and the process of CAP use. Additional extracts from the CAP materials (e.g. CAP record forms) can be found in Appendices 1, 2 and 3.

It is important to note that for each domain, the CAP collects information from several informed CAP participants and parents, as well as the child's self-rating. Differences in scores between CAP users when rating items may be due to a variety of factors, such as context, e.g. home or school; time of the day, e.g. impact of fatigue; modality of instruction, e.g. verbal or non-verbal activities. The 'team' is asked to note evidence for their observations and scores, which are recorded on the CAP Record form. The CAP facilitator can extend the discussion by asking further questions, such as whether a task requirement to use particular cognitive abilities affects the child's attention or whether the novelty or complexity of a task is a factor. Within all the domains, the CAP questions are designed to be valid representations of the domain, but clear enough not to overwhelm non-experts. For each item, examples are provided in the CAP manual drawn from subject teaching and informal settings to aid rating. Nevertheless, a challenge to CAP raters is that these processes are often not made explicit or commonly analysed in mainstream teaching; the terminology although simplified, may still not be familiar to teachers and still less so to parents. The language of the items has to be further explained. The consultation skills of the CAP facilitator are important both to communicate knowledge at a level that is understood, usually by providing a range of straightforward everyday examples, whilst at the same time avoiding coming across as 'too' expert, thereby risking insecurity and alienation from the CAP process by the participants.

This chapter is divided into three sections:

Section 5.1: Explains the items in each domain in more detail and gives additional rationale for each.

Section 5.2: Outlines the CAP process following the use of Section A.

Section 5.3: Concludes the two chapters on the CAP with a brief outline of pilot developmental work on the CAP that led to the current CAP model.

5.1 Domain and item analysis of the CAP

The seven Domains of Section A of the CAP are:

1. Attention;
2. Perception;
3. Memory;
4. Language;
5. Reasoning and Logic;
6. Strategic Thinking/ Metacognition;
7. Behaviours Affecting Learning.

These domains each have a number of items, which are sub-components presented as individual questions (which are set out in the Record Form in Appendix 1). These are intended to promote discussion for the CAP raters, during the consultation.

5.1.1 CAP Domain 1: Attention

Domain items

AA1: Regulation of Attention;

AA2: Selective Attention;

AA3: Shifting Attention;

AA4: Sustained Attention.

Rationale for the inclusion of this domain and its items

As discussed in the previous chapter, the process of attention is essential for all acts of learning (Lidz, 1991) and is a foundational element in Luria's framework. The arousal aspect

of attention relates to creation regulation and maintenance of a state of alertness and this is reflected in items AA1 and AA4. Attention that requires directing focus to certain stimuli while ignoring others and also divided attention are reflected in items AA2 and AA3 respectively. These elements are particularly relevant for educational tasks as Naglieri and Das, 1989, p.193) comment, “During an attentional task, the child must work to direct activity and responsiveness to a particular stimulus and suppress reacting to a competing stimulus or stimuli”.

5.1.2 CAP Domain 2: Perception

Domain items

AP1: Perceiving visual information;
AP2: Perceiving auditory information;
AP3: Perceiving kinaesthetic (tactile) information;
AP4: Perceiving spatial relationships;
AP5: Perceiving temporal relationships (sequences);
AP6: Noting more than one source of information.

Rationale for the inclusion of this domain and its items

The second domain of the CAP refers to the organisation, identification, and interpretation of sensory information.

Luria describes perception as an active process which includes the search for the most important elements of information, their comparison with each other, the creation of a hypothesis concerning the meaning of the information as a whole and the verification of the hypothesis by comparing it with the original features of the object perceived (1983, p.240). Perception goes well beyond stimulus detection and lays the groundwork for cognition (Haywood and Lidz, 2007, p.180).

Concepts around the processes of analysis and integration of perceptual information, which Luria terms coding/analysis of mental processing are included here within these items. For

example, AP4, perceiving spatial information, is associated with simultaneous processing and AP5, perceiving temporal information, is associated with sequential processing. The CAP also itemises different modalities in perception – Visual, AP1, Auditory, AP2 and Kinaesthetic, AP3 – which typically cover many school and daily life applications of perceptual input. A distinction is made between evidence for *perception* of spatial information and evidence for the *naming* of spatial concepts, which is a language issue. Difficulties and strengths in one or both aspects, i.e. perception and naming, may need to be identified.

The final item in this domain AP6 refers to the number of items a child can perceive at any one time, which also reflects developmental level. For example, features of colour and shape will have greater salience for a young child than location, orientation and sequence. It is worth noting that the use of the term *perception* is not familiar to all parents and teachers. Thus, a recommended method within a CAP consultation is to first introduce this domain by explaining, "Now we ask about how well the pupil gathers information through their senses, including sight, hearing and touch, so perception is about how the brain makes sense of that incoming information" (Deutsch and Mohammed, 2010, ch.3). It is pointed out, for example, that a child may be able to hear well, but may have difficulty discriminating different sounds, so we may describe this child as having auditory perceptual difficulties, which will impact on verbal language acquisition, reading and written language skills.

Rating this domain benefits from Occupational Therapy information if available. An OT working with a child or access to an OT report can provide detailed information whether obtained by formal testing, clinical observations or both.

5.1.3 CAP Domain 3: Memory

Domain items

AM1: Short term-immediate recall;
AM2: Using working memory;
AM3: Memory of visual information;

AM4: Memory of auditory information;

AM5: Memory of kinaesthetic information;

AM6: Long term memory.

Rationale for the inclusion of this domain and its items

The third domain of the CAP asks teachers and parents to consider different aspects of memory. Only a very brief reference to memory studies, which is a large field of research, is presented here, to explain the choice of items in the Memory domain.

The division into three aspects of memory (long term, short term and working memory) is based largely on Baddeley and Hitch's (1974, 2000) model which describes working memory as the central executive fed by short term and long-term memory input. However, items in this domain are also influenced by Flavell's (1999) more generalist definition of memory.

Consistent with the Baddeley and Hitch model, some questions about how human memory operates can be applied in classroom or informal settings have been itemised in the CAP. It could be said that the primary function of the assessor and teacher in relation to memory, specifically storage and retrieval processes, is to facilitate the transfer of short term into long term memory or storage, and to enhance the potential for retrieval (Lidz, 1991). Working Memory has become particularly prominent in recent educational research. For example, those with low WM have trouble following long sequences of instructions and reading long phrases (Alloway et al.,2005). Indeed, in an experiment involving 600 five-year-olds, Alloway found that working memory (at age 5) was a better indicator of students' learning outcomes than IQ (Alloway and Alloway, 2010). Alloway (2012) states that WM is not a proxy for IQ, but represents a dissociable cognitive skill with unique links to academic attainment.

The scoring of three main modalities of working memory, visual, auditory and kinaesthetic, AM 3,4 and 5, are designed to correspond with the same modality items in the Perception domain AP 1, 2 and 3, to allow for comparison across the two domains such that consistencies should be observable. For example, if a student has poor auditory perception, it may follow that auditory information will not be efficiently encoded and scores on

auditory memory would be correspondingly low. Alternatively, these items can be used to determine strengths and weaknesses in different modalities, for example, to identify pupils with weak visual memory and strong verbal memory.

Other well-known educational psychology tests also include memory elements. For example, the Automated Working Memory Assessment (AWMA; Alloway et al., 2008), which includes subtests tapping visual recognition, visual recall, verbal recognition and verbal recall; The TOMAL-2 Test Of Memory and Learning which includes memory of narrative, facial recognition and memory and other specific elements (Reynolds and Bigler, 2007); The NEPSY-II, which tests memory for words, sentences and faces, immediate and delayed list learning, memory for names and narrative memory under free- and cued-recall conditions. The CAP does not attempt to replicate the information that can be obtained from detailed memory tests, or to cover every aspect of memory functioning, but to elicit consultative information on how these skills appear in the classroom and to use a dynamic approach in assessing change in this domain.

The interventions arising from this domain could be quite different from one another depending on how the key adults interpret the information available (see later discussion on correlations between items in the memory domain, which are discussed in the Results and Discussion chapters of this thesis).

5.1.4 CAP Domain 4: Language and Communication

Domain Items

AL1: Receptive language (content);
AL2: Expressive language (content) not limited to verbal language;
AL3: Communicating a response taking account of the listener (function);
AL4: Language structures (form).

Rationale for the inclusion of this domain and its items

The centrality of language as a cognitive process and as a vital element in bridging from basic cognitive processes such as attention, perception and memory to higher order thinking processes is recognised in DA theory and practice (Hasson and Joffe, 2007). The majority of LPAD tests use visual and visual -spatial modalities, mainly focusing on non-verbal and perceptual reasoning. Although language is a very important as a tool for mediation, i.e. for the ongoing communication between the examiner and testee) and deficiencies in the use of language are named in Feuerstein's DCF list in all three phases, specific language tests[4] are not prominent in the LPAD battery. However, as discussed in the previous chapter, language is a key component of Luria's framework of cognitive processes and so has been included in the CAP.

Another important reason for including a language domain in the CAP is that some populations may not accurately be assessed using standard language assessments. Deutsch (1965) investigated the role of social class in language development and cognition. Inter-relationships among language and some demographic variables were reported. Findings were that both 'lower' class and minority group status are associated with poorer language functioning (Mendelsohn, Leora, et.al. 2001). However, this result could be a factor of the standardised tasks used. In the UK, there has been growing interest in applying DA and Vygotskian frameworks to the area of Speech & Language Therapy (SLT), both for

[4] The LPAD 16 Word Memory test, based on Rey's Auditory Verbal Learning test, (RAVLT) is primarily a test of auditory working memory rather than of language.

assessment and intervention (Hasson and Joffe, 2007). Research in the UK has led to development of a number of DA procedures for speech and language, for example, the DASS, DA of Sentence Structure (Hasson, Dodd and Botting, 2012) and the DAWL, Dynamic Assessment of Word Learning, (Camilleri and Botting, 2013).

At the same time, Dockrell (2001) argues the inadequacy of standardised SLT tests to inform intervention and suggests that widely used SLT tests cannot distinguish different causes of language difficulty. The child's response to language or speech intervention is considered essential to understanding the nature of the child's difficulties and the strategies to which the child may respond. In other words, the arguments of DA-oriented SLTs are similar to the criticisms of standardised intelligence tests (Peña and Gillam, 2000; Hasson and Joffe, 2007).

The items in this CAP domain are structured according to Lahey (1988) who described the basic dimensions of language as content, function and form. Language is the integration of these dimensions to guide actions either with objects or with people. These refer to what the learner is actually saying, such as the words used and the concepts communicated (content), the order in which this is expressed and the use to which this is put (function) and the structure and syntax of language (form) as in formation of sentences. Language enables the individual to interpret actions, ideas and intentions of others; express own ideas and meanings and initiate and maintain social interaction.

For discussion and ratings by the EP, teachers and parents, the CAP itemises four areas of language: receptive, AL1; expressive, AL2; social communication, AL3; and language structures (sentence formation and grammar), AL4. The input of an SLT into the CAP 'team' is an important asset for rating this domain when available.

Along with the four questions in this domain CAP users are invited to comment on articulation, clarity, pace and tone, if they wish. This can be quite a difficult domain for teachers and parents to rate and it is made clear to those doing the rating that they are not expected to be Speech and Language Therapists. This may be because the teacher is thinking of language in the context of subject teaching only or in terms of literacy. Furthermore, the pace of learning and teaching in class and the number of children in the class may prevent the teacher having sufficient opportunities to hear the child speak in full

sentences (AL4). Indeed, classroom teachers often miss children with language problems and such children are often referred to EPs for behavioural problems (Stringer and Lozano, 2007; Palikara, Lindsay, Cullen and Dockrell, 2007; Ramsay, Cowell and Gersch, 2018). Likewise, parents' views on the adequacy or not of their child's language will be particularly subject to their personal and cultural expectations. Parents sometimes find it easier to rate their child's language both receptively and expressively by comparing the child to a sibling.

5.1.5 CAP Domain 5: Reasoning/Logic

This domain, as well as the domain of Strategic Thinking and Metacognition which follows, builds on the four previous domains and focuses on rating the pupil's use of higher-order mental processes.

Domain items

AR1: Comparing items and concepts;
AR2: Classifying and grouping;
AR3: Conserving constancies;
AR4: Establishing cause and effect relationships;
AR5: Using analogy;
AR6: Using inference.

Rationale for the inclusion of this domain and its items

Logic is often regarded as the science of reasoning, and logical thinking as the process of reasoning correctly and supporting an argument with evidence (Sternberg, 2008).

Recognition of applications of higher order thinking skills and their central importance for academic and personal development has led to emphasis on the need to teach these skills explicitly in school. This has become a much more prominent goal in educational guidance and curricular frameworks in recent years.

A large number of investigators have described the kinds of higher order processing involved in reasoning and problem solving in their attempts to understand intelligence

(Sternberg, Kaufman and Grigorenko, 2008; Sternberg and Grigorenko, 2002). Examples of reasoning processes often investigated are analogies, series completions, and syllogisms. One of the concerns of testing higher order skills in standardised cognitive tests, is that these processes are much more dependent on 'within-culture' learning than 'lower-order' cognitive processes. Both Vygotsky and Luria tested these propositions, demonstrating that spontaneous use of syllogistic reason is not an innate marker of intelligence, but is taught within a social-cultural context (Luria, 1976). Feuerstein demonstrated similar findings in his work with deprived adolescents, showing that the spontaneous use of higher order thinking skills, as demonstrated in scores on static tests, was deficient in these youngsters, but when they were mediated to learn the processes, their performance was significantly improved (Feuerstein, 1980, 2002).

In the CAP, it was decided to separate the cognitive components of reasoning from the decision making/strategic aspects, which are found in the next domain, Strategic Thinking and Metacognition. Theoretically this separation corresponds with Luria's framework and follows a similar organisation of components used in Lidz's CBDA (Haywood and Lidz, 2007). The Reasoning and Logic domain of the CAP begins with three cognitive abilities that underpin reasoning skills: Comparison, Categorisation and Conservation of Constancy.

Comparison, AR1, is a foundation of the process of reasoning (Haywood, 1985; Tzuriel, 2000; Haywood and Lidz, 2007). Categorisation, AR2, is one of the cognitive abilities used for organising information based on comparison of two or more objects or ideas, from which application and transfer to other contexts and activities becomes possible. Although the items are not separated for modality as in the Perception and Memory domains, CAP users are asked to consider these cognitive abilities in different modalities. Whilst skills are not expected necessarily to be uniform across stimuli that are visual, auditory and kinaesthetic, logical reasoning is likely to be a more domain general skill (Sternberg, 2008). Furthermore, the number of items within this domain would make separating each one into different modalities unwieldy for the CAP user.

Item AR3, conservation of constancies, was included in the domain of reasoning despite it not being a well-known concept known to teachers. Conservation is described by Piaget,

(1965), as a cognitive ability, which in his view, is not accessible to children at the pre-operational stage (preschool years), but is gradually formed during primary school years. This item is included here because of the view that not only is conservation possible in younger children than Piaget described (Donaldson, 1978) but that conservation, requiring attention, memory, comparison and categorisation as supporting cognitive skills, is an important basis for transfer of concepts into many areas of learning.

The next three items in this domain concern more specific reasoning processes, building on the previous items. AR4, cause-effect reasoning, is included in this domain because it is the earliest form of logical reasoning to develop in young children and can be rated relatively easily using school and home examples (Haywood, 1985; Haywood and Lidz, 2007, p.185). AR 5, Analogical reasoning is included, because, despite Piaget's contention that 'true' analogical reasoning is not accessible to children below the stage of formal operational reasoning (Piaget et al., 1977), it has been shown that ability to use analogical thinking underpins many learning activities in early years such as the acquisition of literacy, and mathematics (Tzuriel, 2001; Goswami and Brown, 1990; Goswami, 2001), as well as in everyday problem solving and social situations. The final item in the domain, AR6, asks about inferential reasoning, a skill used in school certainly from early primary years on, for example in comprehension in literacy and in maths. In outlining components of cognitive processing, Sternberg states, "if we were to select one performance component as most important of all, we might select inference… which is the discovery of one or more relations between objects or events" (Sternberg et al., 2008, p.106).

5.1.6 CAP Domain 6: Strategic Thinking/Metacognition

Domain items

AS1: Understanding what to do: *problem definition – understanding the task*

AS2: Selecting what is relevant to the task: *the learner can only consider all factors and select what is relevant, once the task has been understood.*

AS3: Creating and testing a hypothesis: *what kind of task is this? Have I done it before? Comparison; how similar or different is it to…? Conservation; reflection on previous learning experience, what did I do then: did it work?*

AS4: Systematic planning behaviour: *after considering all the factors and comparing to a similar problem; simplify the problem; decide on order; time allocation; is it complex? Can it be broken down into parts? Are some parts more important than others? Use of analysis and synthesis; selection of strategies.*

AS5: Precision and Accuracy; *deciding on level of accuracy required by the task*

AS6: Flexibility/Generating alternative solutions: *Working Memory; weighing up different methods: is one more efficient than another; checking against prior knowledge.*

AS7: Transfer and generalisation: *Applying/adapting methods and strategies used to other contexts. Near and far transfer.*

AS8: Self-evaluation: *Have the goals of the task been met? Have all the relevant elements been included? Are they in the best order? Is presentation clear?*

Rationale for the inclusion of this domain and its items

The terms Strategic Thinking and Metacognition have been chosen as the title for this domain, which covers a range of metacognitive processes, some of which overlap with executive functions (EF). Metacognitive processes are defined here as accessing one's store of thinking strategies, selecting appropriate ones to match the situation, and applying these

strategies to perception, learning and problem solving (Borkowski, Turner and Nicholson, 2004; Haywood and Lidz, 2007). Some cognitive processes regarded as contributing to EF, by these and other researchers are rated here and some are placed in various other domains of the CAP. Examples are: Attention (domain 1); Working Memory (domain 3) and Self-Regulation (domain 7). However, a domain dedicated to strategic thinking was needed to reflect the importance of this function in academic achievement and general intelligence (Sternberg, 2008). In the domain of strategic thinking, ratings are especially linked with cognitive processes that have already been discussed and rated in previous domains. For example, Selective use of working memory (AM2), and long-term memory (AM6) are involved, to access past knowledge (content) and strategies (processes) for the task in hand. The extent to which a student can compare and conceptualise similarities and differences (AR1), in relation to previous learning experiences is part of effective use of working memory in contrast to repeated task performance which is dependent on rote-learned routines. Finally, internalised language (AL1) is also required for strategic thinking.

The extent to which cultural factors affects higher order thinking processes or metacognition are also addressed here. In particular, the concept of speed in performance, which is part of most standardised Intelligence tests and is often viewed as an important part of intelligence, is notably *absent* in the CAP. DA frameworks are characterised by the separation of performance i.e. accuracy from speed, in contrast to many standardised intelligence tests in which speed is part of scoring.

In one of Feuerstein's sub-goals of mediated learning he notes the importance of the mediator developing the learner's insight into their successes and failures in learning, even though his formulations may have preceded the use of the term *metacognition* in psychological theory. Haywood, also places metacognition high in the process of change, stating that "what we are actually modifying, when we offer mediation in an assessment as well as during subsequent interventions, are the metacognitive processes as they affect one or more of these more specific mental processes… [such as attention, perception, memory, language]" (Haywood and Lidz, 2007, p.33). This would suggest that mediation is at core, a metacognitive tool.

In Luria's view, metacognition is synonymous with planning. Luria describes planning as creating intentions "[the individual] forms plans and programmes his actions; inspects performance and regulates behaviour accordingly; compares the effects of his actions with the original intentions and corrects mistakes" (Luria, 1966, p.80). Furthermore, metacognition, as strategic control of one's own thinking processes, is strongly associated with improvements in learning, which develop with increased age and ability (Haywood, Brooks and Burns, 1985).

The starting point of any act of strategic thinking must be an understanding of the required task therefore this is the first item, AS1, in the domain of strategic thinking. Item AS1 asks: "*Does the learner understand what they have to do when presented with a problem or task?"* It has often been observed that teachers and LSA's assume that because the task has been written down or discussed, the pupil knows how to proceed. One of the first intervention strategies in this domain is always to check this and revisit the goals and components of the task, for example, by asking the pupil to explain the task in their own words. Note also that pupils with working memory difficulties will often 'lose' the task's goals and elements, as they try to proceed with carrying it out.

AS2, the second item in this domain rates whether a student is able to distinguish and select what is relevant to the task. The order of the cognitive abilities in this domain reflects processes of strategic thinking. A learner cannot sort relevant from non-relevant information and procedures, without first having a clear understanding of the task.

AS3 itemises another aspect of strategic thinking, which is creating and testing hypotheses and considering alternatives. This item is closely linked to processes of reasoning, such as *inferential reasoning (*AR6) rated in the previous domain. Strategic thinking can be observed in tasks ranging from simple to much more sophisticated and abstract examples, thus several examples are provided (in the CAP manual) for the CAP user, as illustrations of the CA at different stages of learning, e.g. within primary or secondary education and in daily activities so that observations can be compared to what that ability might look like in practice. The ability to plan a task in a systematic way (AS 4) in contrast to impulsive

responding, indicates controlled strategic thinking, and as seen in the conceptualisations of several psychologists, (e.g. Das et al., 1994; Lidz, 2003).

Although the role of motivation in metacognition is more fully focused on in Domain 7 (Behaviours Affecting Learning), for the next item, AS5, the CAP team is asked to rate the learner's sense of precision and accuracy needed by the task. The concept of *need* in relation to the use of a cognitive ability is introduced at this point in the CAP (as shown in the CAP Record Form in Appendix 1), although this is certainly not the first time that motivation will have been addressed in discussions around assessing cognitive abilities (e.g. Haywood and Switzky, 1986; Sternberg, 1985; Dweck, 2006). The concept of *need* is explained as stemming from two considerations. The first is driven by individual attitude and disposition, whether the learner regards it as important to be accurate, i.e. whether accuracy has become a "Habit of Mind" (Costa and Kallick, 2000). The second aspect is task related and is the metacognitive aspect of *need*. That is, when performing a task, does the individual show awareness of the need to consider accuracy, how much and where, in relation to specific task requirements? Likewise, in item AS6, which asks about flexibility, CAP raters may be thinking about two aspects of flexibility, emotional and cognitive. A point of discussion when rating the item on accuracy, AS5, is that accuracy in itself may not always be a mark of efficiency. In the case of students who for a variety of reasons may have an obsessive need for accuracy, this can become a barrier to effective problem solving. Rating this item does not refer to students who may have difficulties in delivering accurate performance as a result of sensory or perceptual problems, such as visual or motor coordination problems.

Evidence for the learner's capacity to transfer and generalise learning from one context to another, is discussed and rated in item AS7. The importance of this skill is raised in all formulations of metacognitive processes. Some psychologists define intelligence itself in terms of a person's ability to transfer his or her learning and accumulated experience from one situation to another (Barnett and Ceci, 2002). In Ceci's research (1990) with adult groups who differed in levels of education and cultural background, he demonstrated that transfer is not automatic and that real-world transfer activities do not necessarily correlate with scores on higher order thinking processes or levels of formal education, as tested in

psychological tests (in contrast to near transfer when tasks relate closely to each other). Ceci states that commonly used test batteries do not reflect real world contexts. However, the opportunity and the emphasis on eliciting transfer and generalising cognitive skills between tasks and within tasks is incorporated into the structure of many DA tests. Psychologists differentiate between near transfer and far transfer, including Feuerstein in his LPAD. Using Structural Equation Modelling in a meta-analytic study of mediated learning carried out by parents, Tzuriel (2012) found that mediation of transcendence, which is the deliberate transfer (bridging) of strategies and applications from one situation to another, emerges as the most important and consistent form of mediated learning that explains gains in cognitive modifiability from pre-to post-tests in young children. Intervention to facilitate development of metacognition in children for transfer and generalisation of learning is recognised as important for all learners (McGuiness, 2005; Hattie et al., 2009), not limited to pupils recognised as having learning difficulties, but is particularly needed for pupils struggling with learning.

The final item in this domain, AS8, rates the pupil's self-evaluation of performance, often referred to as self-monitoring. This quality of insight and reflection is addressed again in Section B of the CAP in discussion with teachers, when asking about the pupil's response to strategies used by teachers to promote the development of thinking and learning (see appendix 3 for a brief description of Section B which was not used in this study).

5.1.7 CAP Domain 7: Behaviours Affecting Learning

This final domain addresses some features of non-intellective aspects of learning. The title of this domain reflects the relationship between emotion, behaviour and learning. It is not designed to examine emotional strengths or difficulties as such, which is not within the purview of the CAP, but to identify the interactional relationship between cognition and affect. For this reason, this domain is left to last, as it asks the CAP team to reflect on what they have discussed already and add in the impact of non-intellective factors. There is no attempt to ask CAP raters to consider causal explanations. The model is integrative and transactional. As emphasised throughout CAP use, the CAP is not a tool for diagnosis but rather for functional use.

Domain items

AB1: Openness to intervention of adults: *How open is the pupil to mediation?*

AB2: Openness to intervention of peers: *How well does the pupil respond to help or ideas from peers?*

AB3: Self-regulation of emotions including overcoming blocking and *overcoming frustration*

AB4: Self-regulation of movement

AB5: Motivation: *is the learner easily motivated by a range of learning experiences?*

AB6: Curiosity: *Does the learner demonstrate curiosity in a range of learning experiences?*

AB7: Response to Challenge: *Does the learner respond well to challenge, wanting to progress to more difficult skills levels?*

AB8: Persistence and task completion: *Does the learner show persistence and a need for task completion?*

Rationale for the inclusion of this domain and its items

The items in this domain do not claim to cover all possible aspects of the complex area of the relationship between affect and cognition. In rating the first two items in this domain, openness to intervention by adults (AB1) or peers (AB2), which focus on the pupil's willingness to listen, exchange and learn from others, it is pointed out that this is not directly linked to levels of ability, i.e. a pupil may be quite able intellectually, but emotionally resistant to mediation and dialogue with either adults or peers. Responsiveness to adults is not the same as to peers, and therefore separate ratings are sought for these items. The next two items consider self-regulation from an emotional/behavioural perspective and are rated in two ways. The first being a general question about the child's ability to self-regulate emotionally (AB3). As with all items, examples are provided in the CAP manual to guide ratings. For example, CAP users are asked to consider whether the

child is easily calmed after being upset, or whether there are frequent emotional outbursts which seem associated with learning contexts.

The next item on regulation of movement (AB4) appears at first glance not to have much to do with emotion or behaviour. It might appear to be better placed in the domain on perception. But in this domain, the question focuses on whether the child is *emotionally* able to control their movements and not whether there is an actual motor difficulty in regulating movement. The answer may well be linked to issues raised in previous domains, such as whether a lot of fidgeting in class could be linked to lack of understanding of the task, or problems with the modalities being used in the lesson, such as a lot of auditory information for a child who has difficulties processing auditory input. The next item, AB5, rates the pupil's motivation in a range of learning experiences. It would be relatively rare to find parents and teachers reporting that the child is motivated by nothing. More often there is no simple yes or no response, but rather, it depends what the demands of the situation are. For this reason, the rating focuses on the extent to which a child shows some motivation and under which conditions.

In standardised cognitive tests, aspects of the learner's attitude, motivation and emotional engagement with learning will of course be observed and commented on, but are not directly addressed. That is, the tests focus on scoring intellective areas of learning. Tests of emotional self-regulation and motivation traditionally have been separated from cognition and if tested, have not been part of general batteries. Historically, both Spearman (1927) and Wechsler in the 1950's discussed the need to consider motivational aspects of learning, but these were lost in the structures of testing intellectual competence.

In some forms of DA, non-intellective factors are regarded as essential to the understanding of the learner, especially in models where mediation is individualised rather than pre-determined. In individualised forms of DA, such as the LPAD and Tzuriel's DA of Young Children (DAYC, 2001), cognitive as well as motivational, affective and behavioural aspects are equally the subject of assessment and mediation.

In the LPAD, one of the core criteria of what constitutes a mediated learning experience is the mediation of meaning (Feuerstein et al., 2015). The mediator should have a goal of

actively developing purpose and meaning within specific tasks and more broadly in the development of the learner's 'internal needs system'. Meaningfulness is essential to drive effort, persistence and accuracy factors. In other words, without the energy that comes from meaningfulness, there may be poor intellectual functioning, although the cognitive capacity is there. Bruner refers to the centrality of meaningfulness in intellectual functioning (1991). In descriptions of various aspects of mediation, Feuerstein points to other elements of the relationship of a mediator with a learner; for example, 'psychological individuation' which in current terminology we might associate with concepts of self-efficacy and self-concept as a learner. The mediator is charged with the creation of a rapport that optimises positive emotional engagement, motivation and enables the learner to experience success. In Feuerstein's list of the sub-goals of MLE, which is incorporated in the cognitive intervention programme, Instrumental Enrichment, as well as in the LPAD, he specifically names the development of intrinsic and task related motivation, as a necessary component of thinking and problem solving, and this was also felt to be important when selecting the items of the CAP.

Haywood also brings non-intellective aspects of learning to the fore in his approach to DA and demonstrates that characteristics of intrinsic motivation can be observed on children as young as the age of three (Haywood and Switzky, 1987; Haywood, Brooks and Burns, 1985; Haywood and Tzuriel, 1992). In addition, Tzuriel sets out a list of non-intellective factors which he includes in his younger years DA tests which are derived from Feuerstein's mediational theory and Haywood's transactional model of learning (Tzuriel, 1991, p.109). These are: Accessibility to Mediation, which is rated in this domain as items AB1 and AB2 in the CAP. Need for mastery, which is his terminology for describing motivation, rated in item AB5, within which he includes self-regulation. In the CAP self-regulation is itemised separately as AB3 and frustration tolerance is included in AB3. Tzuriel's item on locus of control, whether internal or externally driven, is associated with intrinsic or extrinsic motivation, fear of failure and defensiveness.

However, the importance of non-intellective factors especially motivation in learning, certainly does not originate with DA. For example, Dai and Sternberg (2004) state the view that basic mental processes such as attention, perception, cognition and memory are always

coloured with motivational and affective overtones. Similarly, Perkins and Salomon (2012), emphasise the role of motivation and disposition in the transfer of knowledge. Motivation is indicated by the intensity (energy), duration and persistence of a goal-directed behaviour or action and can significantly influence the allocation of attentional resources, effort and emotional reactions to difficulties and persistence in the face of setbacks (Dweck et al., 1999, 2006). Dweck and others (for example, Pintrich, 2000) hold the view that motivation is cognitively based and in turn impacts on attitude and affect. These positions can be classified as the search for *causal* relationships.

Furthermore, both Piaget and Vygotsky regard emotion and motivation in learning as important. While Piaget's views on emotion and motivation were not prominent, neither were they absent from his work. He stated "There is a constant parallel between the affective and intellectual life throughout childhood and adolescence. This statement will seem surprising only if one attempts to dichotomise the life of the mind into emotions and thoughts. But nothing could be more false or superficial" (Piaget, 1967, p.15). Vygotsky (1978) on the other hand, considered that motivation and emotion together with higher cognitive functions are socially constructed. Intrinsic motivation is strongly associated with better learning outcomes and self- determination (Deci and Ryan, 1985; Ryan and Deci, 2000).

Item AB6, curiosity (search for novelty rather than staying in one's comfort zone) and openness to challenge AB7 (which is the opposite of fear of failure), are items derived from Haywood's research on characteristics of intrinsically motivated learners. Tzuriel's concepts of 'confidence in correct responses' and 'vitality and alertness' are not specified as CAP Items. Tzuriel (1991, 2001) repeatedly discusses the need to assess non-intellective factors in a dynamic way. The DA mediator should attempt to change the motivational and affective components; assess the amount and type of change and the type of mediation required to produce that change; and the effects of these changes on cognitive modifiability (1991, p.116).

5.2 Completing Section A of the CAP Record Form. What happens next?

5.2.1 Summarising the ratings

After completing the ratings in Section A, the items scored in each domain are added and the total divided by the number of items scored to give an average score for each domain. All N rated items are omitted. It is advised that if fewer than 50% of items in a domain have been rated, a domain average should not be used, as this could be misleading. In that case, scores on individual items are recorded and discussed. The CAP Summary Form is then used (see Appendix 2) to record the average score of each domain (see below). Alternatively, summary of Section A domain scores can be shown in a simple excel graph as illustrated in the example shown in Figure 5 below.

Figure 5: Example of a graph of an individual's CAP domain scores*

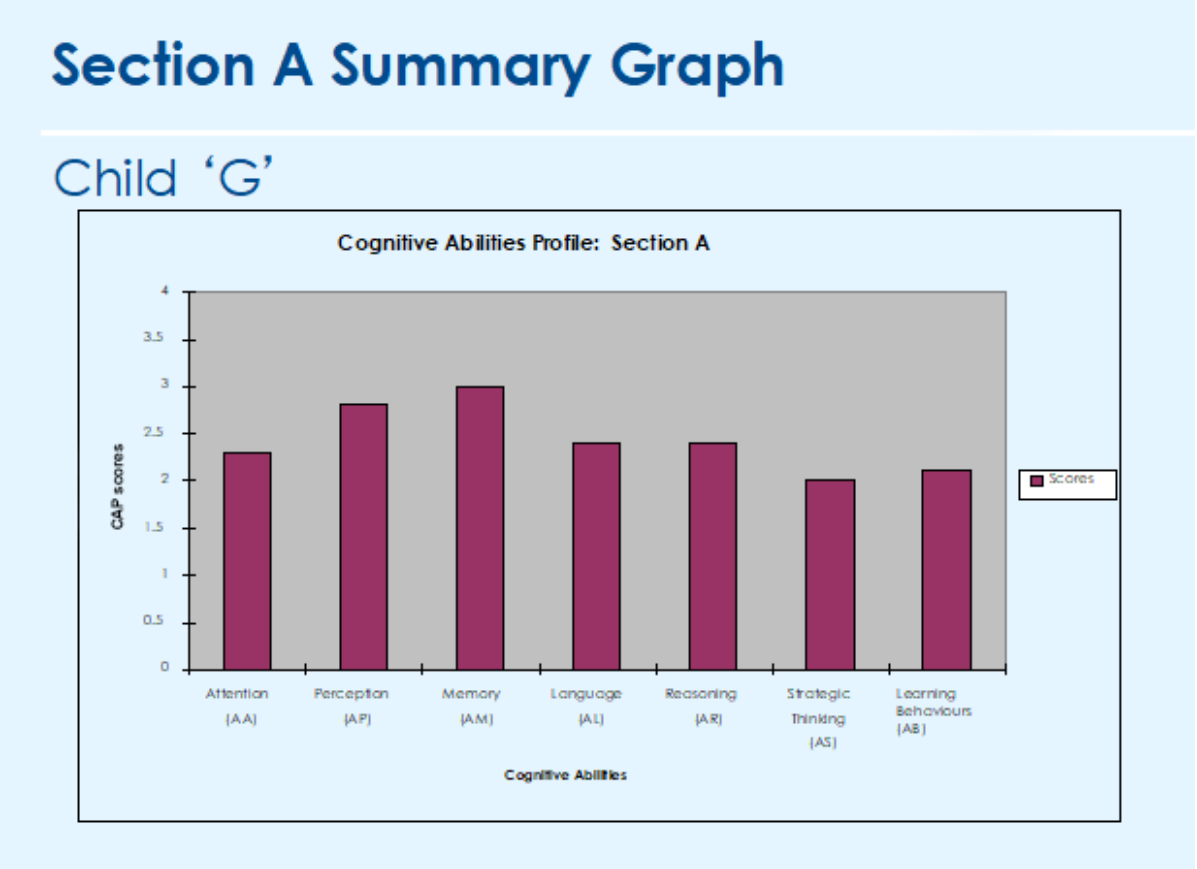


Table 5.1: Example of an individual's CAP domain scores * (Actual scores from a child rated with the CAP by his teachers. Reproduced her with parental permission)

SCORE RANGE: 1-4	**DOMAINS**	**SCORE**
1-1.9: Not able, even with support	Attention	2.37
2-2.9: Only able with support	Perception	2.8
3-3.9: Sometimes able / inconsistent	Memory	2.9
4: Independently able	Language & Communication	3.16
	Reasoning & Logic	2.5
	Strategic Thinking & Metacognition	2.18
	Behaviours Affecting Learning	2.56

The importance of systematically discussing the items in all the domains and not just scoring those that seem to be directly linked to the referral issues, reflects the CAP's principle that cognitive performance within and between domains is interrelated. Inter-relatedness of CAP domains is a subject of study in this research, because of its theoretical links with Luria's model of mental functions; for identification of stronger and weaker areas of cognition and to structure interventions which follow. As the different domains of the CAP are discussed and rated, their relationship to each other starts to emerge.

The investigation of all domains even when it is not initially thought that there may be learning issues in a particular area of functioning may shed light on sources of difficulty or co-existing difficulties that can be missed when attention is drawn to the overt problems only. As has been mentioned previously, a diagnosis such as ADHD in a young child will almost always be accompanied with developmental difficulties in other areas, referred to as co-morbidities, or co-existing conditions. Karmiloff-Smith (2012), in comparative studies of two developmental disorders, Down Syndrome and Williams Syndrome, suggests that a model of domain specificity, which speaks of intact versus impaired domains, is an inappropriate way to understand developmental difficulties in children as it is based on an adult model of brain functioning. She argues that the domain specific versus domain general model should be replaced by a third model, that of domain relevance. The CAP is consistent with these ideas in its focus on assessing functioning across all domains of development and building interventions on the understanding of patterns of co-occurrence and interrelationships in the development of the child (Deutsch & Mohammed, 2010, p.125-166; Gillberg, 2012; Kolb, 2014).

There is no weighting of the domains, but difficulties in the first three foundational domains, Attention, Perception and Memory, according to the model of Luria, would suggest difficulties in the domains of higher order mental processes such as Logic and Reasoning (verbal or non-verbal) and Strategic Thinking. Whilst rating domain items, parents and teachers are made aware that this is not a static assessment, but is about what the pupil is able to do independently or with various levels support *at this point in time*. This fosters awareness as the profile is built up, that this is a dynamic process and is a starting point for

agreeing the most appropriate interventions to facilitate change toward more independent functioning in cognitive abilities.

The issue of age related expectations needs to be addressed in the CAP, with regard to scoring, despite the fact that the CAP is not age normed. This is where background knowledge of typical and atypical child development is required and it can be useful to compare classroom expectations (as observed in Section C of the CAP, see Appendix), with the performance of the referred child. The classroom offers a built-in reference for judging expected levels of skill. Cultural and family expectations are also important to consider in rating the child's performance. It is acknowledged that these factors have a wide literature base, but that these will not be discussed within this thesis.

In summary, this section has analysed the CAP seven domains and their items. Together, these structure discussion about a pupil's learning with those who know him/her best. Following the averaging of ratings in each domain, gives a quantitative baseline profile on which to compare domains and the basis for selection of targets for intervention followed by review and re-assessment.

5.2.2 From CAP rating of Section A to the development of the CAP intervention plan.

In real world use of the CAP, following completion of at least section A (and possibly also B and C), the next step for the CAP "team" is to select targets for intervention. The Summary and Intervention Form of the CAP (shown in the Appendix of this thesis), is shared with parents and teachers and constitutes the consultation record at the end of the profiling process. The development of the intervention plan (IP) is an integral part of the CAP process and operationalises the need identified by EPs (Deutsch & Reynolds, 2000) to translate cognitive assessment findings in to practical classroom strategies for use by teachers. As one of the goals of DA is to link assessment with intervention (Campione and Brown, 1987; Fuchs et al., 2007; Haywood and Lidz, 2007; Grigorenko, 2009; Elliott, Grigorenko and Resing, 2010), EPs using the CAP need to be actively involved with the setting up and monitoring of intervention targets. In some forms of DA, especially those based on mediated learning models, analysis of the student's cognitive abilities alone, is not

considered sufficient as the outcome of a DA and detailed recommendations for promoting next steps in cognitive development would be expected to be part of the DA process.

As many teachers and parents do not have a background in cognitive education and many EPs find it challenging to link assessment of cognitive abilities with interventions, the CAP seeks to fulfil this need by suggesting practical strategies for intervention, within each cognitive domain. To aid this process, detailed recommendations for interventions within each domain are set out in the CAP user manual. In this study, participating EPs and teachers were not given training on how to develop specific interventions for each student. However, each EP and teacher carried out the review stage of the CAP, with or without intervention and comparison of their baseline scores and scores of the pupil at review time, will be examined in this study.

In setting up the pupil's Intervention Plan, the current (baseline) score of a chosen item and its domain is recorded. The IP is expected to have SMART *cognitive* targets (CAP manual, p.117). Traditionally, measurement in IPs tends to be subject or content driven, whilst cognitive abilities to be worked on as underpinning achievement targets, are generally not specified. The CAP structure aims to provide the cognitive and strategic elements of an IP and requires that observable cognitive indicators of progress should measure these. This is a novel aspect of the CAP.

It is not realistic to target a whole domain for intervention or to try to measure broad areas of functioning. For example, it would not be adequate in a CAP IP to write that an aim is to "improve reasoning" (domain 5). The IP would need to show which specific aspects of reasoning are being addressed and define more precisely elements that can be evaluated and measured over time. This is why an understanding of *task* components not only the cognitive needs of the pupil can be helpful so that teachers can then more easily identify what that cognitive ability would look like in a certain topic or learning activity.

The recommended target score at time of review is a 0.5 gain from the baseline score, over a period of a few months, which is considered realistic for the typical span in which IP reviews are carried out. For those pupils with statutory provision, the IP must be minimally reviewed once a year at the Annual Review. A pupil would not be expected to improve by a

whole point on the CAP rating scale in a relatively short time. The gain score is not expressed as "met, partly met or not met", as often noted in school IEPs, but records the path of learning within a specific task and cognitive function from the baseline score of the child to an acceptable level of independent functioning using the CAP rating scale.

The issue of inter-rater reliability is also partly addressed through the process of selection and review of IP targets and attainment over time. Because the CAP is a collaborative undertaking, opinion and ratings are reached by agreement between different raters each bringing his or her own perspective on the pupil's abilities and needs. However inter-rater reliability in a more quantified way is investigated directly in this study. The CAP concepts need to be robust enough that as the pupil moves up from one school year to the next, or there is a change in staff mid-year, the new teacher should be able to continue the process of setting and reviewing CAP targets over time in a meaningful way.

CAP selection of targets is by negotiation within the consultation. A prime consideration is what is realistic for the teacher. It is emphasised that fewer targets which can be readily implemented will be much more effective than an elaborate IP which has little chance of being delivered. If targets are recognised as useful for many pupils in the class, then the pressure of not being able to give individualised attention to one pupil is greatly reduced. In this study, the EP and teacher together selected targets for intervention based on CAP ratings. From that point on, however, there was no further support provided to the teacher.

5.2.3 Reviewing progress using the CAP's follow-up stages

Monitoring progress after IP targets have been jointly agreed is considered essential for practice-based evidence (Fox, 2011). In the CAP, at the first review, only the specific targets (no more than three are recommended) are revisited and re-rated after a few months, to track progress and adjust targets or strategies as per need. In real-world use of the CAP – not in this study – there is a further stage, as it is advised that *all* CAP domains are rescored after one year, even those domains which have not been targeted for intervention.

5.2.3.1 Why review CAP domains that were not targeted for intervention in the first place?

The purpose of conducting a full review, recommended after one year of intervention, is now briefly mentioned, as it has both practical and theoretical implications, although it was not a task carried out in this study. The concept behind this recommendation is to see whether there has been generalisation of any cognitive abilities into other, non-targeted domains. It is important to acknowledge that changes over time can be due just to development and may not be because of the interventions received. However, by focusing only on what is selected for intervention, important information regarding other areas of development or other factors, which may impact on progress, can be missed. In theoretical terms, Feuerstein's theory of Structural Cognitive Modifiability discusses "changes in the state of the organism" (Feuerstein 1980 p.9). He characterised structural changes by their *part-whole relationship*, in which a change affects the whole; by *transformation*, in which parts of the structure are conserved while other parts change; and by *self-perpetuation*, in which schemata continue to develop, expand and adapt (p.7).

Most theorists in this area appear to agree that there is a significant degree of plasticity to cognitive development, even at the structural level (Lidz, 1987). It is this plasticity that cognitive interventions aim to address *over time.* Adey and Shayer (1993) had similar findings when they introduced a focus on cognitive strategies into maths and physics lessons with secondary school students and there was a significant transfer effect to non-targeted subjects such as geography and literacy.

The Record Form is designed for comparison of ratings over time, which is shown as BP (Baseline Profile), R1 (Review 1), as shown in Figure 6 below. Figure 7 shows a 3-year CAP series of reviews.

Figure 6: Review of all cognitive domains after one year of intervention* (actual scores of a pupil , rated by her teachers, reproduced with parental permission)

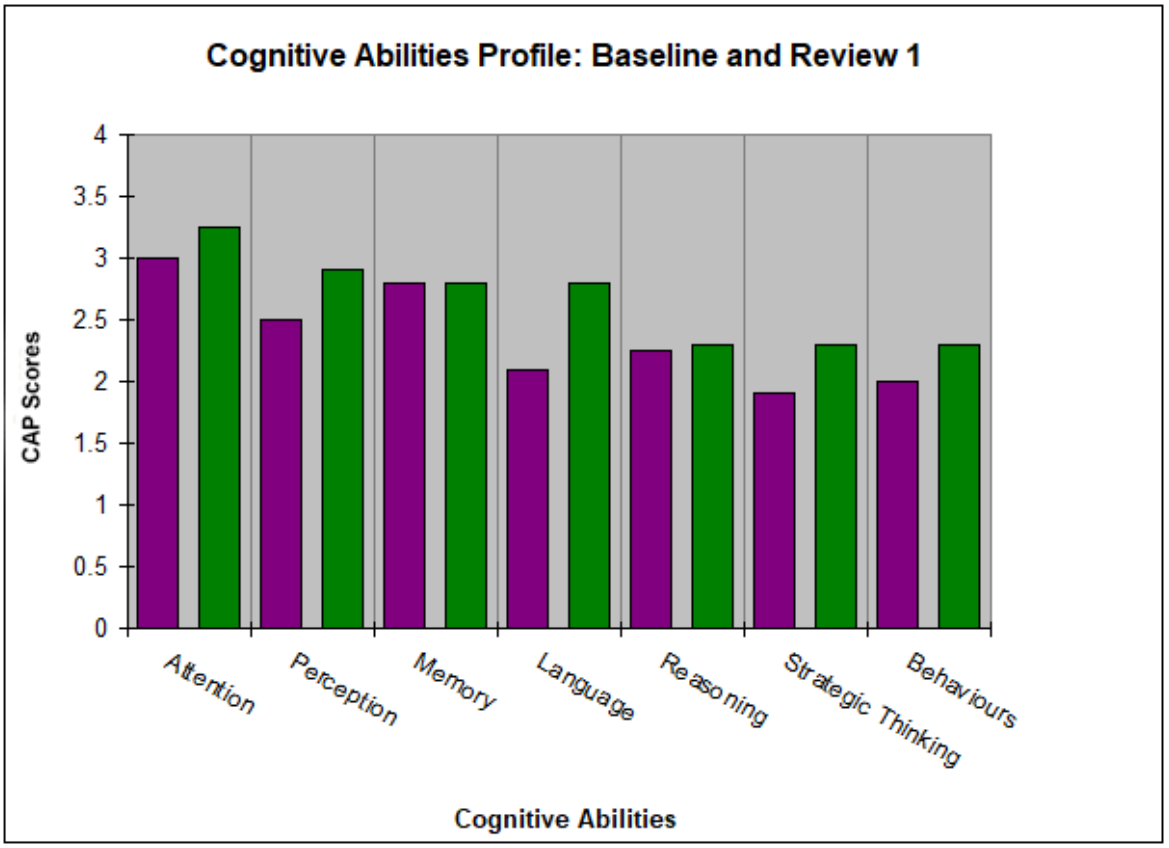
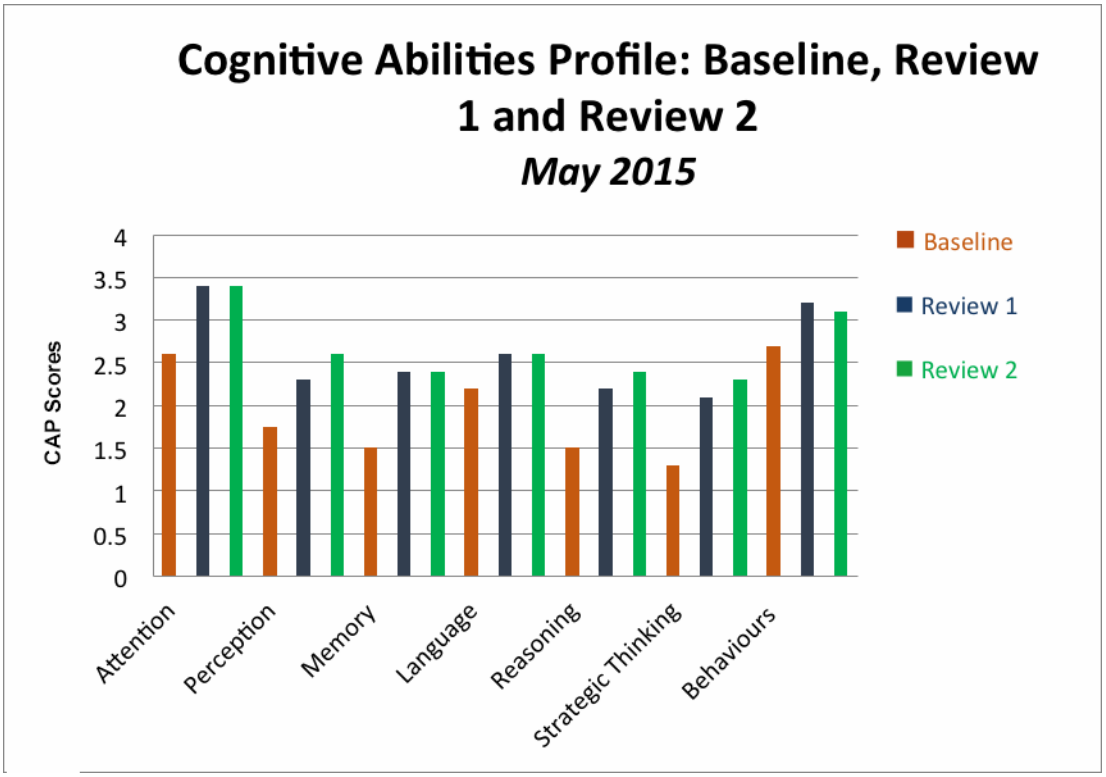


Table 5.2: Review of all cognitive domains after one year of intervention

	Year 1 (Purple)	**Year 2 (Green)**
Attention	3	3.25
Perception	2.5	2.9
Memory	2.8	2.8
Language	2.1	2.8
Reasoning	2.1	2.3
Strategic Thinking	1.9	2.25
Behaviours affecting learning	2	2.3

Figure 7: Cognitive Abilities Profile: Example of a CAP baseline and review over three years



Graph colour code:
ORANGE = 2013 (baseline). BLUE = 2014 (review year 1). GREEN = 2015 (review year 2).

5.3 Pilot research leading to the development of the current version of the CAP

This final section of the two chapters on the CAP tool itself, outlines informal studies of earlier versions of the CAP from which the current model was developed.

Prior to the research of this study, a number of informal evaluations of the CAP were undertaken during various stages of its development. These evaluations were used to revise and hone its format, but these have been small scale and remain unpublished in peer-reviewed journals. They have been summarised by Deutsch & Mohammed (2008). This section explains how the issues that emerged lead to extensive changes resulting in the current version of the CAP, and also influenced the choice of research questions of the present study.

5.3.1 Pre-CAP trials

An early version of the CAP for assessment summaries was trialled by an educational psychologist, in a unit attached to a mainstream school for children with hearing impairments and other learning difficulties. Reported benefits of use of the CAP for this group were, first, the ability to summarise large amounts of data relating to individual students; second, monitoring the progress of students over time without repetition of individual assessments; third, its usefulness with professionals who do not have any knowledge of DA, or background in cognitive education in the classroom; and fourth identifying students who may need additional interventions or where specific interventions could be discontinued.

The CAP was also used in a single case study, as a consultation tool with a teacher unfamiliar with cognitive education concepts in discussing the needs of an eight-year-old who had difficulties in literacy and numeracy. The EP focused on gathering information about the child's cognitive abilities and his response to teaching and mediation. The ratings in each section were used to develop a solution-focused approach in which the teacher was asked to negotiate the goals for small changes in the cognitive abilities being discussed. It was reported that this was where the teacher's lack of knowledge about process skills was a barrier as the teacher was tied to the notion of outcomes. Motivation of the teacher was also a difficulty and the teacher looked to the EP to provide "tips for teachers" and did not see the process as a joint search for solutions (Deutsch and Mohammed, 2008).

The same early version of the CAP was also trialled by specialist teachers working in primary and secondary schools in a Local Authority in Scotland, as part of their use of Instrumental Enrichment (IE), a cognitive remediation programme (Feuerstein et al., 1979, 2002) in which they had been trained. These teachers, who did have a background in cognitive education, used the CAP to rate their students' cognitive abilities before and after using the IE programme. That is the CAP served as a pre- and post-test and the intervention was delivery of some of the IE programme (length and frequency not specified).

This was not a controlled study. The teachers were all familiar with the list of deficient cognitive functions of Feuerstein's phase model used in this early version of the CAP and

scored their pupils levels of abilities/difficulties using that model. Despite greater familiarity with the model than would be expected of most classroom teachers, the IE teachers, scoring on their own, reported lack of confidence in the objectivity of their scores and said they would want to score cognitive functions together with others and not be the sole judge of a pupil's level of functioning (Deutsch and Mohammed, 2008). Additional feedback was that a seven-point rating scale that was trialled in this early version of the CAP was considered too complex. This feedback led to revision of the rating scale to a four-point scale and more precise descriptors were written for each cognitive function to guide raters.

Up to this point those receiving early versions of the CAP to trial, all had some knowledge of Feuerstein's LPAD or its corresponding cognitive development programme, Instrumental Enrichment.

One aim of the present thesis is to investigate the usefulness of the CAP in educational services with little or no prior knowledge of DA or cognitive education. The selection of EP services for participation in this study is explained in chapter 6 of this thesis (methodology).

An EP also used the CAP as a classroom observation tool to analyse the cognitive components required in a maths lesson (now section C of the CAP). The EP found that the structured observation together with some later individual assessment provided insights into a pupil's difficulties, which may not have been evident from assessment alone.

5.3.2 Group trials of the Pre-CAP

Following the revision of the CAP rating scale to a four-point scale and further clarification of the cognitive abilities, the CAP was used in two studies (2004/5) with groups of Educational Psychologists, with or without background knowledge of DA, who were invited to take part in a one- day exercise using an earlier version of the CAP.

There were a number of goals of this exercise.

1. To find out how much training on the CAP would be needed in order for EPs to feel confident that they could use the CAP in their work. This question corresponded to one of the most prevalent concerns raised by EPs in the Deutsch and Reynolds

(2000) survey.

This was a concern investigated in this study and is reported in the Results and Discussion chapters of this thesis.

2. To find out whether EPs perceived the CAP as user friendly. A related question regarding the impact of prior training in DA on perceptions of user friendliness of the CAP was also explored, by asking participants to indicate their level of prior training and experience in DA.

   This question was asked of participating EPs in the current CAP study and will be analysed as part of Research question (4) on EP perceptions of the CAP.

3. To find out whether this early version of the CAP could demonstrate acceptable levels of inter-rater reliability.

   Interrater reliability of the CAP is one focus of this study

EPs (N = 40) were given a half -day introduction to the CAP. They were then shown a video of a five-year-old child working 1:1 with a teacher and also with a speech and language therapist and were asked to score the child's cognitive functions using the CAP rating scales. They were not allowed to confer with each other.

EPs were asked to complete a questionnaire individually and told not to change any of their answers as a response to the general discussion and joint video analysis, which would follow. It was made clear to participants that this was not a judgment of their skills, but a test of the tool. They were first asked to classify themselves in terms of any prior training or experience in DA. The same categories were used as in the Deutsch and Reynolds survey (2000), i.e. no prior knowledge of DA (No Training group); Read about or had a brief introduction to DA (Taster group); A short course (Short training group); A lengthier course (Full training group). These same categories were used in the EP perceptions of the CAP questionnaire in this study – research question 4 (see methodology, results and discussion chapters).

Participating EPs were asked to rate the user friendliness of the CAP and whether the one-day introduction was sufficient for them to be able to use the tool.

In response to questions (i) and (ii) it was hypothesised that length of training in DA would be positively correlated with perception of user friendliness and confidence in using the CAP. The group who had the longest DA training was overall more confident in the use of the CAP, but there were not large differences between those who received taster training or short courses. The results were expressed as percentages, but were not subjected to statistical analysis to examine whether differences were significant. The largest differences were between those who had no DA background and those who rated themselves as having done longer training.

This provided some preliminary evidence that experience of prior training in DA or cognitive education could be an important factor in perceptions of user confidence of the CAP. Nevertheless, all respondents stated that one day training without further support would not be sufficient on its own for confident use of the CAP.

User-friendliness of the CAP was rated using a 5 -point Likert scale: from 0 – impossible, to 4 – extremely easy and user friendly. Although the situation was artificial, that is being asked to rate an unknown child in a short video excerpt, EPs were asked to rate their experience of the CAP activities of this one- day trial. Their overall judgment was based on various factors, especially rating the cognitive functions from a brief video out of context, lack of familiarity of the concepts being rated and clarity of the description of the items. The majority of respondents scored user friendliness, as a 2 or 3, thus overall user friendliness of the CAP was rated as neither extremely difficult, but also not very easy to use. From the perspective of CAP development, this was not considered a satisfactory level of user friendliness and these findings led to extensive revision of the CAP.

In response to question (iii), the independent video ratings of all EPs were analysed to calculate levels of inter-rater reliability. The same method of analysis was used as in the Tzuriel and Samuels study (2000): i.e. the number of agreements was divided by the total number of agreements and disagreements. Two levels of agreements were calculated. One was percentage of exact agreements and the second was percentage of agreements within half a point (+ or -.5). An N category was provided for use when the rater did not have sufficient information or was not sure how to rate the item. Where the modal value was N

on an item, (i.e. N was the most frequently given rating), no second level of agreement could be calculated as N has no numerical value.

The results showed large variations ranging from 36-100% for inter-rater agreement. Whilst the results were certainly influenced by the video scenario itself and the artificiality of rating a child 'cold' with no background knowledge of the case, they provided useful information especially on items that received the highest and lowest levels of agreement.

In this earlier version of the CAP, the cognitive functions were divided into three phases INPUT, ELABORATION and OUTPUT, as set out in the LPAD model. The cognitive functions, which were the least consistently rated, fell into two main groups. Many of the ELABORATION cognitive functions were difficult to rate as they are mainly ones involving internal mental acts, such as using logic, linking and categorising ideas, using memory of information perceived at the INPUT phase. This low IRR was interpreted as indicating that reflective and planning processes are especially difficult to rate in the absence of direct contact and intervention with the pupil. The phase that scored the highest level of inter-rater reliability was the OUTPUT phase, the stage at which thinking is expressed as an external observable activity.

In the user-friendliness section of the questionnaire, EPs were also asked to rate which section of the CAP they found easier to rate. Overall participants found that items about behaviour or emotional responses of the child were easier for them to rate. Confidence in rating of the intellective cognitive functions (section A at that time), benefitted most from prior experience with the LPAD model.

The second group of items receiving low inter-rater agreement were items that could not easily be slotted into one specific phase of the LPAD model. For example, if the child being observed was showing impulsivity, where was this occurring? Was it an Input, Elaboration or Output difficulty, or maybe all three? Another cognitive process difficult to assign confidently to one phase was comparison (IRR < 50%), whilst a child being able to use the language of comparison was much easier to rate (IRR > 80%).

Taken together, two conclusions were drawn from the inter-rater reliability part of the exercise. The first conclusion was that the clarity of the cognitive abilities needed further work. Low levels of agreement indicated that the cognitive function described did not mean the same thing to all those doing the rating. Further work was needed to address some cognitive functions that were difficult to differentiate from others; repetitive or overlapping items needed to be clarified or removed. The findings of this informal exercise were consistent with both Vaught and Haywood (1990) and Tzuriel and Samuels (2000) studies on the aspect of lack of shared meaning of cognitive functions. The second aspect of the Tzuriel and Samuel's study, rating levels of agreement on the mediation used in the LPAD, was not investigated, as the CAP trial exercise was not about the LPAD, nor about use of mediated learning techniques. It focused only on identifying the cognitive functions of the child observed on the video.

The second conclusion was that the phase model itself was problematic for the CAP's goals. Whereas the studies referred to above indicate some of the concerns raised in the DA literature regarding reliability of findings from a directly administered LPAD, inter-rater reliability of ratings, using observation only (as in the video scenario) was found not to be adequate. Therefore, in the current version of the CAP, cognitive abilities are no longer organised into phases, but regrouped within domains of mental activities, as explained in the previous chapter. Items that appeared to have low levels of clarity were either removed, rephrased or further clarified, resulting in the current rating system which attempts to combine some of the clearest of the Feuerstein phase model items within a Luria based domain structure.

In summary, the current thesis builds on this previous development by formally evaluating and rigorously testing the properties of the final CAP tool. This is important because previous studies were small scale, did not properly address reliability, were not designed to have an element of control and did not assess the impact of the CAP on pupils' progress, to examine whether the CAP could provide added benefit to target children over and above traditional testing or consultation processes. User friendliness of the CAP, although considered during the early development of the CAP, is now formally addressed in this study

by examining the perceptions of EPs and with reference to themselves and the teachers with whom they used the CAP.

5.4 Summary

Chapters 4 and 5 of this thesis have described the rationale for the development of the CAP. Both conceptual and practical aspects are discussed. Chapter 5 described and analysed the items within each domain of the CAP, since these are tested in the research for aspects of validity and reliability and their clarity for CAP users. The chapter concluded with a brief summary of pilot informal CAP work, which informed the structure and contents of the current model. The next chapter outlines the methodology used to rigorously test some of the CAP's psychometric properties and to evaluate its usefulness both in terms of added value for children with needs, and perspectives of its users, thus aiming to address some of the issues outlines in the DA and consultation literature and issues arising from earlier stages of development.

Chapter 6 Method

In this chapter, details of all participant groups are given first and ethical considerations of the study are discussed. The stages and time scale for the research is then set out. Finally, a description of the measures used for each of the four research questions is provided.

6.1 Participants

The participants were educational psychologists, mainstream primary school teachers and year 4 and 5 (approximately 8-10 years old) primary school pupils. Each group is described below.

6.1.1 Educational Psychologists

Three groups of educational psychologists from three different Local Education Authority Educational Psychology Services (EPS) participated in the research. Henceforth, these groups will be referred to as services A, B and C. Service A had nine participating EPs, service B, ten and service C, seven. Thus, there were twenty-six EPs at the start of the research (see Table 6.1). All but one EP had many years of professional experience; one participant in service C, had recently completed EP training. Twenty-five EPs completed the data collection, as one EP from service A had to withdraw for health reasons. As a result, in service A, 9 EPs carried out baseline CAP, but 8 EPs carried out the CAP review.

Table 6.1: Comparison of average length of professional experience of EPs across all three services

Service	**A**	**B**	**C**
Number of EPs	8 (9)	10	7
Average years as EPs	10.9	12.4	10.8

A questionnaire was given to all EPs following completion of their participation in the research project. In the questionnaire, participating EPs were asked to list their background training in DA if any and prior use of DA and/or consultation. This question was asked

because there was some indication in informal prior studies of the CAP (as reported in chapter 5), that prior training in DA could make a difference to EPs confidence in using the CAP or their perception of its user-friendliness.

EPs' background experience of DA and use of consultation as reported in the EP questionnaires is described below:

1. All EPs reported having had some DA and some consultancy training, with EPs in service A reporting having more.
    a. For DA training there was a significant difference between services. EPs in service A were more likely to have had longer (several days) training (8/9 participants; 89%) than services B (3/11 participants; 27%) or C (2/7 participants; 29%) ($\chi^2(2) = 7.243, p = 0.027$).
    b. For consultation training, service A again reported having had more formal training (9/9 participants; 100%) than services B (10/11 participants; 91%) or C (4/7 participants; 57.1%) although this difference was of borderline significance $\chi^2(2) = 5.982, p = 0.050$. This would be consistent with service A's policy not to use standardised psychological tests with pupils and the need to therefore have more training in other methods.

2. Service A reported significantly more use of DA in their work. This was shown by the combined scores of 4 – 'use DA very frequently', together with scores of 3 – 'use DA quite frequently'. Service A (8/9 participants; 89%); Service (B: 3/10 participants; 30%; Service C: (2/7 participants; 29%) $\chi^2(2) = 10.859$, p = 0.004.

3. EPs in service A, were significantly less likely to meet with teachers (4/9 participants; 44%) compared to service B (10/11 participants; 91%) and service C (7/7 participants; 100%) $\chi^2(2) = 8.88$, p = 0.012; In addition, service A was also less likely to meet parents at consultation (5/9; 56%) compared to service B (10/11; 91%) and service C (7/7; 100%) $\chi^2(2) = 6.25$, p = 0.04.

4. In total, 13/27 (48%) EPs always did a classroom observation; 12/27 (44%) sometimes did. One EP said they never did and one rarely did. There were no significant differences across services.

5. The majority of EPs reported sometimes doing direct work with pupils (20/27; 74%). Four always did. One EP never did direct work.

6. Service C was more distributed on time for consultation. Most EPs reported a typical time of 1-2 hours.

Thus, in terms of background training in DA and use of consultation, all participating EPs had some training in both approaches and most EPs spent approximately the same amount of time in consultation. Service A had the most experience of DA techniques.

6.1.2 The three participating boroughs and their schools

All three services were located in inner city areas; two of these, services A and B, are amongst the most deprived boroughs in the UK on measures of child poverty. The third borough, (service C) which served as the control group, has greater variations within the population with some areas of affluence and others of extreme deprivation causing social polarisation. All three boroughs have similar percentages of ethnic groups, which are recorded as white/non-white populations with corresponding numbers of children for whom English is an additional language (EAL) (see Table 6.2).

This information is taken from the published demographic statistics of each borough. It should be noted that the borough in which service C is located, has a difference of approximately 20% fewer children in low income families than services A and B. Nevertheless, as each ward in service C is more mixed than in A and B, the pupils selected by teachers were a mixture of children from more deprived socio- economic backgrounds and those from families with higher socio- economic backgrounds. There were similar numbers of pupils with EAL and ethnic minority pupils in all three services as shown in table 6.3. Furthermore, if some service C pupils were from higher SES homes, this would lead in any case to more conservative results.

Table 6.2: Demographic features of the three research boroughs

Service	Children in low Income families	In work	Out of work	Rank of borough (where 1 is the most deprived in the UK)	Number of deprived wards in the Borough	Population Size	Ethnic composition W = White – Mixed; NW = Non-White
A	61%	24%	37%	26	16/165	287,000	W: 63%. NW: 37%
B	61%	16%	45%	8	31/118	289,000	W: 70%: NW: 30%
C	41%	15%	25%	144	0/174	200,000	W: 64%: NW: 36%

All schools in the three services were Local Education Authority (LEA) run mainstream primary schools. Service A schools were all Community mixed schools with just one school being a Foundation school whose admissions and management was also under the LEA.

In service B, there were two faith schools, one Church of England supported and one Roman Catholic affiliated. Both faith schools were mixed voluntary aided schools. All the other schools were Community mixed schools and all school admissions and management were under the LEA. In service C, all schools were LEA Community mixed schools. No independent schools were included in the research.

6.1.3 Pupil selection criteria for the research project

All pupils were selected from years 4 or 5 local mainstream primary schools within the Local Education Authority (see Table 6.3). There were two reasons for the choice of these year groups; one was to ensure that the pupils were old enough to understand the meaning of their participation in the research and be able to give informed consent. The second reason was that given the stages of the research, spread over a few months- baseline, intervention period of 3-4 months and review – it was decided not to use year 6 pupils in case the review stage could not be completed with a pupil in the same academic year. It would be very

difficult to follow them up after transfer to secondary school and not possible to conduct the CAP review with the same teacher who had scored the baseline CAP in the previous school year. Recruitment procedures for all participants will be described below.

All pupils who participated in the research were selected on the basis of meeting the following criteria:

Year 4 or 5 pupil in a mainstream school:

- Teacher has concerns about the child's progress.
- Must not have a Special Educational Needs (SEN) Statement at the time of the research [This support system was restructured in 2015, and is now called an Education, Health and Care Plan (EHCP)].
- Must not have a primary psychiatric diagnosis.
- Must not have a primary significant sensory disability such as blindness; severe hearing impairment.
- Must not have a primary medical condition or chronic illness.
- May have English as an additional language (EAL).
- Children may be on School Action or School Action +, of the SEN Code of Practice (see note above).
- The psychologist must not have directly worked with children i.e. the EP must not have carried out a previous assessment on the child.

Table 6.3: Pupil data for all services participating in the research

	Service A	**Service B**	**Service C**
Number of schools	8	12	6
Number of pupils	17	16	14
Age Range	19 months	31 months	27 months
Mean Age (years/month)	9.4	8.9	9.1
Standard Deviation (months)	5.6	8.9	8.6
School Year 5 (n)	10	4	6
School Year 4 (n)	7	12	9
Gender	Male 9 Female 8	Male 9 Female 7	Male 9 Female 5
***No. of pupils on School Action [n (%)]**	6 (35%)	12 (75%)	9 (64%)
No. of pupils on School Action Plus [n (%)]	11 (65%)	4 (25%)	5 (36%)
Number of teachers	15	15	14
No. of EPs	8(9)	10	7

*The School Action and School Action + system was replaced in 2015 with a revised Special Educational Needs and Disability (SEND) Code of Practice.

It can be seen from the above table that the proportion of pupils on School Action Plus was higher in service A. This could mean that pupils had more learning difficulties than in the other two services to begin with. However, this is not necessarily the case, as individual policies differ between services as to the specific criteria for placing a child in one of these categories.

6.1.4 Referral concerns

Once the pupils had been identified and all consent letters were received (head teacher, parents, class teacher and pupil), the EP requested referral information about each pupil from the teacher. There is no standardised terminology by which teachers describe pupils' difficulties and pre-set categories were not used for this research in order not to bias the opinion of the teacher. Teachers may use a variety of terms to describe similar types of concern. Some teachers will use one summary term to describe a range of difficulties, such as 'lack of', or 'slow' progress, whilst others will be more specific. The frequency with which certain terms were used to describe pupils is shown in Table 6.4 and is indicative of overall patterns of the referral concerns. For purposes of categorisation some of these descriptive terms have been grouped together:

Table 6.4: Referral concerns of teachers regarding pupils selected for the CAP research

Service	**A**	**B**	**C**	**Total**
Slow progress	6	6	5	17
Attention / Can't work independently	3	8	5	16
Literacy Reading	5	7	6	18
Dyslexia	3	1	1	5
Writing – Fine motor difficulties	4	2	7	13
Memory	2	1	2	5
Maths	2	0	4	5
Language difficulties; poor comparison skills	3	4	11	18
Behavioural issues	4	4	6	16

6.2 Ethical considerations

Standard ethical procedures for educational research (British Educational Research Association, 2004) and psychological research (British Psychological Society, 2004) were followed throughout the study. The Research Ethics Committee of the School of Health Sciences of City, University of London granted ethics approval for the research. Enhanced CRB (Criminal Records Bureau) approval was granted to the researcher in order to undertake direct work with the pupils. Consent letters were received from all participating schools and parents.

As shown in Appendix 6, ethical issues included the need for freely given approval and the right to withdraw at any time and the need to ensure full understanding by all participants, professionals, parents and pupils:

1. Each school's headteacher received an explanatory letter about the CAP and the planned research and the EP of the school could choose to speak to the Head or SENCO as well, to explain the research. The consent letters emphasised that schools should feel free to refuse to participate, even though many had an ongoing working relationship with the EP. It was also emphasised that even after agreeing to participate, the school was free to withdraw at any time.
2. The researcher tried to ensure that any class teacher approached to participate in the research felt free to refuse to participate with no pressure from the headteacher, SENCO or EP of the school. Teachers were assured that even after agreeing to participate, they were free to withdraw at any time.
3. Following the identification of appropriate pupils who fitted the participation criteria, parental permission was obtained after full explanation of what would be involved in the research. Parents received explanatory letters; could request an individual discussion with the researcher and were assured that they were free to withdraw their consent at any time. In the written communication to the Head, SENCO and parents, care was taken to ensure that they understood that the goal was first and foremost research. Since part of the research involved the pupil having two testing sessions with the researcher, parents needed to understand that test

results could not be given at once, but they were invited to request a meeting with the researcher (with or without the teacher/SENCO) following completion of the research to learn more about their child's functioning, if they wished to do so.

4. Although the researcher is a practitioner psychologist, it was made clear to all participants that direct benefit was not the goal of the study. However as will be discussed later in this study, some teachers and parents showed a high level of interest in gaining information and advice about the pupils and several took up the offer of a feedback meeting after the research was completed, which this researcher offered as a thank you for their participation.
5. Pupils needed to understand fully in what they were being asked to participate. Parents and teachers were requested to speak to the child and all children were assured that they were free to withdraw at any time.

6.3 Timetable and stages of the research

6.3.1 Research procedures and time scale

The following is a summary table of the stages and time scale of the main body of the research undertaken to address all research questions. Beneath the table, each stage of the research is discussed in more detail.

Table 6.5: Summary of procedures and time scale for research

Stage 1 (Autumn Term) Training and preparation	**Stage 2 (Spring Term) Baseline consultations**	**Stage 3 (Summer term) Follow-up reviews**
CAP 1-day training for services A and B	EPs carry out baseline consultations using the CAP (services A and B) with teachers	EPs **review and rescore** the CAP targets (services A and B). Data obtained for IRR study2.
Supported practice for EPs doing the CAP: Services A and B	EPs carry out **Baseline Consultations** with teachers without the CAP (control group - service C). Researcher tests all pupils on independent cognitive tests.	Follow-up, review consultation is carried out by service C.
All 3 EP services- A, B &C, recruiting schools	EPs give teachers the Summary Form of the CAP and jointly developed IP with scored targets. (Services A and B) and a similar Consultation Record (service C) for teachers in the control group. **IRR study 1:** Other EPs, blind to above EPs/teachers CAP scores, rescore the CAP with same teachers approx. 2-3 weeks later.	
	Intervention period (3- 4 months) for all teachers using the CAP IP with each child (services A and B).	Researcher retests all pupils on independent cognitive tests.
	Intervention period of 3-4 months for (service C) consultations.	2 days of CAP training given to service C following completion and collection of all research data from all three services.

6.3.2 Initial training

Services A and B, who constitute the CAP user services in this study, were each given one day of training in the use of the Cognitive Abilities Profile (CAP) by this researcher. In order for the EPs to be able to have sufficient familiarity to use the CAP, one day's training was considered the minimum. It was agreed that up to 10 EPs from each service would volunteer to participate in the research. The EP team decided who these EPs were amongst themselves. This researcher did not select any of the EPs. Following the day's training, the identified EPs were offered supported practice in the use of the CAP, which consisted of one individual or group case discussion with this researcher during a period of 2-3 months. The offer of limited additional support following the one- day general training was designed to go some way to acknowledge the researcher's awareness that one day's training alone may not enable the EP's to use the CAP confidently (see pilot work on the CAP, described in chapter 5). The third EP service, service C, which was designated as the control group, did not receive training in the CAP, but had a full EP team meeting to explain the CAP research and timetable in detail and the researcher's offer to provide CAP training as a 'thank you' following completion of the research. Thus, services A and B were given minimal training in order to carry out consultations with teachers for selected pupils using the CAP. Service C, the control group, would also carry out consultations with teachers, but without the use of the CAP.

6.3.3 Selection of pupils

Concurrent with the initial CAP training and during the period of supported practice of the CAP in services A and B, all participating EPs approached local mainstream primary schools in order to recruit teachers and pupils for the CAP research. This was carried out entirely by the EPs in consultation with schools. The researcher was not involved at any time in the process of selection either at school or teacher level. Written consent was obtained from the head-teacher at each school and from each pupil's parents.

As noted above, participating EP services, schools, parents and pupils were given an explanation of the purpose of the study both verbally and via information letters and were informed that their data would be treated in confidence and that they would remain

anonymous. Head teacher, SENCOs and parents were invited to contact the researcher for more information if they wished to do so and their right to withdraw at any point in the study was made clear. The SENCO confirmed consent at all three levels, headteacher, teachers and parents, before the EP contacted the teacher directly to set up the consultation and before the researcher made contact with the school to set up concurrent independent pupil assessments (as shown in Table 6.5). The proposed plan was to recruit a maximum of 10 EPs per service who would each select two pupils to use the CAP with, for a total of 60 cases. These numbers were not reached, although many of the EPs who participated did use the CAP on two pupils each, as shown in Table 6.3. In some cases, these came from the same school, in some cases from different schools, and in some cases the same teacher identified two pupils from his or her class for whom to use the CAP. For the research design, these choices were left as fluid as possible within the criteria for selection, in order to give EPs the widest possible scope to recruit teachers and pupils and to closely match real-world use of the CAP.

6.3.4 The initial (Baseline) consultation

Each EP from service A and B carried out the first consultation using the CAP, at a meeting with the pupil's teacher. In the consultation, each item within the seven cognitive domains which comprise Section A of the CAP was discussed in order to jointly agree the rating score for the item and all scores were written on the CAP Record Form. The EP and teacher then averaged the scores for each domain. The seven domain average scores constituted the Baseline Profile of the pupil.

This was the essential first activity to be carried out by the EP with the teacher. All EPs knew from their initial one-day training that the CAP should if possible be a "team" consultation between those who know and work with the pupil. The EPs participating in the research also had the option of doing a classroom observation, either before or after the teacher/parent consultation. The decision as to whether to do a classroom observation in addition to the consultation meeting was left to the EP, so that the CAP consultation would be a flexible choice, not differing from the EPs usual consultation methods except in the use of the CAP. Any classroom observations carried out were not formally structured and EPs did not use Section C of the CAP.

EPs from service C (the control group) also carried out consultations with the teacher and others of their choice, but without the use of the CAP.

The following table shows those who participated with the EP in the baseline consultation in this study, for services A, B and C.

Table 6.6: Participants in the baseline consultation with the EP

Number of pupils in the CAP study	**Service A (N = 17)**	**Service B (N = 16)**	**Service C (N = 14)**
EP+ Class teacher only	16 (94%)	10 (59%)	6 (43%)
EP+ Class teacher and 'others' e.g. TA / Inclusion manager	1 (6%)	6 (35%)	8 (57%)
EP+ Parent present	0	6 (35%)	3 (21%)
Classroom Observation by EP	9 (56%)	9 (53%)	12 (86%)

6.3.4.1 Index of inclusive practice by EP per service

Although no specific instructions were imposed on the EPs other than the core task of completing Section A of the CAP with the class teacher (and in the case of service C, conducting their own method of consultation), involvement of others was encouraged. For example, inclusion of a teaching assistant, or inclusion manager, parental involvement and carrying out a classroom observation was encouraged. In Table 6.6 above these are referred to as 'others'. Additional involvements such as parental involvement in a consultation can be regarded as elements of inclusive practice and the extent of this can be compared across the services.

As shown in Table 6.6, some EPs reported that they had carried out a classroom observation as well as meeting the teacher. In service A, all but one EP met with the class teacher only. No EP from service A arranged for a parent to attend the CAP session. More than half of service A pupils were observed in class, even if briefly.

In service B, more than one third of the EPs had an additional member of staff attending the CAP session and more than a third of parents were invited to attend the CAP session.

In service C (control group) consultation records show that nearly all the pupils were both observed in class as well as having the teacher consultation. For 8 out of 14 pupils the EP met with a teacher and another member of staff for their consultation. Three EPs chose to invite a parent as well. The decision as to whether to invite parents to attend the consultation was left to the EP and teacher. Across all three services, service B had the highest number of parents involved.

One EP in service B arranged for a multi-staff CAP consultation, with the teacher, classroom assistant, Inclusion manager and parents, but without observation. Across all services, many EPs took time to go into the classroom to observe, even briefly, indicating that this was regarded as an important part of their consultation role. In service C, without use of the CAP, many EPs chose both to observe and to arrange for more than one member of staff to be present at the consultation, usually the class Teaching Assistant (LSA).

These variations in practice illustrate the flexibility in the design of the CAP, which is intended to enable its use in different contexts and with a variety of sources of information. EPs as part of the research were asked to gather background information on the pupil, as shown in the summary table of referral concerns (table 6.4 above) but direct work by the EP with the pupil, such as use of cognitive tests, was not permitted at this time. Although numbers are small and implications of greater or lesser inclusive practice have to be treated with caution, it is interesting to note that the service that chose spontaneously to conduct more classroom observations than any of the three services was the control group. Despite this additional source of information on pupil functioning, service C pupils overall showed the smallest changes in performance in pupil performance on independent tests at the review stage, as compared with the two CAP user pupils. This point is further discussed in the final summary of the implications of use of the CAP in chapter 8.

Following the baseline CAP consultation, the EP together with the teacher wrote an Individual Plan (IP) based on the CAP rating scores for each pupil. Guidance for completing the CAP, as set out in the CAP manual, recommends that up to 3 items (items) should be

selected from one or more of the domains, as intervention targets for the teacher (and Teaching Assistant, if applicable) to focus on with the pupil in the coming months, to be delivered, if possible, within the pupil's daily learning activities. There was no expectation that teachers should set up additional teaching provision for the participating pupils. More than 3 targets for a period of 3-4 months are considered unrealistic (CAP Manual, chapter 6). The items selected for intervention by the EP and teacher would be ones that received the lowest rating scores when completing the CAP baseline profile.

In the IP, the baseline score was recorded for each selected item, and an increase of 0.5 above the baseline score was assigned as the target score to be achieved by the time of the review, approximately 3-4 months later. The smallest change (0.5) was targeted in view of the short amount of time between the baseline CAP and the review. No other specific conditions for conducting the consultation were imposed. For example, the EPs were not told whether to share the IP and targets with the parents, nor were the EPs given specific instructions as to whether to offer the teacher support and advice in the period between the baseline CAP and the CAP review. As much as possible, use of the CAP was to be fitted in to the regular schedule and working practices of the teachers, thus aiming for conditions as close as possible to real-world use of the CAP tool. In fact, as will be analysed in the Discussion chapter 8 of this thesis, methodological conditions were more rigorous and support much more limited than would be provided in real-world use of the CAP.

Service C carried out all procedures exactly as in services A and B, but without the use of the CAP. Pupils were selected using the same criteria as for A and B and service C EPs held their consultation with the teachers, using whatever style of consultation they used in their regular practice. As in services A and B, following the initial consultation with the teacher (and parents), the EP and teacher agreed on additional support goals for the teacher to implement in class. Also, as with services A and B, EPs from service C could gather any background information needed, could choose to do a classroom observation or not, but direct work by the EP with the pupil was not permitted. A written Record of Consultation was provided for the teacher in all services.

Parallel to the baseline consultation, all pupils in all three services were independently tested on a range of cognitive tests by this researcher. This part of the research method, will be described below in section 6.4.

6.3.5 The period between the Baseline and the Review

Following the initial consultation to score the baseline CAP and choose the cognitive targets for each pupil, a period of 3-4 months was designated for implementation of targets chosen by teachers to offer the pupil additional support in weak areas of cognition. In order to allow sufficient time for the teachers to implement pupil targets in the classroom, EPs had to complete their baseline consultation in the spring term, enabling them to do the follow up review consultation in the summer term. For service C, pupils whose consultations were carried out without the CAP, the interim period was the same as for services A and B.

6.3.6 Review of the CAP targets

After 3-4 months, EPs from services A and B, together with the class teacher, reviewed and rescored *only* the items that had been identified as CAP targets and recorded these on the CAP Record form. The EP and teacher were not expected to re-score the entire CAP as this is not considered a realistic goal after one term or less, as advised in the CAP user manual (Deutsch & Mohammed, 2010) and is not how the CAP is used in practice.

Similarly, service C EPs and teachers reviewed agreed targets. It was considered important to conduct all stages of the research procedure within one academic year. In the majority of cases, baseline and review sessions were carried out within the pre-determined time frame. In a small number of cases follow up could not be completed within the same academic year and the review stage was held over to the next school year. In these few cases, the review was not always with the same teacher who scored the baseline CAP.

This scenario, discussed in the CAP manual (chapter 2), is realistic in real world application and is one of the reasons why it is considered so important that the CAP questions are clear and unambiguous as the teacher will not always be the same and the EP or SENCO may not be the same person as previously involved. Even though the first inter-rater reliability study of the CAP (IRR 1) (see below), is not a conventional IRR design, it was set up for the main

purpose of testing this very situation: whether CAP questions rated by a different combination of EP and teacher would be sufficiently robust to show high levels of consistency when compared to the scores of a previous pair of raters. Table 6.7, below, shows the overall number of consultations for all three services. At the same time as the reviews were being conducted, the researcher re-tested all pupils on the independent cognitive tests, as an independent measure of progress.

Table 6.7: CAP consultations: Services A & B, and non-CAP consultations: Service C

Number of Consultations	**Service A (CAP use)**	**Service B (CAP use)**	**Service C (Consultations without CAP)**
Baseline	17	16	14
Review	14	16	14

6.4 Procedure for independent testing of pupils

6.4.1 Independent test selection

Tests were selected and used with all participating pupils in all three services, to provide a source of independent evidence of a pupil's cognitive abilities across several areas of functioning, related to various domains rated on the CAP. These were administered at the time of the baseline consultation and approximately 3- 4 months later at the time of follow up/review. It was not considered feasible to test pupils using seven separate tests to represent all seven CAP domains. From a practical perspective, the time required would have been excessive for the pupils and from a theoretical perspective, many of the abilities elicited in these standardised tests reflect a variety of cognitive skills that are evident in more than one domain and provide information across different modalities and types of tasks.

As all pupils were tested in their own schools, the researcher was not blind to which boroughs and therefore which services and schools pupils belonged to. However, procedures were put in place to minimise the risk of bias and to ensure the greatest degree

of distance between the researcher and the participating schools and teachers. Firstly, to ensure that the researcher would not receive any information about the pupil's history or currently perceived needs, this researcher tested each pupil with no knowledge of background teacher concerns. Secondly, the researcher did not share any information that was found in the independent testing with the school EP or teachers that could influence their consultations and subsequent work with the pupils.

The researcher received no background information such as National Curriculum levels or School Attainment (SATS) scores and no copies of Individual Education Plans (IEPs) on any of the pupils prior to or after the testing, other than their names and which school they attended. Thus, without any prior information on the pupil being tested, this part of the research imposed greater limits on information available to this researcher, than would be usual for an EP conducting standardised test procedures in real world psychology practice.

The researcher did not meet or speak to any of the teachers or parents before assessing the pupils, nor at any time until both the pre- test and post-tests and all research data obtained by the participating EPs (that is baseline and review CAP scores) was completed. Thirdly, no CAP data from services A and B or information from service C EPs was examined or analysed and no pupil's test results were seen by the researcher until all stages of testing and all consultations in all three services was completed.

Contact between the school SENCO and the researcher was restricted to setting up the assessment session and it was understood that no information could be shared and no feedback provided to teachers or parents until the completion of all stages of data gathering in all three services. The independent testing session for each pupil took approximately 55 minutes and was held at school in a quiet room. All tests were administered to all pupils at both pre- and post-consultation stage. The tests were carried out in strict standardised administration. No help was provided to any pupil within the test situation and care was taken to ensure that instructions on each test were the same for all pupils. The same order of test administration was adhered to for each pupil.

The independent testing was carried out at the same time as the EPs were conducting their consultations with the teachers. The aim of the testing was to compare results on

standardised tests to the CAP teacher ratings and to compare pupil progress at two times during the research programme. The first session of independent testing was carried out close to the time the EP conducted the first consultation i.e. before any ratings or targets for the pupil had been agreed. This was the baseline stage. The second time, the review stage, was at the time that the CAP targets were reviewed and rescored (services A and B) and similarly for service C.

6.4.2 Description of tests grouped by association with one or more CAP domains

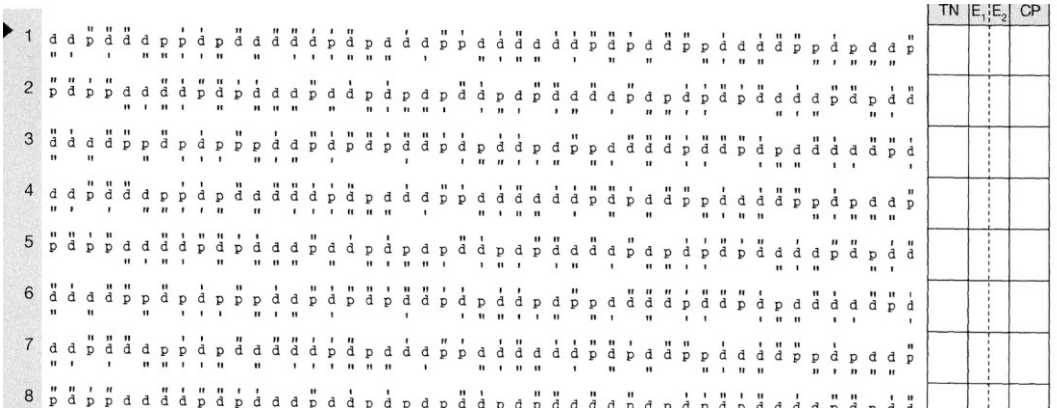
An attempt was made to represent some important features of the various domains in the CAP, at least partially, in the test selection, with an awareness of the difficulty of trying to identify "pure" matches of tests to a specific domain and realistic time constraints.

6.4.2.1 (i) Attention domain

The d2 Test of Attention (Brickenkamp and Zillmer, 1998, 2003) was chosen to measure some aspects of the domain of Attention (CAP domain 1) in this study. Whilst acknowledging that there are challenges regarding testing attention, which include the pervasive nature of attention and issues around real-world validity of test results, the d2 is a well-regarded test of selective visual attention and processing speed and is relatively quick to administer. A battery of attention tests for children, the TEA-ch (Manly, Robertson, Anderson, Nimmo-Smith, 1998) has good psychometric properties, but for reasons of time required and ease of administration, the d2 Test of Attention, which has good psychometric properties and is a stand-alone test, was used.

In the d2 test the learner has to identify and mark the letter **d,** with either 2 lines above, below or above and below. On the test page (see Figure 8), there are 14 lines with 47 characters on each line. In the adult version, the test taker is given 20 seconds on each line, and is then told to stop and begin the next line. In an alternate administration, the learner is given four uninterrupted minutes for the test. It is a test of *selective* attention, which is also sensitive to *speed* and *quality of performance.*

Figure 8: Extract from d2 test page



The test is scored for correct items and errors of two kinds: E1 – errors of omission; and E2 – errors of commission. These are subtracted from the overall score. The d2 has been normed in the USA and Germany for children age nine + and adults. Even though it has not been standardised in the UK, given the content of the test – selective visual attention to alphabet letters – the lack of standardisation in the UK, was not considered an impediment to its use in this context. Furthermore, although some of the pupils in the research were below age nine, given the goal of noting changes in scores over time (for which raw scores were used) and not age norms, this was not considered an obstacle to the use of the d2.

The d2 is used to measure different aspects of selective attention (Baron, 2004; Brickenkamp & Zillmer, 1998; Culbertson & Sari, 1997). Mental concentration, visual perception, visual scanning ability, and perceptual speed are thought to be involved (Baron, 2004; Brickenkamp & Zillmer, 1998). The d2 Test has been described as a test of both selective and sustained attention, which corresponds to two of the items to be rated in the CAP domain of Attention. The d2 Test has the advantage over other tests of attention that it is short, can be easily administered, does not require extensive instruction, can be administered to a large age-range and to groups or individuals alike, and it has good psychometric properties (Brickenkamp & Zillmer, 1998; Culbertson & Sari, 1997; Eser, 1987).

The d2 has consistently been found to correlate with other standardised measures of attention, while exhibiting minimal relationship to measures of psychometric intelligence. Standardisation of the d2 on children has been carried out using method 2, the four-minute administration. This was the chosen method of administration for this study, rather

than 20 seconds per line, because the visual attention required would be more associated with realistic classroom tasks in which a pupil, for example, copies from the board or does written work for several minutes consecutively. The test involves the need to keep in mind the task, memorise the items, select what is relevant, inhibit wrong responses and combine speed with accuracy. However, because of the memory component, (in contrast for example to the Symbol Search and Coding subtests of the WISC), there may be an overlap with the visual working memory Block Recall test that is described next, as Block Recall also requires *sustained* visual attention.

The d2 was considered a "purer" test of visual attention than, for example, the Coding subtest of the WISC, because the latter requires symbol formation and copying. The d2 test also requires visual perceptual input (CAP domain 2) and visual working memory (CAP domain 3), illustrating Manly's point (2001, p.1066), that attention is "everywhere and nowhere".

6.4.2.2 (ii) Perception domain

No specific test was chosen to represent the CAP domain of Perception because this domain is multi-faceted and is composed of and influences a number of perceptual processes such as visual, auditory and tactile, which are either encoded into working memory, or rapidly lost. Therefore, aside from neurological testing, perceptual processes are mostly identified through their functional manifestations, which are seen in further domains such as memory, language and reasoning. Whereas the independent tests chosen for this study were expected to show some association with one or more domains, as shown in Table 6.7 below, different perceptual processes which are involved in all learning activities, are not represented as one single test. As will be noted in the Results chapter (7), teachers in this study were not rating the CAP in a multi professional group, for example together with Occupational or Speech therapists, and on their own, they chose very few specific perceptual targets. This possibly also indicates the relative difficulty of identifying and rating various perceptual items through the day-to-day experience of working with pupils in class.

6.4.2.3 (iii) Memory domain

Two subtests from the Working Memory Test Battery for Children (WMTB-C) (Pickering and Gathercole, 2001) were selected for this study because they provide an accurate assessment of working memory in 5 to 15 year olds, are well used (even though the battery has now been replaced by the Automated Working Memory Assessment (AWMA) (Alloway et al., 2008) and have good psychometric properties. Manual subtest administration in this research was also easier for technical reasons than using a computer-based test. The overall battery is designed to reflect the three-component structure of the Working Memory Model proposed by Baddeley and Hitch, 1974; Baddeley, 1996) as discussed in chapter 5.

As well as a Central Executive (CE), which is involved in the control and regulation of the Working Memory System, this model posits two short terms memory 'slave systems'. One known as the Phonological Loop (PL) is responsible for holding verbal information for short periods; the other is the Visuo-spatial Sketchpad (VSSP), which holds information in visual and spatial form. Research conducted on the WMTB- C (Pickering and Gathercole, 2001; Gathercole, Pickering et.al. 2003) indicates that these elements of the WMTB-C are useful in identifying children who perform poorly at school, including children with specific learning difficulties such as dyslexia. Data is also available on the extent to which the WMTB-C predicts achievement at school more directly, by exploring the profiles of children at Key Stage 1, Key Stage 2 and Key Stage 3 using school-based assessments of progress on the National Curriculum (Gathercole, Pickering, et al., 2004).

Furthermore, the WMTB-C has been validated against existing well-established tests of achievement, including British Picture Vocabulary Scale, subtests of the British Ability Scales, Neale Analysis of Reading Ability; Group Arithmetic test and subtests of the Differential Abilities Scales (Pickering and Gathercole, 2001).

In this study, two tests from the WMTB-C were used to investigate visual and verbal STM.

6.4.2.4 (iii a) Testing Visual Memory

Block Recall is one of the subtests of Visuo-Spatial Memory that was chosen to reflect one of the areas of memory scored in the CAP memory domain (3). Visual working memory is an

area not directly tested in the WISC, for example. It was felt to be important for this study that subtests for both visual and auditory modalities of WM should be included. This corresponds with the CAP's differentiation of three major modalities in perceptual processes (domain 2) visual, auditory and kinaesthetic and the same three modalities are rated in the memory domain (domain 3). Functionally for purposes of appropriate teaching/therapeutic intervention, these differences need to be identified and addressed.

6.4.2.4 (iii b) Testing Auditory memory: Nonword List Recall

This test of Auditory Memory was selected from the group of phonological loop (PL) tests. Recall of a nonword list was chosen as a valid representation of auditory working memory, scored in the memory domain of the CAP, as it separates semantic knowledge from auditory recall and is a good marker for language difficulties more generally (Botting et al., 2001). Together, difficulties in WM are significantly linked to difficulties in learning, to a greater extent than scores on general measures of intelligence (Gathercole and Alloway, 2008), as they measure contributory cognitive processes rather than achievement.

6.4.2.5 (iv) Language domain

Two language subtests from the Assessment of Comprehension and Expression (ACE) (Adams, Cooke, Crutchley, Hesketh and Reeves, 2001) were used in this study to associate with the domain of language. The ACE is a flexible assessment tool, with good psychometric properties, composed of five subtests. These are Sentence Comprehension; Inferential Comprehension; Naming; Syntactic Formulation and Semantic Decisions. It was decided to use two subtests from the same language battery even though raw scores were used in this study, as it was useful to take subtests that were co-normed within one battery. Speed and ease of administration, were also factors in the choice of the following two subtests.

iv a) Naming Pictures: subtest from the ACE
(Adams, Cooke, Crutchley, Hesketh and Reeves, 2001)

This subtest was selected from the ACE to represent receptive and expressive language at the one-word naming level, as both receptive and expressive language is scored in the CAP Language domain (4). In Naming Pictures, the child is shown a page with a single picture and has to say what it is. The vocabulary gets harder as the subtest goes on. The content of the

language tests compared to the other independent tests selected for use in this study is the most culture-specific but it was decided to use the same standardised language tests with all the pupils to reflect the classroom. Furthermore, the goal was not age norming their language skills, but looking to see whether pupils identified as needing additional language support according to their CAP scores would also show poorer performance on the standardised language tests, without investigating the specific causes of their difficulties; and to document changes in scores over time.

As shown in Table 6.4 the area of language and comprehension was one of the categories of need most identified by teachers, when referring a pupil for the CAP research and although these categories were not discrete, i.e. a teacher could name as many areas of referral concerns as they wished, it indicates that poor language and comprehension were identified many times by classroom teachers. Unsurprisingly, the number of pupils also noted in the literacy and reading category was similar to the number of pupils in the language and comprehension category. Because of the close link between receptive and expressive language and literacy, it was considered likely that pupils identified as poorer in language skills by teachers, on their CAP scores in this domain, may also score less well on the independent language tests used with them.

iv b) The Semantic Decisions subtest (ACE)
(Adams, Cooke, Crutchley, Hesketh and Reeves, 2001)

This subtest focuses on comprehension of word meanings. The child is shown a page with five pictures. They have to match the picture in the centre of the page with one of the other four pictures. The first part of this subtest has pictures and the second part has words only. Thus, the language elements are linked to working memory and retrieval from long-term memory (domain 3); logical reasoning (domain 5); relevance and ability to select from alternatives; strategic thinking (domain 6). Given several contributory cognitive abilities required in this test, it was thought possible that independent scores on this subtest may associate with teachers' CAP scores not only on language ratings but also with scores in the domain of memory and perhaps more strongly to pupils' CAP scores in the domain of strategic thinking.

6.4.2.6 (v and vi) Reasoning/ Logic Domain and Strategic Thinking/Metacognition

Raven coloured progressive matrices (RCPM) and standard progressive matrices (SPM), were chosen to associate with the domains of Logic and Reasoning and Strategic Thinking (Raven, Raven and Court, 2000). They are amongst the best-known tests of non-verbal reasoning and have consistently demonstrated high levels of validity and reliability (Raven et al., 2008). The test specifically assesses analogical problem solving in a visual/spatial modality. It has been demonstrated that progression of tasks in the Raven tests moves from the earlier items, which can be solved by using visual-spatial perceptual processes and gestalt, to the later items that require the use of certain rules. Both the RCPM and the SPM were used with all children, to avoid a ceiling effect amongst more able pupils. As in the recommended administration of the revision of the RCPM and SPM (2008), the test taker is encouraged to complete all test items. The pupils were given sets A, Ab and B from the CPM and C and D, (set E was not given) from the SPM. It was considered possible that there may be a relationship between scores on the Raven and the domain of perception (domain 2) and the domain of logical reasoning (domain 5), as well as the domain of strategic thinking (domain 6). In domain 5 (logical reasoning) specific items associated with matrix reasoning are systematic comparison; conservation (what changes, what stays the same); inferential and analogical reasoning. Raven's matrices was chosen as an independent test to also reflect in part the domain of Strategic Thinking/ Metacognition (domain 6), in which a number of cognitive abilities are required for the more difficult analytical items such as ability to create and test a hypothesis, flexibility and the need for accuracy.

As discussed in chapter 5 of this thesis, when considering which strategic and metacognitive abilities were selected to be itemised in the CAP, this researcher was not aware of any single standardised test of the concept of metacognition *as a whole*, in children. There are various tests that involve elements of these higher order skills, but the concept itself, as with EF, is composed of a number of variables, used in combination with cognitive abilities named in other domains. A further test selection consideration was that Raven's matrices are considered to be relatively culture-neutral. Raven and similar matrix reasoning tests are very familiar to psychologists and widely used both in clinical and DA research (see chapter 1, Table 2.2). It is also one of the core tests used dynamically in the LPAD battery. Although the

test is considered one of fluid intelligence, many researchers agree that this type of reasoning is very teachable, as has been shown in many field studies of DA (for example Hessels and Schlatter, 2003; Tzuriel, 2001).

6.4.2.7 (vii) Behaviours Affecting Learning domain

Myself as a Learner Scale (MALS) (Burden, 2000) was selected to represent some motivational aspects related to learning, including self-awareness as a learner and self-efficacy. MALS is not a test. It consists of 20 statements about the pupil's self-perceptions about learning and problem solving, which the pupil has to rate on a scale choosing one of 5 scores from **a** – 'very true about me', to **e** – 'not at all true about me'. These self-perceptions are considered as contributing to and reflecting motivation and achievement at school (Burden, 2000) and are thus linked to some of the items rated in this domain. Mainstream pupils age nine and above are considered as being able to read and respond to the statements independently. In order not to disadvantage pupils who were struggling readers, the researcher read all questions to all pupils. Although the MALS questionnaire has been standardised on a sample of pupils of age 12- 13, (UK school years 7 and 8) the test manual does not limit its use to this age group.

MALS demonstrates good levels of validity and reliability (Burden, 2000, p.10). It has the advantage of being brief and easy to administer. It can be used both for individual and group testing. During standardisation it was correlated with Daniels and Diack's standard reading test (1998) and with numerical ability as measured by the Cognitive Abilities Test (CAT). The MALS draws on two theoretical aspects of educational psychology, a social interactive perspective and motivational theory. Burden regarded the concept of teacher as mediator of vital importance especially as elucidated in the work of Bruner and Feuerstein (Williams and Burden, 1997; Burden, 2000, p.16). Thus, the conceptual basis of the MALS, shares some similarity with principles of the CAP. Burden emphasised a holistic approach in which 'learning to learn' is an integral part of motivation and self-esteem and recommended not to focus exclusively on activities designed to build individual feelings of self- esteem. Thus, despite the relatively young age of the pupils in this study (compared to the sample used for standardisation) MALS was considered a compatible and practical tool to address some of the items in the CAP domain of behaviours affecting learning. It was considered possible

that test results on the other independent tests and CAP scores on the other six cognitive domains would not be directly related to MALS scores.

In summarising the rationale for the choice of the independent measures used in this study, all tests selected share the following criteria:

a. All have good levels of reliability and validity;
b. All feature a number of cognitive abilities which associate with different domains of the CAP;
c. None are replications of tests found in widely used educational psychology batteries (such as the BAS or WISC);
d. All tests are relatively culture-neutral (with the exception of the language tests as noted) so that measurement of achievement at school can be more readily separated from underlying cognitive processes;
e. All tests offer ease of administration and realistic time requirements and can be individually scored.

The order in which the tests were administered was:

Raven's Matrices; The d2; ACE-Naming; ACE-Semantic Decisions; WMTB-C Block Recall; WMTB-C Nonword List Recall; MALS-Myself as a Learner Scale.

6.4.3 The independent tests: Unitary measures or overlapping functions?

The following table indicates overlap of several cognitive abilities in and amongst different tests. It is also worth noting that:

1. There is unlikely to be a close match between a single domain and a single test.
2. For teachers using the CAP for the first time, with no background experience in identifying cognitive abilities within regular classroom teaching, it is likely that it will be more difficult for them to identify perceptual processes (domain 2), different types of working memory (domain 3) and analyse logical reasoning (domain 5).

It has often been shown, for example by Manly et al. (1998) in studies of attention and by Gathercole and Alloway (2008), in studies of working memory, that in using tests of cognitive processes, as compared to overall batteries of intelligence, one is not measuring the same constructs. The CAP focuses on cognitive abilities, related to many tasks, whilst conventional intelligence tests generally measure achievement (Haywood and Lidz, 2007).

Table 6.8: Summary of independent tests and associated CAP domains

Test	**Cognitive Abilities**	**Possible Domain Links**
Raven CPM + SPM	Visual-spatial perception; use of several sources of information; logical reasoning-systematic comparison; conservation (inductive and deductive); relevance Hypothesis testing.	Perception (2) Logical Reasoning (5) Strategic Thinking (6)
d2	Sustained attention; selective attention; visual-spatial perception; memory; relevance; need for accuracy	Attention (1) Perception (2)
Block Recall	Sustained attention; selective attention; visual spatial perception; visual working memory; planning behaviour; need for accuracy	Attention (1) Perception (2) Strategic thinking (6)
Nonword List Recall	Sustained attention; auditory perception; auditory memory; Expressive language	Attention (1) Perception (2)
Naming	Auditory working memory; expressive language	Memory (3)
Semantic decisions	Auditory working memory; systematic comparison; relevance; hypothesis testing; flexibility	Memory (3) Language (4) Strategic thinking (6)
MALS	Receptive language; metacognition; self-regulation; motivation	Strategic Thinking (6) Behaviours affecting learning (7)

6.5 Procedure and planned data analysis for investigating RQs

6.5.1 Research questions (i-iii)

Research question (I a) Internal consistency of the CAP

Internal consistency was investigated by examining if there was a correlation between the domains of the CAP, using baseline CAP scores obtained by teachers and if all items inter-correlated and contributed to the total score (Intra Class Correlation Coefficients: ICC). For the former, Pearson correlation coefficients were calculated and for the latter Cronbach's alpha.

Research question (I b) Inter-rater reliability (IRR) studies.

Two IRR studies were undertaken to examine the IRR of the CAP. It is recognised that IRR1 study uses the same teacher for both assessments (with a different EP), and thus is not a conventional design for an IRR study. IRR2 is a more typical IRR study, but in both studies, numbers are very small. The two IRR studies differ in other ways.

- In IRR 1, both EPs and teachers had no prior experience of using the CAP, but the advantage was that the teacher doing the rating would be very familiar with the pupil in the everyday classroom setting.
- In IRR 2, the CAP users were more experienced CAP users, but none were classroom teachers and none saw the child on a daily basis in the classroom context. In addition to teachers, they also included other professionals, Occupational and Speech therapists, all of whom were rating the child on very limited experience of working with the child (4-5 sessions of 1:1 teaching or therapy in 50% of the cases), and in all cases out of the school context, but adding in multi- professional rating, a feature of CAP use.

Thus, by modifying standard psychometric procedures it is recognised that this design is an attempt to balance ecological validity (IRR1) and objectivity (IRR2).

6.5.2 IRR Study 1

Three EPs from service A (from the total of nine) agreed to go into a school not known to them, i.e. not a school in their designated geographical area or case load, in which the CAP was used by a colleague EP who had conducted the first rating. In service B, it was difficult to find an EP who could undertake the additional work of the IRR CAPs, so one EP, who had been given one day of basic CAP training along with the whole EP team, but had *not* participated in the first CAP sessions with teachers, agreed to undertake the IRR CAPs for service B. Three teachers in service A schools were re-interviewed (second rating) for the IRR and they rescored the CAP with an EP who was blind to the pupil's background and needs and to the original CAP scores. In the same way, two teachers in service B schools agreed to be part of the IRR study.

In both services, because the EPs who conducted the IRR ratings, did not work in those schools and had no prior relationships with the SENCO or class teachers, when they conducted the IRR baseline ratings CAP again with the teacher, their starting point was even less well informed than the EP who conducted the first rating. The IRR was set up with this degree of distance between the second EP and teacher because of the non-traditional nature of this IRR study. It should be emphasised, that reliability in this study is not about the stability of the child's performance, but about the reliability of the tool.

The IRR CAP ratings were only carried out if the class teacher had agreed to have a second consultation with a second EP within a time span of no more than three weeks after the original consultation. Parents were not asked to attend a second (IRR) consultation. The teachers involved received a clear explanation of this additional request for their time and understood that the second consultation was not to test them or the consistency of their CAP ratings, but to assess the reliability and clarity of the CAP questions themselves. Only Section A of the CAP, i.e. the seven domains, was rescored in both IRR studies. There was no expectation that the teacher or the second (IRR) EP had to develop an Intervention Plan again.

6.5.3 IRR Study 2

The second study aimed to test IRR of the CAP in a different context to investigate if adequate IRR could be found across different settings. The second IRR context was a multi-professional special educational needs service in the voluntary sector. All teachers and therapists in this service had been trained to use the CAP and used it regularly as a baseline assessment of their pupils' cognitive needs. They were accustomed to group consultation to develop an IP for the pupil, by agreeing joint intervention targets and to subsequent joint reviews and monitoring the child's progress. However, for purposes of this IRR task, they were asked to work with each child independently and rate the child on CAP section A, with no sharing of information and no joint consultation allowed between them.

The voluntary service used for IRR 2, worked with children and adolescents, age 3-19 years (approximately) who are referred by schools, health and educational services and parents. At the time of this study, the service team consisted of an EP, several teachers all of whom had additional SEN training, Speech and Language Therapists (SLT) and Occupational Therapists (OT). Typically, children would receive more than one type of input, in or out of school, because of complex needs, for example, a combination of specialist teaching and SLT, or teaching and OT. Some children may have all three types of intervention concurrently.

Staff were asked to select a few cases with similar criteria to those used in the main research study, i.e. mainstream pupils from years 4 or 5, without SEN statements and who had not had a formal EP assessment. A letter was sent to all parents using the service requesting permission to access their child's CAP data for the purpose of this study. No case was used for this IRR study unless a signed consent form was returned. Staff were requested to work as usual with the child, which consisted of approximately four or five sessions, spread over the first four weeks of getting to know the pupil and as noted, contrary to their usual practice, each professional was asked to do their own CAP scoring independently, with no consultation with any other colleague.

The usual practice is that after CAP targets are agreed and implemented by each member of the team around the child, they are shared with parents, school and any other relevant

agencies and reviewed jointly after a few months. The complete CAP is rescored after one year. In usual practice, parent baseline information is incorporated. However, for purposes of this study, in order to match the components of the main study as closely as possible, parents' views were not included. Six cases that met all criteria for inclusion in this IRR study are summarised in Table 6.9. Three cases were baseline CAPs and three were CAP reviews.

Table 6.9: Summary of cases used for the IRR Study 2

Cases	**2**	**3**
1	Baseline	Teacher + teacher
2	Baseline	Teacher + OT
3	Review	Teacher + teacher
4	Baseline	Teacher + SLT
5	Review	Teacher + SLT
6	Review	Teacher + OT

An *intraclass correlation coefficient* (ICC) of 0.70 is considered good and an ICC of 0.80 is considered very good for inter-rater reliability (Landis-Koch, 1997; Fleiss, 1981). These criteria will be applied when reporting the results of the two ICC studies in the Results chapter 7 that follows.

6.5.4 Research question (ii) Convergent and known groups validity

The design of the research is a between-within groups design, comparing three educational psychology services using different manipulated models for teacher consultation. EPs and teachers scored the CAP (Section A only) and pupils' scores on the baseline CAP were correlated with their scores on the independent standardised tests conducted by the researcher for convergent validity testing. As set out in Table 6.8, above, there is considerable overlap of cognitive abilities between the tests, which appear in several

domains. Some domains have been considered as possibly showing a closer correspondence between certain independent tests and CAP scores in that domain.

To explore the CAP's known groups validity, it was hypothesized that children who are *targeted* via the CAP as having additional needs in certain domains will score lower than their *non-targeted* peers on the related independent tests. Independent t-tests were used to compare the scores on the independent tests of the two groups (CAP targeted and non-targeted pupils).

6.5.5 Research question (iii) Rates of change

This part of the research investigated whether the use of the CAP would result in different rates of change for the children in services using the CAP, versus children in the service that did not use the CAP, as measured by progress on the independent tests results. Mixed ANOVAs were used to compare changes over time between the three services. The question itself would imply ambitious goals for the CAP, i.e. to achieve changes in pupils' scores on standardised tests, just by teachers using the CAP itself at baseline, over a relatively short period of time and with no controlled or guided interventions. However, in using the CAP one can consider the possibility that even an indirect procedure, via consultation, might impact on a teacher's awareness, influencing their teaching approach which may carry over to affect the pupil's functioning. Although there are important limitations to looking for change in this way, it is suggested that some change in practice may take place and to investigate whether this change is detectable in standardised tests over a short time period. This will be reported in the Results chapter.

6.5.6 Research question (iv) Perceptions of the CAP

A final strand investigated whether the EPs perceived the CAP tool to be useful in their practice and to comment on their perceptions of teacher responses to CAP use, albeit in limited application, i.e. using only Section A of the CAP for this research.

A questionnaire was given to all participating educational psychologists who lead the consultation process with individual teachers (see Table 6.10 below). The EP questionnaire

was administered once only, after the completion of both the initial (baseline) and follow up (review) consultations. Perceptions of EPs who conducted consultation with the CAP (groups A and B) were compared with the control group C. Kruskal-Wallis non-parametric analyses were used to compare the ordinal questionnaire responses from the educational psychologists of the three services.

The questions were loosely grouped into two sections: Firstly, background information on the EPs themselves, such as previous exposure to DA, training and use of DA and also their experience of consultation, reflecting the dual themes of the CAP, DA based and use of consultation in their EP practice, training and ongoing use. For both DA and consultation, EPs were asked how much time typically they would give to one or other activity. The questions were designed to reflect issues raised by EPs relating to challenges in using DA in their work (Deutsch and Reynolds, 2000), to find out if these concerns had been addressed and to what extent in the CAP. These background questions are reported earlier in this chapter, in the description of the EP research participants.

The second group of questions was on EPs' evaluation of the research consultation. For services A and B, questions were specifically about CAP use, including perceived benefits to teachers and pupils, and for service C, similar evaluation of benefits of their chosen method of consultation for teachers and pupils. The third and final evaluation questions were on the CAP itself and were therefore relevant only for services A and B. Responses to the second and third group of questions are reported in the Results chapter.

Table 6.10: EP questionnaire on perception of use of the CAP – services A & B – and use of regular consultation – service C

EP perceptions following completion of all stages of their participation in the research*

1. Prior Training	2. Consultation	3. The parts of the CAP	4. The Review Process	5. Outcomes of the CAP (or other) process	6. The CAP forms	7. Time issues	8. Usefulness of the CAP
Have you had any training in Dynamic Assessment?	Have you had any training in using consultation as an EP?	Going through and rating Section A (the seven cognitive domains)	At Review 1: Had the teachers tried to implement the agreed targets?	Were there benefits for the teachers resulting from the CAP (or other) consultation process?	Did you find the layout/ design of the CAP Record Form user friendly as an EP?	Please compare the time needed for the CAP with other forms of consultation/ direct work, or other interventions that you carry out.	What is your opinion of the general usefulness of the CAP?
Have you used DA in your ongoing work as an EP?	When you do consultations, do you meet the teacher/Teaching Assistant/parents?	Explaining the ideas and concepts to teachers	Do you think the teachers understood how to implement the targets?	In what ways were you able to see if the teacher(s) benefited from the CAP (or other) process?	Did you find the Summary form/ IP user friendly as an EP?	If you found the CAP/this consultation took longer than other forms of work you do at school, please tick any of the following that apply to you – choice of answers	
	Do you use classroom observation as part of consultation?	Helping teachers think of relevant examples of the different cognitive abilities.	Do you consider that the teachers needed more direct support/ guidance	Were there benefits for the pupil(s) resulting from the CAP process (or other consultation			

			to implement agreed strategies?	process for service C)			
	Do you include direct work with pupils as part of the consultation?	Did you carry out a classroom observation?					
	Time taken for consultation?	Did you discuss the classroom observation with the teacher/parent?					

*Q 1, 2, 4, 5 - All EPs Q 3, 6, 7 & 8- CAP Users

Chapter 7: Results

In this chapter research results will be presented. A general description and overview of the CAP ratings characteristics at baseline will be presented first, after which analysis of each research question (RQ) will follow. Overall RQs (i) and (ii) relate to psychometric properties of the CAP and RQs (iii) and (iv) address issues of impact and usefulness of the CAP.

7.1 Characteristics of the CAP

Table 7.1 and Figure 9 below, display mean baseline domain scores rated by teachers together with the EP for the seven domains of the CAP (section A) for all participating pupils in services A and B (n = 33). For each of the domains, mean baseline scores are seen to lie between scores two and three, with relatively small respective associated standard deviations, indicating that each one of the seven CAP domains represent an area of cognition in which teachers generally rated pupils as showing some evidence of the cognitive skill, but being either less able – 'needing substantial support' – score of 2, or more able - score of 3 - 'needing some reminders and support'. This would be consistent with the criteria of selection for participating pupils for this research, that is, pupils were selected on the basis of being a cause of concern regarding their learning, but not of such severity that they had been given a statutory assessment or a Statement of Special Education needs (as it was in SEN practice at the time of this research field work).

In Table 7.1 below, the domain of Strategic Thinking is seen to have the lowest mean score followed by the domain of Attention meaning that teachers identified these two domains as ones in which many pupils showed the greatest need for support.

Figure 9: Baseline CAP scores for the seven domains of the CAP

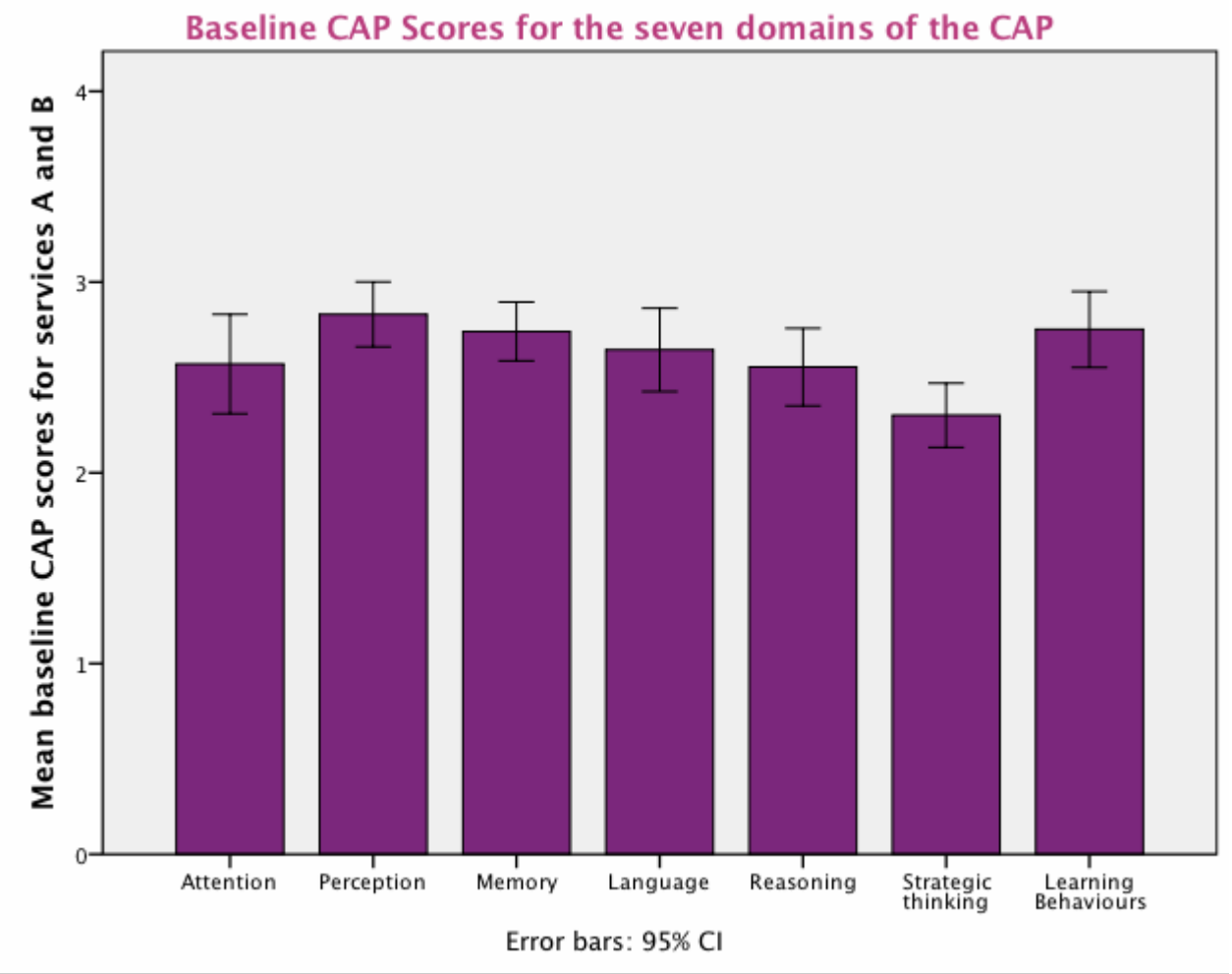


Table 7.1: Mean baseline CAP scores for the seven domains of the CAP (n = 33)

	Attention	**Perception**	**Memory**	**Language**	**Reasoning**	**Strategic Thinking**	**Learning Behaviours**
Mean	2.60	2.83	2.75	2.67	2.55	2.30	2.75
SD	0.74	0.46	0.42	0.61	0.55	0.46	0.55

After completion of the baseline scores, the teacher and EP selected no more than three areas of cognition as targets requiring further support for the pupil. Generally, these would correspond to items in which the pupil got his or her lowest score and these targets can be selected from the items within any domain. A teacher could choose more than one target

from the same domain, if it was felt that this was the most urgently needed area for support for the pupil. As the targets chosen for additional focus by the teacher would mostly be expected to correspond to those domains receiving the lowest mean scores, this should be evident in the selection of targets. This is shown in Table 7.2 below.

Table 7.2: Total number of CAP targets for all pupils chosen by teachers in each domain*

	Attention	**Perception**	**Memory**	**Language**	**Reasoning**	**Strategic Thinking**	**Learning Behaviours**
Total	16	5	12	11	9	36	9

* It should be noted that because pupils can have more than one target, these figures do not total N pupils.

Consistent with the mean domain scores shown in Figure 9, the Strategic Thinking domain emerged as the most frequently chosen domain, perceived by teachers as requiring more support. The domain of Attention followed this. The domain of Perception (AP), which received the highest mean baseline score, was consequently targeted for the smallest number of pupils.

7.2 Psychometric properties of the CAP

7.2.1 RQ (i) Reliability of the CAP

(ia) Internal consistency /reliability: How do the seven domains of the CAP interrelate?

This section addresses the question whether pupils with high scores on one domain also score high on another CAP domain. In Table 7.3 below, highlighted correlations are significant at $p < 0.01$ level.

There was a strong positive correlation ($r > 0.5$) between the CAP domain of Attention and other CAP scores at baseline for the Learning Behaviours domain and moderate associations between Attention and CAP domains of Perception and of Strategic Thinking. Correlations between Attention and Language, Reasoning and Memory, were low ($r < 0.2$) and did not reach statistical significance. Baseline scores in the domain of Perception

showed strong and significant positive correlations with scores on all other domains except with attention with which it had a moderate but still significant correlation.

There was a strong positive correlation between baseline CAP baseline scores on Memory and those of Perception and Reasoning and weaker but significant associations with language and strategic thinking but no significant correlation with Attention (as above) and Behaviours affecting Learning. There was also a strong positive correlation between baseline CAP baseline scores on Language and those of Reasoning and Strategic Thinking; Reasoning and Strategic Thinking and Reasoning and Learning Behaviours. The pattern observed in these correlations will be further analysed in relation to the theoretical model on which the CAP domains were constructed.

Table 7.3: Correlation of baseline scores across all domains of the CAP

BASELINE CAP DOMAINS		Attention	Perception	Memory	Language	Reasoning	Strategic Thinking
Perception	r	.436					
	p	.011					
	n	33					
Memory	r	.139	.634				
	p	.440	< .001				
	n	33	33				
Language	r	.167	.644	.474			
	p	.353	< .001	.005			
	n	33	33	33			
Reasoning	r	.188	.725	.615	.785		
	p	.294	< .001	< .001	< .001		
	n	33	33	33	33		
Strategic Thinking	r	.458	.788	.492	.665	.796	
	p	.007	< .001	.004	< .001	< .001	
	n	33	33	33	33	33	
Behaviours affecting learning	r	.632	.684	.211	.482	.526	.789
	p	< .001	< .001	.247	.005	.002	< .001
	n	32	32	32	32	32	32

Thus, as expected the CAP domains correlated moderately-highly with each other, with the exception of Attention with Memory, Language, and Reasoning. The Cronbach's alpha score was α = -0.877 and confirmed that the CAP has high internal consistency.

7.2.2 Internal consistency within domains

Further analysis examined the internal consistency within each domain, i.e. the relationship between the subcomponent items of each domain. The Attention scale had very high internal consistency (Cronbach's Alpha α = .90), followed by the Reasoning/Logic scale (α = .89). The Strategic Thinking/Metacognition scale (α = .85), and the Language and Communication scale (α = .80) followed. Thus, these domains were in the 'very good' range of ICC (Landis-Koch 1997, Fleiss, 1981).

The Behaviours Affecting Learning scale (α= .78) and the Perception scale (α= .73) were in the 'good' level of ICC range (Landis-Koch 1997, Fleiss, 1981). One domain, the Memory domain (α= .51) showed weak internal consistency. This will be further considered in the Discussion chapter.

ib) Inter-rater reliability: How similarly do independent raters score the CAP?

Because IRR is difficult to achieve using a dynamic tool, two separate inter-rater reliability (IRR) studies were undertaken:

7.2.3 IRR Study 1

IRR study 1 focused on the same pupil, with the same class teacher but with a different EP conducting the consultation; IRR study 2 explored scores from two or more professionals independently rating the same child on the CAP (details are given in chapter 6: method). Inter-rater reliability was generally good for IRR1. Across all cases (a total of n = 91 individual domain scores) only two domain scores differed by more than 0.5. Perfect agreement was found in eleven domain scores across all the cases.

Domain scores were examined using intra-class Correlations (ICC) for both IRR studies as shown in Table 7.4 below. Overall results showed a high level of inter-rater reliability: intra-class coefficient (absolute agreement) CAP total = 0.998 (95% CI = 0.98 to 1.0) $p < 0.001$).

Table 7.4: Comparison of intra-class correlation coefficients results for inter-rater reliability: studies 1 and 2

CAP SECTION A	STUDY 1 Services A and B – same teacher, different Ed. Psych. – IRR 1		STUDY 2 Multi–Professional service: different teachers/therapists – IRR 2	
CAP DOMAIN	**ICC**	**Significance**	**ICC**	**Significance**
Attention	0.96	P = 0.005*	0.80	P = 0.016*
Perception	0.80	P = 0.001*	0.63	P = 0.67
Memory	0.93	P = 0.019*	0.68	P = 0.48
Language	0.99	P =< 0.001*	0.64	P = 0.63
Reasoning	0.89	P = 0.023*	0.96	P = 0.005*
Strategic Thinking	0.86	P = 0.006*	0.75	P = 0.044*
Learning Behaviours	0.88	P = 0.026*	0.72	P = 0.054*

7.2.4 IRR Study 2

Inter-rater reliability in Study 2 did not reach the consistently high level of Study 1. Four domains reached a good (> .70) or very good level (> .80) IRR in Study 2, as shown in Table 7.4. The remaining three domains had ICCs of >.63.

The somewhat lower level of consistency in IRR study 2 may be partly due to the low number of raters and the small number of cases analysed. The two IRR studies took place in quite different contexts: IRR study 1 involved one (the same) classroom teacher, whereas IRR study 2 used at least two teachers and /or therapists per child, in the context of an out of school teaching centre/clinic. Although direct comparison is not possible, overall, the level of consistency of scores on the CAP was somewhat higher when the CAP is re-used by a second EP with the same teacher as in IRR study 1.

However as noted above, same teacher/different EP is ecologically the most important scenario for CAP inter-rater reliability. Even with the more stringent method and smaller sample in IRR study 2, 4/7 domains showed good reliability. The domains in which both studies showed high levels of inter-rater reliability were: Attention; Strategic Thinking and Reasoning. Language, which was the highest IRR score for individual teachers in IRR study 1, was just below statistical significance in Study 2.

7.3 RQ (ii) Convergent and known groups validity of the CAP

7.3.1 (iia) Convergent validity

Do pupils with high scores in a CAP domain also score high on related independent tests?

Convergent validity was investigated by correlating CAP domain scores with performance on relevant independent tests. Table 7.5 shows the correlations between each of the CAP domains and related independent tests and their significance level.

Although significant correlations were found between performance on standardised tests and the CAP domains for some areas, these were not always the most directly linked theoretically and overall the relationships are weak when examining the data continuously. For example, the only test score that was significantly correlated with the domain of Attention is the visual/spatial test of memory-Block Recall. Its corresponding auditory memory test, Recall of Nonwords, was not correlated with the domain of Attention but showed a significant correlation with CAP Language domain scores as expected.

No significant correlations appeared between any of the independent standardised tests and CAP scores in the domain of Perception. Furthermore, two independent tests selected to reflect aspects of language, which were Naming and Semantic Decisions, did not correlate significantly with teachers' scores in the Language domain of the CAP. However, this association was evident in categorical analysis (see below). Overall, the correlations between independent standardised tests and baseline CAP scores as shown in Table 7.5 appear to be relatively weaker than CAP-to-CAP domain scores, as shown in Table 7.3.

However, for validity analysis one does not look only at the statistical significance (which with smaller sample sizes is likely not to be significant) but also at the size of the correlation. Anything above an absolute value of .30 is a moderate correlation that indicates a relationship. Thus, in Table 7.5, moderate correlations, which do not reach statistical significance are also highlighted indicating some possible trends toward significance.

Table 7.5: Summary of correlations between baseline CAP scores and independent tests

		Raven's Matrices (sets A-D)	d2 Test of Attention	Word Naming (ACE)	Semantic Test (ACE)	Block Recall (WMTBC)	Non-words (WMTBC)	MALS (Myself as a Learner)
Attention	Pearson Correlation	.295	.290	-.211	.140	.370	-.207	-.111
	Sig. (2-tailed)	.096	.121	.239	.438	.037	.248	.538
	N	33	30	33	33	32	33	33
Perception	Pearson Correlation	.249	.084	.014	.200	.247	-.324	.028
	Sig. (2-tailed)	.161	.658	.939	.264	.172	.066	.876
	N	33	30	33	33	32	33	33
Memory	Pearson Correlation	.322	.133	.330	.386	.226	-.055	.337
	Sig. (2-tailed)	.067	.484	.060	.026	.215	.760	.055
	N	33	30	33	33	32	33	33
Language	Pearson Correlation	.293	.283	.249	.316	.058	-.369	-.038
	Sig. (2-tailed)	.098	.130	.162	.073	.751	.035	.835
	N	33	30	33	33	32	33	33
Logic/ Reasoning	Pearson Correlation	.310	.228	.310	.403	.086	-.289	.073
	Sig. (2-tailed)	.080	.225	.079	.020	.638	.103	.688
	N	33	30	33	33	32	33	33
Strategic Thinking/ Metacognition	Pearson Correlation	.436*	.216	.031	.351	.215	-.333	-.011
	Sig. (2-tailed)	.011	.252	.863	.045	.237	.059	.953
	N	33	30	33	33	32	33	33
Behaviours affecting Learning	Pearson Correlation	.327	.284	-.144	.251	.224	-.349	-.295
	Sig. (2-tailed)	.068	.136	.431	.166	.227	.050	.101
	N	32	29	32	32	31	32	32

*Significant correlations between a domain and an independent test are highlighted in **green**; Domains showing a trend toward significant correlations (p<0.1) are highlighted in **yellow.***

With reference to possible associations between independent tests and specific domains as shown in Table 6.7, in the methodology chapter, the following results were found:

The Attention domain had a moderate and significant correlation with the Block Recall (WMTBC) test (r = .37, p = .037). Its correlation with the d2 test of attention was lower than expected, but still not negligent at r = .29.

The Perception domain had a moderate and negative correlation (trend to significance) with the Nonword test (WMTBC) (r = -.32, p = .066).

The Memory domain had a moderate and significant correlation, as expected, with the ACE Semantic Test (r = .39, p = .026). There was also a moderate but not significant (although there was a trend to significance) with the ACE Word Naming (r = .33, p = .06) and the MALS (r = .34, p = .055) and also with Raven's Matrices (r = .32, p = .067). No significant correlation was found with the d2 test (p=. 48), as expected.

The Language domain had a moderate significant negative correlation with the Nonword (WMTBC) test (r = .29, p = .035) and a correlation (trend to significance) with the ACE Semantic test (r = .32, p = .07). This domain also had moderate correlations (trend to significance) with Raven's Matrices (r = .29, p = .098).

The Logic/Reasoning domain had a moderate correlation, as was expected (trend to significance) with the Raven test (r = .31, p = .08). This domain also had a moderate significant correlation with the Semantic Test (ACE) test (r = .40, p = .02) and moderate, but with a trend to significance correlation with the Word Naming (ACE) (r = .31, p = .079), and negative correlations with the Nonword test (WMTBC) (r = -.29, p = .10).

The Strategic Thinking / Metacognition domain had moderate and significant correlations with Raven's Matrices (r = .44, p = .011) and with the Semantic test (ACE) (r = .35, p = .045) as was expected. This domain also had a moderate negative correlation (trend to significance) with the Nonword (WMTBC) (r =- .33, p = .059). This domain did not have significant correlations with the Block Recall test (p = .32) and the MALS (p = .33).

The Behaviours affecting Learning domain had a moderate positive correlation (trend to significance) with Raven's Matrices (r = .33, p = .068) and negative correlations (trend to significance) with the Nonword (WMTBC) (r =- .35, p = .05) and with the MALS (r =- .30, p = .10).

7.3.2 (iib) Known groups validity

Do those pupils targeted for extra support in some areas, based on their baseline CAP scores, also score lower on independent baseline tests?

Despite the relatively weak relationship between CAP domain scores and independent tests, examination at a categorical level, of whether the CAP was associated with independent test results, was undertaken. That is, whether children who were *targeted* via the CAP as having additional needs in certain domains, scored lower than their *non-targeted* peers on the independent tests that were selected as possibly associating with some cognitive abilities in a domain, as discussed in the methodology chapter and summarised in Table 6.7.

In the domain of Attention, there was no significant difference in the Block Recall test (*t* (30) = 0.61, *p* = .55) between the targeted (*M* = 23.1, *SD* = 2.9, *N* = 11) and the non-targeted groups, (*M* = 24.0, *SD* = 3.5, *N* = 19); no significant difference in the Nonword list recall test (*t* (31) = -0.05, *p* = .96) between the targeted (*M* = 9.3, *SD* = 2.9, *N* = 11) and the non-targeted groups (*M* = 9.3, *SD* = 3.5, *N* = 19) and no significant difference in the d2 test (t(28) = 0.76, p = .45) between the targeted (*M* = 9.3, *SD* = 2.9, *N* = 11) and the non-targeted (*M* = 9.3, *SD* = 3.5, *N* = 19) groups.

In the domain of Memory, there was no significant difference in the Block Recall test (*t*(27) = -1.5, *p* = .13) between the targeted (*M* = 26.0, *SD* = 2.8, *N* = 10) and the non-targeted (*M* = 24.0, *SD* = 4.6, *N* = 21) groups. There was a non-significant difference in the Nonword test (*t* (18) = -0.95, *p* = .35) between the targeted (*M* = 11.2, *SD* = 3.0, *N* = 10) and the non-targeted groups (*M* = 12.3, *SD* = 3.1, *N* = 21).

In the domain of Language, there was a significant difference in the Naming test (*t*(14.5) = 4.0, *p* < .01) between the targeted (*M* = 9.0, *SD* = 5.0, *N* = 11) and the non-targeted groups (*M* = 15.2, *SD* = 3.2, *N* = 21) and also a significant difference in the Semantic Decisions test

($t(31) = 3.0$, $p < .01$) between the targeted ($M = 9.5$, $SD = 3.8$, $N = 11$) and the non-targeted groups ($M = 13.0$, $SD = 2.9$, $N = 21$). There was no significant difference in the Nonword test ($t(31) = 0.33$, $p = .75$) between the targeted ($M = 9.0$, $SD = 3.3$, $N = 11$) and the non-targeted (M = 9.4, SD = 3.4, N = 22) groups and no significant difference in the MALS test ($t(31) = 1.53$, $p = .88$) between the targeted ($M = 70.2$, $SD = 9.3$, $N = 11$) and the non-targeted groups ($M = 69.6$, $SD = 11.2$, $N = 22$).

In the domain of Reasoning, there was no significant difference in the Raven test ($t(35) = 0.80$, $p = .43$) between the targeted ($M = 32.0$, $SD = 10.7$, $N = 7$) and the non-targeted ($M = 35.9$, $SD = 11.2$, $N = 25$) groups.

In the domain of Strategic Thinking, there was no significant difference in the Raven test ($t(31) = 1.53$, $p = .14$) between the targeted ($M = 33.3$, $SD = 10.8$, $N = 23$) and the non-targeted groups ($M = 38.5$, $SD = 10.9$, N = 10). There was no significant difference in the MALS test ($t(31) = 0.14$, $p = .89$) between the targeted ($M = 70.4$, $SD = 8.3$, $N = 23$) and the non-targeted ($M = 69.8$, $SD = 12.0$, $N = 10$) groups.

In the domain of Perception, no independent tests were selected as directly representative of this domain; therefore, no comparisons were carried out. Similarly, there were no CAP scores that correlated significantly at baseline with the pupil self-rating questionnaire (MALS). For the domain of Behaviours affecting Learning (domain 7) there were no significant relationships between pupils' scores on any of the independent tests and this domain.

7.4 Usefulness of the CAP

7.4.1 RQ (iii) Rates of change

Does use of the CAP in itself associate with improved outcome for the pupils?

Mixed ANOVAs were used to compare baseline and review (post-test) standardised test scores for pupils in services A, B and C in order to evaluate the effect of use of the CAP on pupil change in performance on standardised/independent tests. The results for the six standardised tests are now discussed. It should be noted that the period of assessment/re-

assessment is short and the outcomes used are standardised test scores, which might not be expected to change in this short time span. This was not only necessary for practical reasons (timescale of this thesis) but also provides the most stringent test of change.

Changes in test scores of all three groups is evident in pupil performance on all standardised tests in each of services A, B and C. However larger differences were noted in services A and B (CAP users) than service C (control group) and these interactions reached statistical significance for some measures as detailed below.

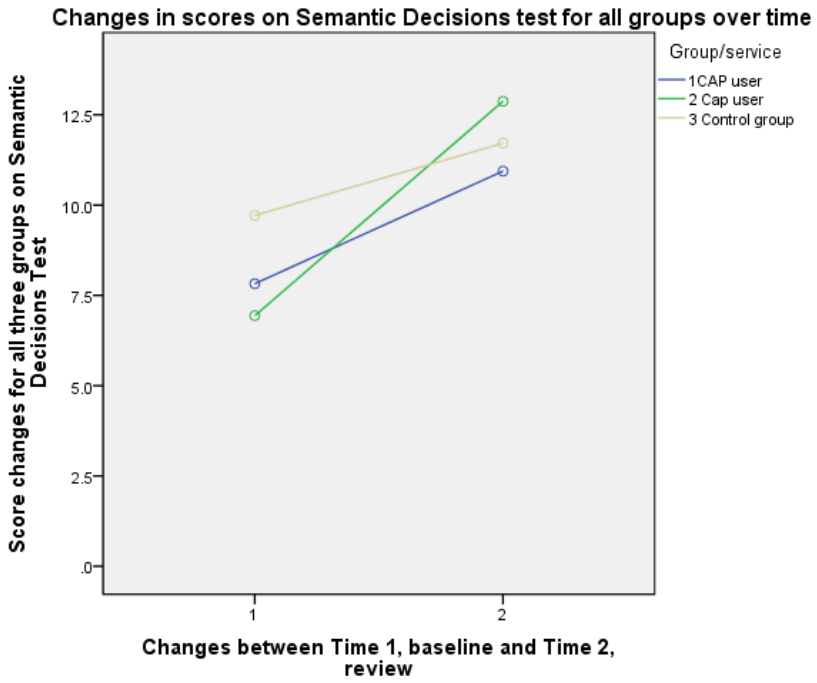
Semantic Decisions Test

Table 7.6: Comparison of changes in scores on a Semantic Decisions test across all services over time

Semantic Decisions test	**Service A (CAP)**			**Service B (CAP)**			**Service C (control)**		
	n	Mean	SD	N	Mean	SD	n	Mean	SD
Time 1, baseline	17	7.8	3.8	16	6.9	2.7	14	9.7	3.3
Time 2, review	17	11	3.7	16	12.9	3.3	14	11.7	2.3

There was an interaction effect between the three services over time (Wilks' Lambda = 0.744, F (2,44) = 7.57 $p < 0.001$, $\eta_p^2 = .26$), with services A and B showing a steeper improvement than service C. The main effect of time was also significant showing an increase in the scores on the Semantic test (Wilks Lambda = 0.366, F (1,44) = 76.08, $p < 0.001$, $\eta_p^2 = .63$). The overall main effect of service was not significant: F (2,44) = 0.833, $p=0.441$, $\eta_p^2 = .04$. This is shown in Figure 10 below.

Figure 10: Semantic test baseline (Time 1) and review (Time 2) test scores for pupils in all services



Naming Test

Table 7.7: Comparison of gains over time across services for the Naming test

Naming test	**Service A (CAP)**			**Service B (CAP)**			**Service C (control)**		
	n	Mean	SD	N	Mean	SD	n	Mean	SD
Time 1, baseline	17	10.7	4.2	15	11.6	4.7	14	11.7	4.1
Time 2, review	17	11.8	5.4	15	15.1	4.1	14	14.2	4.7

For the naming test, there was no interaction effect between the three services and time (Wilks' Lambda = 0.871, F (2,43) = 3.2, p=0.51, η_p^2 = .13). The main effect of time was significant showing an increase in the scores on the Naming test for all three groups (Wilks Lambda = 0.567, F (1,43) = 32.9, p < 0.001, η_p^2 = .43). The main effect comparing the services was not significant F (1,43) = 1.2, p = 0.336, η_p^2 = .05. Details are shown in Table 7.7 above.

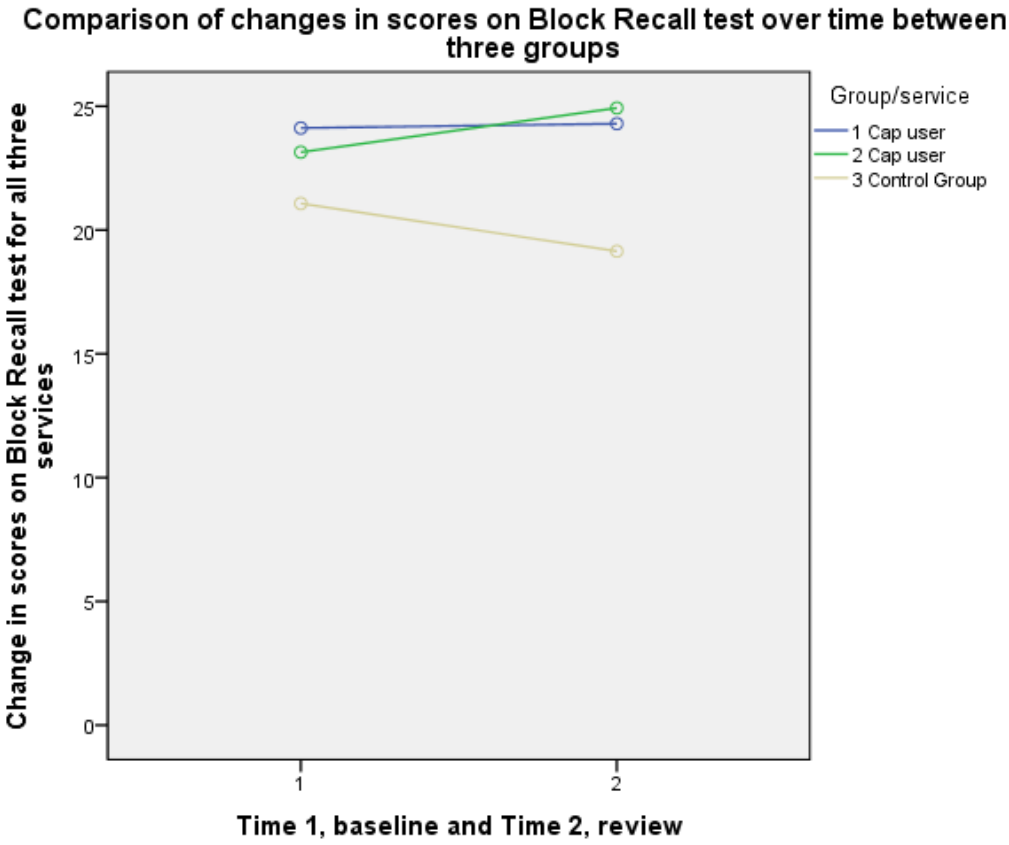
Block Recall Test

Table 7.8: Comparison of gains over time across all services for the Block Recall test

Block Recall	**Service A (CAP)**			**Service B (CAP)**			**Service C (control)**		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Time 1, baseline	17	24.1	3.9	14	23.1	2.5	14	21.1	4.7
Time 2, review	17	24.3	4.6	14	24.9	3.6	14	19.1	5.7

The interaction between group and time on Block Recall test, shown in Figure 11 and Table 7.8 was significant (Wilks Lambda = 0.827, F (2,42) = 4.39, p = 0.019, η_p^2 = .17). There was no significant main effect for time (WL = 1.00, F (1,42) = 0.001, p = 0.982, η_p^2 = .001) as there was a decline in performance of service C (no CAP) and an improvement in services A and B. There was also no significant main effect of service, F (2,42) = 5.01, p = 0.11, η_p^2 = .19, although this difference was close to significance.

Figure 11: Mean Block Recall baseline (Time 1) and review (Time 2) test scores for pupils in all services



Raven's Matrices

As shown in Table 7.9, there was no interaction effect between the three services over time for Raven Matrices. Wilks Lambda = 0.930, F (2,43) = 1.61, p = 0.211, η_p^2 = .07. Main effect of time was significant showing an increase in the scores on the Ravens test for all three groups. Wilks Lambda = 0.529, F (1,43) = 38.3, p < 0.001, η_p^2 = .47. The main effect comparing the services who did or did not use the CAP was not significant: F (2,43) = 1.08, p = 0.348, η_p^2 = .05.

Table 7.9: Comparisons of gains over time across services for Raven's Matrices

Raven's Matrices	**Service A (CAP)**			**Service B (CAP)**			**Service C (control)**		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Time 1, baseline	17	35.1	11.3	15	36.5	9.9	14	33.6	11.8
Time 2, review	17	40.2	9.3	15	45.9	6.8	14	39.1	10.1

Nonword List Recall Test

Table 7.10: Comparison of gains over time across all services for Nonword List Recall

Nonwords	**Service A (CAP)**			**Service B (CAP)**			**Service C (control)**		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Time 1, baseline	17	10	3.7	15	8.47	2.9	14	11.9	3.9
Time 2, review	17	12.2	2.8	15	11.7	3.4	14	12.5	3.4

As shown in Table 7.10, there was no interaction effect between the three services over time for the Nonword Recall test: Wilks' Lambda = 0.901, F (2,43) = 2.37, p = 0.105, η_p^2 = .10. Although the difference was not significant, there was a trend to significance**.**

The main effect of time was significant showing an increase in the scores on the Nonword List Recall test for all three groups, Wilks Lambda = 0.724), F (1,43) = 16.4, p < 0.001, η_p^2 = .28. The main effect comparing the services who did or did not use the CAP was not significant: F (2,43) = 1.9, p = 0.162, η_p^2 = .08.

d2 test

Table 7.11: Comparison of gains over time across services for the D2 test

d2 Test	Service A (CAP)			Service B (CAP)			Service C (control)		
	n	Mean	SD	N	Mean	SD	n	Mean	SD
Time1, baseline	16	182	46	13	186	74	14	161	51
Time2, review	16	202	56	13	195	58	14	181	39

There was no interaction effect for the d2 between the three services over time, Wilks' Lambda = 0.990, F (2,40) = 0.200, p = 0.819, η_p^2 = .01. The main effect of time was not significant in the increase in scores on the d2 test for all three groups. Wilks Lambda = 0.887; F (1,40) = 5.12, p = 0.29, η_p^2 = .11. The main effect comparing the services who did or did not use the CAP was not significant: F (2,40) = 0.807, p = 0.453, η_p^2 = .04.

In sum, all pupils in all three services showed improvements over time, but only in two tests were there significant interaction gains by pupils in the services for which the CAP had been used (A and B). These were in one of the language tests – Semantic Decisions and in one of the memory tests – Block Recall. These results were not part of a controlled efficacy study of teacher interventions and will be further analysed in the Discussion chapter, which follows.

7.5 Perceptions of EPs – RQ (iv)

All EPs who participated in the research project, used consultation, either with the CAP – services A and B - or consultation with any method of their choice – service C. A summary of the questions used to evaluate the perception of the CAP or other form of consultation can be found in Table 6.8 in the method chapter 6.

7.5.1 Questions about the consultations across all services

Evaluation of the perceptions of EPs regarding the consultation undertaken for the research project revealed a number of useful findings, which are reported below using Kruskal-Wallis analyses. Additional comments were made by some EPs alongside their answers to the questions, which give further insights on their experience with the CAP. A selection of these is shown (in italics) below the table of median and the interquartile range (IQR) scores.

The rating scale for each question was: 'Not at all' – 0; 'Not much' – 1; 'Neutral/don't know' – 2; 'Somewhat' – 3; 'Very much' – 4.

7.5.2 Implementing targets by the teachers

Although target implementation by teachers was not controlled in the study, all services were asked to comment on this aspect as one indication of how easy or difficult teachers found understanding and possibly implementing the concepts or targets discussed in their consultation. There were no significant differences between services as to whether EPs thought that teachers had implemented targets. Overall 18/26 (69%) felt this was the case (Kruskal Wallis χ^2 (2) = 1.008, p = .604). Percentages for the individual services are shown below in Table 7.12.

There were no differences between services on whether EPs thought teachers understood how to implement targets. Again overall 18/26 (69%) felt they had understood.

Table 7.12: Perception by EPs of teachers' attempts to implement CAP (or non-CAP) targets

Service	Teachers tried to implement	Teachers understood how to implement	Teachers needed more support	Teachers benefitted	Pupils benefitted
A	Median 2 (IQR) .25-3.75	Median 3 (IQR) 2.25-3.75	Median 3 (IQR) 3-3.75	Median 3.5 (IQR) 3-4	Median 4 (IQR) 2.25-4.75
B	Median 3 (IQR) 1.75-4	Median 2 (IQR) 2-3	Median 3 (IQR) 2.75-3.25	Median 3 (IQR) 2.75-4	Median 3 (IQR) 3-4
C	Median 3 (IQR) 0-3	Median 3 (IQR) 3-3	Median 1 (IQR) 0-3	Median 3 (IQR) 3-3	Median 3 (IQR) 3-3

A large proportion of all EPs, 24/27 (89%), felt that teachers needed more support to implement targets. This was significantly more so for the two CAP services, $\chi^2(2) = 6.823$, $p = 0.033$ and there was no difference across the two CAP user services. There were no differences across services, on whether EPs thought pupils or teachers benefitted from the consultation given.

7.5.3 Pupil perceived benefits

EPs were also asked if and how they felt pupils benefitted from whichever process was used, CAP or regular consultation. The responses of EPs for all three services are shown here in Table 7.13.

Table 7.13: Benefits of consultation for pupils across all services, as reported by EPs

	Service A (n=14)	Service B (n=16)	Service C (n=14)
No benefits observed by any party	0	1	1
Gains in SATS scores	1	0	1

Increase in focus/ attention	5	6	5
Improvement in memory	0	1	1
Improvement in language	2	3	0
Change in logic/reasoning	2	4	0
Change in self-awareness of thinking/learning strategies	5	3	1
Change in learning-associated behaviours	5	6	5
Change in peer relations in classroom	1	1	2
Change in responsiveness to adults	3	1	2
Increase in openness to challenge	2	2	2
Increase in ability to control frustration	1	3	0
Increase in ability to control impulsive responses	1	2	0
Reduction in task avoidance	3	2	4
TOTAL positive changes noted	31	34	23

Very few pupils in both services A and B were reported as not having benefitted at all. Direct comparison of numbers of targets scored as having improved is difficult, because there were also different numbers of targets chosen. Most teachers stayed with the recommended number of 3 targets, but some identified and scored more targets. It can be seen that all three services noted increase in the pupil's ability to focus on tasks (as reported by teachers to the EPs at their review consultations) and all three groups of EPs noted

improvements in learning associated behaviours, which is also linked to the last item, reduction in task avoidance, in which service C EPs particularly noted positive changes. In the more specifically cognitive targets, such as logic and reasoning; awareness of one's thinking and language, all of which were prominent in the CAP group choices of intervention targets, it can be seen that changes were noted by service A and B to a greater extent than by the non-CAP user service. Although numbers are small and interventions were not controlled in any formal way, it would appear that 'regular' consultation tended to emphasise behavioural markers of change, such as increased attention and reduction in task avoidance, whilst the CAP user groups were targeting more specifically cognitive goals which underpin access to curriculum and 'learning to be a learner', to a greater extent than observed behavioural changes. However, it is difficult to compare the three services directly in their assessment of changes in pupils' cognitive functioning over time, because the two CAP user services used the CAP rating scale starting with baseline scores on selected targets and comparing these to the review scores, whilst the control group targets were not named and rated specifically and change was based on the teacher's opinion only. This difference will be considered further in the Discussion chapter.

7.5.4 Additional comments

Additional comments were also made in this section by some EPs, which add to the quantitative information presented above. These are shown below grouped under two key themes relating to 'Implementing targets' and 'Benefits for teachers and pupils'.

Implementing targets:

"I think issue of implementation also relates to teacher having ownership and motivation to work with strategies." (Participant 1)

"Varies with teacher." (Participant 2)

"Teacher motivation, - one teacher really understood and was able to run with it. The other teacher found it interesting but challenging." (Participant 3)

Complexity of some concepts suggests need for knowledge and experience in DA. Would it be better used with advisory teachers? (Participant 4)

Benefits for teachers and pupils:

"Parents may not understand the cognitive concepts. Teachers however seemed to enjoy and appreciate this opportunity to carry out in depth work on a particular child. Shorter version for parents?" (Participant 5)

"Sometimes I feel we have not only to match the learning style of the pupil but also that of the teacher, as we depend so heavily on them to agree and deliver interventions and track progress." (Participant 6)

"I was very impressed with how my teacher implemented the strategies. She produced a booklet of strategies, tips and suggestions for the pupil… shared this with the TA and used some of the strategies for the whole class." (Participant 7)

7.5.5 Evaluation of use of the CAP by services A and B

EPs were asked to rate the ease of use of the CAP on a 5-point scale ranging from 'very difficult' to 'very easy'. EPs were mixed on how easy the CAP was to use. In total, 11/20 (55%) found it 'somewhat difficult' to go through section A (a further 5 rated this as 'neutral'); 7/20 (35%) found the CAP difficult to explain to teachers (with a further 6 rating this as 'neutral'). 9/20 (45%) found it difficult to give examples to teachers (a further 3 were 'neutral'). However, 17/20 (85%) thought the CAP forms were easy to use (same for both the Record and Summary forms).

There were no significant differences between services A and B, in terms of EPs perceptions of ease of use of the CAP, although service A, has a service-wide policy not to use standardised tests and as a whole service, has received more in-service training in DA than service B, as noted in the methodology chapter. This finding does not support informal findings when an early version of the CAP was trialled (Deutsch and Mohamed, 2008), as reported briefly in chapter 5 of this thesis. In that exercise, prior training in DA did make a

difference to EPs perceptions of ease of use of the CAP. Some suggestions for this difference in findings are offered in the Discussion chapter of this thesis.

The questionnaire also asked whether the CAP users felt the new tool had time implications (again using a 5-point scale from 'much quicker' to 'much longer'). Overall, 14/20 (70%) said it took longer than their usual process, (χ^2 (2) = 9.774, p = 0.008). The most specified reasons given for extra length of time needed for the initial CAP consultation in comparison with typical consultation time was that CAP was new; it taking longer for cognitive concepts to become familiar; and more time is needed for explanations for the teachers.

Again, additional comments were made by some EPs as follows:

"More time than usual consultation, but the benefit is a detailed analysis of the child's cognitive skills, which is something different from the usual more informal consultation, especially for children presenting with more complex patterns of learning" (Participant 8)

"I like it and want to use it in my special school but it is time consuming. But it's a really valuable tool!" (Participant 9)

"Very useful and insightful, but time issue… but as I became more familiar, time reduced…" (Participant 10)

Finally, EPs were asked whether, overall, they felt that the CAP gave enough insights into the pupil without direct assessment. On a 5-point scale ranging from 'no insight' to 'as plentiful as direct assessment', 14/20 (70%) felt that the CAP gave 'sufficient' (8) or 'plentiful' (6) insights into the child. A Kruskal-Wallis test showed no significant difference between the responses of service A and B.

Additional comments made within this section of the questionnaire are given below:

"The fact that CAP engages the teachers and places cognition in the classroom, is its strength" (Participant 11).

"Provides a different language for explaining concerning behaviours" (Participant 12).

Informal analysis of themes that emerged from those who chose to add further comments suggest that:

1. The CAP is useful, but time constraints were an issue as most EPs and teachers could not complete both the CAP record form and set up a detailed IP in one hour (typical time allotted for a consultation).
2. Some EPs felt that a key element of successful use of the CAP was the motivation of individual teachers. Many EPs who used the CAP with more than one teacher compared the benefits for teachers and pupils in accordance with the interest and uptake of the teacher.
3. The CAP offers a different framework for consultation.
4. None of the teachers received an introduction to the CAP and the majority of EPs recognised that the teachers would need additional support. However, service C EPs, who did not use the CAP, made similar observations about their teachers' need for more support.

7.6 Impact of the use of the CAP: comparison of teachers' ratings and EP perceptions.

The overall number of changes in selected targets for teacher implementation, as seen in their ratings at the review phase of the CAP, is presented in Table 7.14. These data indicate that professionals completing the CAP perceived improvements in targeted areas for the majority of children in both services.

Table 7.14. Change in CAP scores over time for services A and B (service C did not use CAP)

	Number of CAP targets chosen and reviewed	**Number (%) of children showing Improvement in CAP scores**	**Number (%) of children showing no improvement in CAP scores**
SERVICE A	52	41 79%	11 21%
SERVICE B	38	34 89%	4 11%

7.61 Case studies illustrating different CAP experiences

However, the group data presented thus far does not give a detailed picture of child progress. Therefore, two case studies will now be presented, the first, illustrating a more successful use of the CAP and the second describing a child who made less progress. The case studies enable us to see how these pupils' individual test scores compare to teacher ratings and EP perceptions. Whilst there were cases where the pupil improved after CAP assessment and this was reflected in other measures, there were also instances where the pupil improved only marginally and where the CAP ratings did not reflect direct testing.

CASE STUDY 1:

Service A: Child S

This girl was 9 years 5 months old when the first CAP consultation took place and was identified by teachers as being suitable for the study because she had already been identified as having literacy difficulties, summarised by her teacher as "Low National Curriculum levels, maths, reading okay, home and social issues". She was on School Action Plus but had not had an EP assessment to date. Child S spoke Jamaican patois at home. Her father is her primary carer and she was described as missing her Mum and sometimes getting upset. She receives English as an Additional Language (EAL) input having only recently learnt to read and write. She does not speak grammatically correct English. The

teacher identified difficulties in maths to a greater extent than S's literacy difficulties and a second EP, who conducted an IRR rating of the CAP on child S, noted "no progress in simple division since year 1/ 2". Child S was described as concrete in her thinking, benefitting most from tactile (kinaesthetic) modes of learning and struggling with abstract concepts. She was attending a large school in an inner- city area and the class teacher was described as 'quite young'. The teacher had not taught in an inner -city school in London before and when she spoke to the EP informally, after the completion of the study, she expressed negative views about her experience and said she was very disappointed at the lack of provision in the school as such. Child S was one of the cases which was also used for the inter-rater reliability study of the CAP, and thus her baseline CAP scores can be compared between the two psychologists who conducted the initial CAP consultations, as shown in table 7.15 below.

As the table 7.15 below indicates, the CAP assessment identified targets all relating to strategic thinking.

Targets chosen:
AS3: Creating and testing a hypothesis;
AS4: Systematic planning behaviour;
AS5; Precision and Accuracy.

Child S's scores were fairly low across the board, but these particular sub-items scored below 2.5 and were felt to be priorities by the EP and teacher. Consistent with both initial consultations, (the school's EP (EP1) and EP2 who conducted the IRR CAP consultation with the same teacher) targets selected for child S were all taken from the domain with the lowest average score, Strategic Thinking / Metacognition. At review, the teacher and EP discussion led to improved ratings in all the identified targets for Child S (see Table 7.15). This improvement was reflected in the independent direct testing (see Table Y) in which child S improved across all areas including tests which are associated with strategic thinking, such as the Semantic Decisions subtest which shows a statistically significant correlation with the domain of Strategic Thinking, as shown earlier in this chapter in Table 7.5. Thus, in this case, the CAP scores were in line with objective measures of performance.

Table 7.15: CAP scores for Child S at baseline with specific targets (sub-items of domains) at baseline and review

Baseline CAP scores and review

	Attention	Perception	Memory	Language	Reasoning	Strategic Thinking	Behaviours	Target 1	Target 2	Target 3
								AS3*	AS4*	AS5*
Baseline* EP1 EP2	2.8 2.8	3.0 3.5	3.0 3.0	2.5 2.25	2.6 2.75	2.3 2.2	2.6 2.75	2.0	2.0	2.0
							Review:	2.5	2.5	2.5

*EP 1 was the school's EP and EP2 was the external EP who conducted the IRR CAP.

NB: Only chosen targets are scored at review

Table 7.16: Independent test results for Child S at baseline and review

Raw independent test scores

	Ravens	d2	Naming	Semantic Decisions	Block Recall	Non-Word Recall	MALS
Baseline	45	240	13	13	23	13	63
Review	47	216	14	17	27	17	95
Change	+4%	-10%*	+8%	+31%	+17%	+31%	+51%

* In one independent test, the d2, child S scored lower at review.

Child S – EP's background experience:

This EP indicated that she had some training in DA, both a short and longer course *(as did most of Service A EPs)*. She indicated that most of her work with pupils is related to DA approaches and that her background helped her use the CAP. She also had formal training in consultation work. Most of her consultations she regards as unstructured, guided by what the client presents.

She stated that she sometimes meets teachers and parents, sometimes does a classroom observation and sometimes undertakes direct work with the pupil. She described her use of time for consultation as flexible. Feedback from her consultations are given verbally and in writing and sometimes to parents and pupils. She rarely offers SMART targets, but often follows up after initial consultation.

Child S – EP's views on the CAP:

The EP for Child S expressed a view that CAP training was too brief; and that two days would have helped. The follow up practice offered to each EP was perceived as very useful in preparing for the research interview.

The EP found the use of Section A of the CAP somewhat difficult. Likewise, it was somewhat difficult to explain concepts to the teachers and help teachers think of relevant examples (of the various domains of Cognitive Abilities). In contrast, she found the CAP manual very helpful at all stages, defining the CA's, generating relevant examples and identifying targets and strategies. She discussed all domains and scores with the teacher, but no parent was present. Interestingly, filling out the Summary Form (which names the targets and recommended strategies) she found somewhat difficult and did not do this with the teacher.

The EP chose the targets after the consultation and sent them to the teacher with some further discussion. She would have liked to set up a separate meeting with the teacher to discuss the targets, but commented that she managed to "grab the teacher in the

staffroom" on one of her visits and asked her if she received and understood the IP targets. "She reassured me that she did".

Note: Most if not all of the EPs, took up the time available at the initial consultation to complete the baseline CAP rating, which is the longest piece of work at this stage and had to go away and think about the ratings targets and strategies, not just because of time constraints, but because of their lack of experience in using the CAP.

Child S – The CAP Review Process:

Despite the less than ideal process described above, the EP felt that the teacher had very much understood how to implement the targets. Nevertheless, the EP stated that the teacher may have benefitted 'somewhat 'from more direct support /guidance for implementation. The EP provided the teacher with extracts from the CAP manual to guide her and stated that the teacher found this very helpful.

The EP wrote: "I was very impressed with how my teacher implemented the strategies. She produced a booklet of strategies, tips and suggestions for the pupils; shared this with the TA to use with the pupils in class; ensured the pupils used the booklet and other strategies when necessary".

Child S – EP's view of teacher benefits of the CAP:

The EP for Child S felt that the teacher benefitted very much and that the CAP's emphasis on underlying cognitive abilities and when asked to rate how much it gave new insights to the teacher, rated this as 'very much'. These insights included more awareness of cognitive processes to help understand the pupil's challenges; more awareness of the links between cognition, emotion and motivation and awareness that SMART targets can be applied to cognitive processes. When the EP named and described specific mediational strategies to address these, the teacher, in her view, also became more aware of her own actions and responses in the classroom. The EP added the comment" I think the teacher unconsciously applied some strategies to her whole class teaching".

Child S – Perceived CAP benefit for the Pupil:

The EP noted the following on her questionnaire: Child S showed gains in SATS scores; An increase in focus and attention (at times, dependent on the task); Changes in self-awareness of her own thinking /learning strategies; Changes in behaviours associated with learning and Increase in openness to challenge.

The EP then commented that "I think for one pupil [*the EP used the CAP for two pupils, but with different teachers]* the pupil's emotional and medical needs made it difficult see clear change. With the other pupil, the teacher's main concern with literacy difficulties did not change /improve". Although Child S's identified difficulties with literacy were not seen as having benefitted directly from the CAP targets in this short time, when EP 2 IRR study conducted the initial (IRR) CAP consultation she noted teacher's comments that child S cannot read the clock, struggles with numeracy and with abstract concepts

The EP commented later in the questionnaire, that in her opinion, whether the teacher implemented the strategies or not was not related to time factors but "was due to the motivation of the teacher to agree to implement the strategies or not. Luckily a teacher was selected for me by the SENCO who knew she had an interest in psychology of learning and would cooperate effectively".

The EP's comments about the motivation and interest of the teacher represent a frequently noted observation of many EPs. Analysis of the complex interplay between a pupil's needs and the teacher's approach and other systemic factors will be taken up in the Discussion chapter of this thesis.

CASE STUDY 2:

Service B: Child F

This boy was just 8 years old when the study began, somewhat under age as compared with the majority of pupils in the research. He was identified by his teacher as being suitable for the study because he was on School Action Plus and it was reported that that he had difficulties with 'Language, Literacy and being unable to work independently', but had not

had an EP assessment to date. He was attending a large school in an inner-city area. Child F's teacher was young. Precise years of teaching experience were not known, but she was not new to the school.

As the tables 7.17 and 7.18 below indicate, the CAP assessment identified targets relating to child F's scores in the initial CAP ratings.

Table 7.17 Child F: Baseline CAP and Review Scores

Baseline CAP scores

	Attention	Perception	Memory	Language	Reasoning	Strategic Thinking	Behaviours	Target 1	Target 2	Target 3
								AB2*	AL2*	AS6*
Baseline	3.8	3.2	2.6	2.3	2.5	2.8	3.6	2.5	2.0	2.5
							Review:	2.5	2.0	2.5

Although child F's baseline scores show Language and Reasoning as the lowest domain scores, targets are not always selected from the domains that show the lowest average scores. This is because there may be a mixture of higher and lower scores and the specific target could be a particularly low score even in an overall higher scoring domain.

Targets chosen for Child F:
AB2: Openness to intervention of peers;
AL2: Expressive language;
AS6: Flexibility / generating alternative solutions.

On child F's CAP form a comment was made that AB2 was chosen because child F was "not so happy [working with peers] as he likes to be right." AL2 was chosen from the Language domain as he "gets easily confused with what he says. Class teacher understands him sometimes now; Peers can understand him better". Although the domain of Strategic thinking/metacognition did not emerge as one of the lowest, the EP selected target AS6 – (flexibility /generating alternative solutions) as one of child F's targets. The comment on the

CAP form stated that he "needs structure and will put up his hand to ask questions but is not very experimental". In the EP's summary form, which had not been discussed with the teacher, the EP wrote as a suggestion: "Take a concept and ask F to explain it in two ways. Teach him to generate his own questions when looking at information".

When reviewed, as shown, none of the targets were rated as having achieved progress. For example, in AS6, it was noted that the suggestion to introduce paired reading for F, had not been implemented. In F's language target review it was commented that F is "responding well in Speech/Language groups. Familiar adults can understand him. He is able to follow instructions but has difficulties with transitions". With regard to the strategic thinking target, the review comment noted that class teacher was "trying to encourage F to do self - assessments but he finds this difficult as he does not like marking himself as incorrect". *Note: This comment at the review stage does not relate to the chosen target AS6.*

Table 7.18: Child F's Independent test results - Raw scores

Raw independent test scores							
	Ravens	**d2**	**Naming**	**Semantic Decisions**	**Block Recall**	**Non-Word Recall**	**MALS**
Baseline	42	N/A	6	5	22	4	71
Review	32	UNDER AGE	13	10	24	9	72
Change	-24%		+117	+100%	+9%	+125%	+1%

In contrast, child F's Review scores on the independent tests indicate some improvements in language related tests, Naming, Semantic Decisions and Non -Word Recall, which relate to one of the chosen targets and corresponds with the teacher's comment that child F had benefitted from a Speech and Language group. Nevertheless, the EP and teacher did not rate the CAP language target as having shown any improvement. No change in target AB2 score was shown. This may be because no independent test directly evaluates openness to

peers AB2, one of F's targets. Child F's target AS6 (flexibility /generating alternative solutions) could relate to aspects of skills required for Ravens or Semantic Decisions. On the Ravens, F's score did not improve, whilst on the Semantic Decisions subtest there was improvement, even though it did not appear that the teacher had worked on any suggested interventions toward that target.

Thus, for this pupil, the independent test results did not correspond to teacher or EP perceptions. As shown below, this may also have been partly a result of the fact that the EP did not seem to know if there was any improvement, and the teacher and EP did not jointly rate improvements in any of the three targets. Nevertheless, the independent test results do indicate some improvements in language related tests which was one of F's targets and was consistently identified as one of his needs.

Child F – EP's background experience:

The EP reported having some awareness of DA via her own reading and having attended a short training course. She said that she occasionally used DA approaches in her work. Her prior experience of DA may have made 'a little difference' to her use of the CAP. She had formal training in consultation and described her use of consultation as relatively structured. When conducting consultations, she stated that she always meets with the teacher, sometimes the TA and always the parent. She always conducts a classroom observation and sometimes carries out direct work with the child. Her estimated time for a consultation is between 1-2 hours. Feedback is given both verbally and in writing. She stated that she always agrees or provides targets and strategies as part of the consultation. The EP reported that she often sets SMART targets for interventions and often follows up the intervention after initial consultation, with a school visit or meeting.

Child F – EP's views on the CAP:

The EP felt that 2 days of initial CAP training would have better prepared her for use of the CAP and that the practice following the initial brief training was very useful in preparation for the research. She found the Record form for rating Section A domains quite easy to use

and that it was “very easy” to explain the ideas and concepts to the teacher. She used the manual and found it very helpful.

Despite the fact that the research EPs were not asked to use Sections B and C of the CAP, this EP reported that she discussed the items of Section B with the teacher, and also did a classroom observation and scored it *(scores not found on child F’s CAP form)* and discussed her observations with the teacher. There were no written indications as to how her observations influenced the CAP consultation or setting of targets.

The EP stated that she found the Summary form, somewhat difficult to use. She did not discuss the targets with the teacher during the consultation, but chose them herself afterwards and sent them to the teacher without further discussion. There was no follow up.

Child F – The CAP Review Process:

The EP said that the teacher had tried to implement the CAP targets ‘somewhat’ and ‘somewhat understood how to implement’ them. At the review and looking back, she felt the teacher needed ‘very much more support and guidance’ on how to implement the strategies. Extracts from the manual to guide the teacher were not given to her by the psychologist.

Child F – EP’s view of teacher benefits of the CAP:

The EP did not know or was ‘neutral’ as to whether the teacher benefitted from use of the CAP. However, she thought that the teacher became more aware of certain cognitive processes that may help to understand the pupil’s challenges and that the teacher felt empowered by the CAP consultation process.

Child F – Perceived CAP benefits for the pupil.

The EP answered this question by stating that she did not know or was ‘neutral’ as to whether child F benefitted from the CAP process. No specific elements of possible benefits were indicated (see table above) On the EP questionnaire, all choices were left blank,

including the item asking if teachers, parents, TA's etc., thought that the CAP gave no benefits.

Although the EP stated that the time needed for the CAP was 'about the same as other work I carry out at school', she answered the item that asked about time issues for teachers, by ticking the item that said 'due to unavoidable time constraints there wasn't enough time between the teachers receiving the suggested strategies in the IP and the first review'. In the same question, she also ticked the item stating that 'there was enough time for the teachers to implement the agreed strategies'.

There are two additional points to add to this case study. One is that the child was slightly underage for a couple of the independent tests which were therefore not scored and for the suggested research age range. The criterion for pupil selection, as noted in the Methods chapter, was that pupils should be in year 4 or 5. The pupils in this class were a combination of year 3 and year 4 ages. Whilst the teacher had agreed to use the CAP for two pupils in her class, she told the EP and myself afterwards that she had not been able to implement the targets for either pupil.

Summary of the two case studies:

In reporting these two cases as examples of more and less successful use of the CAP, the context of the EPs' self- reports on their work practices is regarded as important to present together with the pupil results and perceived benefits or otherwise, as the issues involved in each case, combine contextual aspects of EP practice and teacher practices, without which their use of the CAP cannot be adequately understood.

Further discussion of these cases and some hypotheses about factors that may have affected pupil progress, both in relation to the CAP and wider EP/teacher issues, will follow in the Discussion chapter. Although two cases cannot be used to over-generalise, it will be important to identify possible implications of these cases which may impact on issues for further research and development of the CAP.

Chapter 8: Discussion

8.1 Introduction

The present study explored the use of the CAP for providing additional information derived from principles of dynamic assessment in order to support teachers in mainstream classrooms in understanding the cognitive needs of pupils and carrying out cognitive interventions for pupils struggling with their learning.

The study found the CAP to have various promising psychometric properties including high internal consistency and good inter-rater reliability. Although the CAP scores did not relate clearly to performance on standardised tasks (concurrent validity), pupils in services that used the CAP showed some indications of enhanced progress in comparison to pupils for whom the CAP was not used. The present research was not intended as an efficacy study in which variables of implementation of cognitive targets would be tightly controlled. Instead, the study examined effectiveness of the CAP as a tool for educational psychologists leading the CAP consultation and for the participating teachers. A post-study questionnaire for EPs suggested that there is much interest in the areas of DA and consultation and that EPs saw some merits in the CAP. However, EPs also raised concerns relating to aspects of utility of the CAP, in particular the time it might take to complete and the ability of teachers to interpret the domain scores. These findings will now be discussed in more detail in relation to each research question respectively.

8.2 RQ (i) Does the CAP demonstrate acceptable levels of reliability?

8.2.1 a) Internal consistency

Finding 1: Relationships between the various domains of the CAP: High correlations were found between scores on the various domains of the CAP.

The importance of this finding is twofold. Firstly, it relates to critiques of the most widely known DA model, that of Feuerstein's LPAD, the most 'clinical' of the DA models, with regard to its list of Deficient Cognitive Functions (DCFs). The LPAD model has been

challenged as a-theoretical and lacking reliability (Büchel, 1993; Frisby and Braden 1992) and as comprising an eclectic collection of clinical findings. In particular, critics have highlighted the challenge of subjectivity of the findings of the LPAD because of lack of clarity and consistency in the very definitions of the DCF's. Attempting to address these issues in the development of the CAP, i.e. the need to validate the CAP structure both theoretically and in practical use and the need to establish adequate levels of internal reliability of the cognitive concepts described and measured in it, was considered a prime goal of this study.

Preliminary studies of the CAP (Deutsch and Mohammed, 2008) lead to reformulation of the CAP structure, away from Feuerstein's phase model of DCF's and towards an adaptation of Luria's domains of brain-based behaviours (Luria, 1980; Lidz and Haywood, 2007). Evidence of a strong relationship between the domains of the CAP provides some support for Luria's concepts of the relationship between items within domains and their separate identification and hierarchical structure in the development of higher order thinking processes. Adaptation of Luria's concepts to the field of educational assessment has been described e.g. Das, Naglieri and Goldstein (2006), but using Luria-based concepts in a consultation framework in the CAP is a novel application of Luria's model.

Finding 2: Four of the seven domains of the CAP showed excellent levels of internal consistency within domain items and a further two domains were between good and very good. However, the Memory scale (domain 3) showed lower internal consistency.

One CAP domain showed less internal consistency than others. Although the choice of items within the domain of Memory was based on widely agreed definitions of memory functions, it may be that teachers had difficulty in identifying these aspects of memory functions. Perhaps the wording of the items in this domain assumed more knowledge than is realistic. Alternatively, teachers may have understood clearly what was being rated, but it was not easy for them to identify these processes in everyday classroom activities. Despite relatively weak internal consistency in the Memory domain, one of the independent tests given to all pupils in the study – Semantic Decisions – which involves aspects of long-term memory, such as word retrieval, corresponded well with teachers' CAP ratings of their pupils' memory functions. In as much as the Semantic Decisions test requires access to stored memory of

word meanings, it would appear that the CAP item on long term memory (storing knowledge of words and their meanings) was well understood by teachers in this sense, hence the relationship. Possibly, though, the three items on working memory, which constitute 50% of the items in this domain, were not so easy for teachers to identify in regular classroom activities, especially their sub-division into visual, auditory and kinaesthetic (tactile) memory. This may indicate a need to further clarify these items in future work on the CAP. Furthermore, one striking finding across many studies is that children with poor working memory, who have been identified via screening, are rarely described by their teachers as having memory problems (Gathercole et al., 2006); suggesting that generally, identifying aspects of memory functions is not an easy task for teachers. The CAP might help to unpick some of the knowledge that teachers have and label it under memory.

8.2.2 (b) Inter-rater reliability (IRR)

Finding 3: IRR was shown to be medium to high in baseline use of the CAP.

Most previous IRR studies of DA have used expert raters and in this research, some of the EPs and all of the teachers were novices to DA concepts. The two variations in IRR studies, albeit not in typical IRR format and conducted with small numbers were important for this CAP study, against a background of varied research results shown in several IRR studies using the LPAD, as outlined in the literature review. This concern was particularly relevant to the CAP, because as it has been shown that IRR was less than satisfactory in some studies using direct interactions in a DA in the hands of expert DA users, very familiar with the model of DCF's being rated. It may follow that two features of the CAP, (i) observation and consultation ratings without direct intervention using DA, and (ii) a heterogeneous group of CAP raters who were not designated DA experts, would likely result in even less satisfactory IRR. Thus, the finding of this study that the CAP items were adequately reliable, even with small numbers, is encouraging for further use of the CAP. Thus, it may be possible to increase confidence in ratings and interpretation of items and increase confidence in identifying relationships between cognitive abilities and classroom activities.

A point frequently raised in studies of DA in practice is the need for training and supported experience both for psychologists and teachers in the concepts involved (Deutsch and Reynolds, 2000; Haywood and Lidz, 2007; Green, 2015; Ashman and Conway, 1997).

The need for training in the CAP emerges clearly in the analysis of the EP questionnaires, RQ (iv). Whilst training and support in DA has been consistently highlighted as a challenge to wider dissemination and practice of DA, evidence points to the need for CAP users both EPs and teachers to also have some training in understanding *cognitive abilities* as well as in *metacognitive teaching* and the need for CAP users to gain experience in identifying CA's in a broad range of activities in and outside the classroom. Increased training in these factors would likely lead to enhanced IRR. Despite indications in informal trials of an early version of the CAP, that prior training in DA (mostly in the LPAD) did make a difference to perceptions of ease of use of the CAP, this research did not support this finding.

There were no significant differences at service level, between perceptions of ease of CAP use by the service whose psychologists had more previous DA training (service A), as compared to EPs with less DA training (service B). A possible explanation is that the DA training most commonly available to EPs was that of Feuerstein's LPAD model, which was more similar to an earlier version of the CAP that used Feuerstein's phase model of Deficient Cognitive Functions. In this study, EPs were introduced to the Luria based CAP domain structure of cognitive abilities which was novel to all of them, suggesting that even for EPs who had previous DA training, their prior DA training did not carry over readily to the unfamiliar structure of the CAP. As discussed in the literature review, there is in any case, no current consensus of what DA training is or 'should' consist of (Lidz, 2014; Green, 2015). Thus, without a commonly agreed framework, prior experience in use of DA and wide variety of DA training and experience, means that common ground cannot be assumed for EPs coming to the CAP. Thus, sufficient training has to be provided in DA related concepts, for all potential CAP users. Using an early version of the CAP (Deutsch and Mohammed, 2008) as discussed in chapter 5, it was indeed evident that although experienced DA users felt somewhat more confident when using the CAP in an observation exercise, than those with little or no prior exposure to DA, there was still a need for more initial training. Another possible explanation regarding CAP user service (A) who had more prior DA training

than the other CAP user service (B), relates to the often-identified need for ongoing mentoring and support in using DA. Despite more previous DA training in service A, there was no apparent ongoing DA mentoring in place in service A, thus in practice, confidence and experience of the EPs in DA use was very varied. EP perceptions of the need for the teachers to have more support in the delivery of the chosen cognitive targets, emerged clearly as a majority opinion. Such support was not requested of the EPs in this study, for two reasons: Firstly, to keep the conditions of the research activity as close as possible to what the EPs would typically offer to teachers and secondly, because support for implementation of CAP targets was not the purpose of the study. Most of the EPs did not provide ongoing support and it is not known whether this differed from their usual practices. However, this lack of mentoring made the task of the teachers, trying to implement novel cognitive targets (in contrast to more familiar curricular support) a much more challenging task. Control group C conducted their consultations as usual and provided whatever support or not they normally did. Therefore, they did not feel as a group, that the teachers needed as much additional support, over and above their regular consultation activities as those using the CAP with teachers for the first time.

8.3 RQ (ii) Convergent and known groups validity

Finding 4: Overall, close correspondence between single domains of the CAP and single independent tests was not found.

Whilst the evidence from this study indicates a few associations between CAP domains and standardised tests, the pattern does not show a simple correspondence.

Thus, the question is raised whether CAP targets represent some underpinning cognitive skills that are not directly tested in various standardised tests, or, put another way, it would appear that some standardised tests present the test taker with tasks which require a mixture of cognitive skills together with subject knowledge and are therefore not correlated in a simple direct way with one specific cognitive domain. Lidz (2003, p.197) points out that assessors seeking some unitary measure of processes such as memory and attention will not find one [in these tests] as they are not represented in the nervous system as unitary processes.

This finding would appear to support one approach to the use of DA, e.g. that of Haywood and Lidz (2007) and Lidz (2014), which does not regard DA as an alternative to standardised tests, but rather as complementary, assuming that both processes are relevant for the individual or group being assessed. That is, it can be helpful to identify different types of information about a pupil's functioning, and the interface between findings from some standardised tests (i.e. summative assessment) and DA (formative assessment) can be very useful. This study thus adds to the view that DA and DA based systems such as the CAP, are not necessarily a replacement of standardised tests, but rather should be selectively used when the questions to be explored are about impediments to learning – how does this pupil learn? This in contrast to, or alongside, recording previously acquired information and skills – what does this pupil know? (Tzuriel, 2000; Sternberg and Grigorenko, 2002; Feuerstein, et al. 2015; Haywood and Lidz, 2007). The standardised/independent tests that came closest to a corresponding domain were the two language tests from the ACE, with the Semantics test corresponding to the domains of Memory and Logic/Reasoning and the Nonword test being linked to CAP scores in the Language domain. Deficits in nonword repetition and sentence recall, have been found to be clinical indicators in children identified with specific language impairment (SLI) (Bishop, North and Donlan, 1996); Conti-Ramsden, Botting and Faragher, (2001). Combination of tests of memory and language demonstrate subgroups characterised by short-term memory and language difficulties (Archibald and Joanisse, 2009). It appears that CAP language items are sensitive enough to pick up language skills detected by an independent test of nonword recall even without the additional use of a sentence recall test which is commonly used as an additional clinical indicator of SLI.

In the domains of higher order thinking set out as Strategic Thinking and Metacognition there was some correspondence between independent scores on Raven's Matrices and the domain of strategic thinking and metacognition. However, somewhat unexpectedly, the d2 Test of Attention, when used as one of the independent tests in this study, did not show significant correspondence with the CAP domain of Attention. Although the d2 is described as a test of sustained attention and selective attention, its 4-minute length of administration does not qualify it as a classic test of sustained attention (Wassenburg, et.al. 2008). The d2 focuses more on selective attention, the ability to attend to relevant stimuli and to ignore irrelevant stimuli (Baron, 2004; Cohen, 1993; Tannock, 2003). Although selective attention is

one of the four items for rating in the CAP Attention domain, when teachers are rating a pupil's attention, what is possibly foremost in their minds is sustained attention, not selective attention, i.e. this is what teachers notice most in the classroom. However, it was also noted in the Results chapter, that there were items that came close to statistical significance, but did not quite reach a moderate level (.30). One of these was the correlation (.29) between the scores on the independent d2 test of attention and teacher CAP ratings in the domain of Attention. It is suggested that with larger numbers of pupils this correlation might reach statistical significance.

8.4 RQ (iii) Rates of change

Does use of the CAP in itself associate with improved outcome for the pupils?

Finding 5: Children in the two services using the CAP showed some significant trends toward relative increase in pupil performance over time in comparison to children in the service not using the CAP. However, all three service groups showed some educationally relevant gains in performance over time, even if not to a statistically significant level.

This finding relates to a number of studies of the impact of cognitive education for teachers, for example, Haywood (2003, 2007); Lidz (2015); Mentis (2008); Howie (2011), especially with regard to teachers' own awareness of mediational and metacognitive strategies. Indications of a trend toward greater benefit for pupils in CAP user groups may be consistent with reported findings that it may be the teachers who change first as a result of a mediational/metacognitive focus in the analysis of their work with pupils, as reported for example, by Ashman and Conway in their study of implementation of cognitive education with secondary school pupils and teachers in Australia (1997). Barak, et al. (2007) found a catalytic relationship between the pedagogies used by the teachers to develop their students' metacognition in acquiring critical thinking skills in science education and the teachers' own learning and metacognitive knowledge and skilfulness.

As a tool that promotes metacognitive awareness in teachers through the need to systematically analyse and reflect on the pupil, it is possible that the use of the CAP may in itself serve to promote metacognitive awareness in the minds of teachers. Several EPs in

their user perceptions questionnaire, commented that whether pupils did or did not benefit from the CAP and any subsequent interventions, was contingent on the individual awareness, commitment and motivation of the teachers. This finding is encouraging, because in this study, Section B of the CAP, which focuses specifically on teacher awareness of metacognitive strategies in the classroom and pupil response to their interventions, was not used.

Although in real world educational programmes one cannot be fully confident that a change in functioning is due to one specific intervention, nevertheless a further finding is of interest. Despite the fact that the control group service C EPs, conducted more classroom observations than the two CAP user services and spent at least the same amount of time on their consultation activities than the CAP user services, changes over time in pupils of service C, were less than in the two CAP user services.

8.5 RQ (iv) EP perceptions of the CAP

Finding 6: A high percentage of EPs in all three services, CAP and non-CAP users felt that teachers needed more support to implement [cognitive/teaching] targets. In the design of this study, the EPs were not asked to support the teachers in their implementation of CAP targets, nor were the teachers given any training in CA's and techniques of mediation.

The need for training in the CAP emerges clearly in the analysis of the EP questionnaires, RQ (iv). A point frequently raised in studies of DA in practice is the need for training and supported experience both for psychologists and teachers in the concepts, interpretation and shared communication of results from a DA. (Deutsch and Reynolds, 2000; Haywood and Lidz, 2007; Green, 2015; Ashman and Conway, 1997).

Whilst training and support in DA has been consistently highlighted as a challenge to wider dissemination and practice of DA, evidence points to the need for CAP users both EPs and teachers to also have some training in understanding *cognitive abilities* as well as in *metacognitive teaching* and the need for CAP users to gain experience in identifying CA's in a broad range of activities in and outside the classroom. Increased training in these factors would likely lead to enhanced IRR. Despite indications in informal trials of an early version

of the CAP, that prior training in DA (mostly in the LPAD) did make a difference to perceptions of ease of use of the CAP, this research did not support this finding.

There were no significant differences at service level, between perceptions of ease of CAP use by the service whose psychologists had more previous DA training (service A), as compared to EPs with less DA training (service B). A possible explanation is that the DA training most commonly available to EPs was that of Feuerstein's LPAD model, which was more similar to an earlier version of the CAP that used Feuerstein's phase model of Deficient Cognitive Functions. In this study, EPs were introduced to the Luria based CAP domain structure of cognitive abilities which was novel to all of them, suggesting that even for EPs who had previous DA training, their prior DA training did not carry over readily to the unfamiliar structure of the CAP. As discussed in the literature review, there is in any case, no current consensus of what DA training is or 'should' consist of (Lidz, 2014; Green, 2015). Thus, without a commonly agreed framework, prior experience in use of DA and wide variety of DA training and experience, means that common ground cannot be assumed for EPs coming to the CAP. Thus, sufficient training has to be provided in DA related concepts, for all potential CAP users. Using an early version of the CAP (Deutsch and Mohammed, 2008) as discussed in chapter 5, it was indeed evident that although experienced DA users felt somewhat more confident when using the CAP in an observation exercise, than those with little or no prior exposure to DA, there was still a need for more initial training. Another possible explanation regarding CAP user service (A) who had more prior DA training than the other CAP user service (B), relates to the often-identified need for ongoing mentoring and support in using DA. Despite more previous DA training in service A, there was no apparent ongoing DA mentoring in place in service A, thus in practice, confidence and experience of the EPs in DA use was very varied.

Although across services A and B there were no significant differences in their perceptions of ease of use of the CAP forms themselves, nevertheless in both case studies, the EPs reported that filling in the Summary form was 'somewhat difficult', more so than completing Section A of the Record Form, the part of the CAP used in the research consultations. Given that no participating EP had used the CAP prior to this research, it might be expected, as indeed the EPs themselves commented, that there is a need for more initial training than

was provided in this research, followed by support and mentoring even for experienced EPs. This would help develop increased confidence in the use of the tool to ensure that the process of going from scoring the CAP to specifying the targets, is made easier. Offering support and mentoring could also help shorten the time taken to conduct the various stages of the CAP, which many EPs found more time consuming than conventional consultation.

The need for teachers to have more support in the delivery of the chosen cognitive targets, emerged clearly as a majority opinion from EPs. Providing ongoing support to participating teachers was not requested of the EPs in this study, for two reasons: Firstly, to keep the conditions of the research activity as close as possible to what the EPs would typically offer to teachers; and secondly, because support for implementation of CAP targets was not the purpose of the study. From EP responses in their questionnaires, it appeared that most of the EPs did not provide ongoing support to the teachers using the CAP and it is not known whether this differed from their usual practices. However, this lack of mentoring made the task of the teachers, trying to implement novel cognitive targets (in contrast to more familiar curricular support), a much more challenging task. Control group C conducted their consultations as usual and provided whatever support they normally offered. Therefore, they did not feel as a group, that the teachers needed as much additional support, over and above their regular consultation activities as those using the CAP with teachers for the first time.

Furthermore, direct comparison is difficult when regarding whether pupils changed positively over time, as the control group did not provide evidence for the teacher's opinion by using an objective external rating scale. Whereas the CAP Likert scale makes no claim to do away with subjectivity entirely, it does provide a frame of reference which can be used by all CAP users and those accessing and planning interventions based on this tool, adding a more objective evaluation measure over time.

This observation relates to findings of a number of research studies on consultation practices in Educational Psychology, as discussed in chapter 3, in that there are few objective measures of impact of consultation. Most studies to date have been qualitative and have tended toward perceptions of benefits without the use of objective measures to

support the views of providers or recipients of consultation services (Larney, 2003; Henderson, 2013).

Generally, for teachers to be asked to implement a novel method, with no support or mentoring system in place, would be a very challenging expectation. However, in the specific context of the CAP, this finding indicates again that understanding of cognitive processes or mediation techniques cannot be assumed and both training and ongoing support will be needed to achieve useful implementation. There are implications for the training of psychologists if they are to facilitate these approaches in schools. But the fact that some EPs in the control group also felt that their teachers needed more support for carrying out targets deriving from their (non-cognitive) consultations, has implications for wider issues in teacher training and in-service support.

In this study, as shown in the Results chapter, the domain most often chosen by teachers to target for the benefit of their weaker pupils, was that of Strategic Thinking/Metacognition. This is consistent with findings which demonstrate that cognitive education, embedded within assessment or curriculum, is necessarily focused on the processes of *metacognition*, first as applied to basic neurological processes engaged in learning and, second, as these processes are tapped (or need to be tapped) by specific domains (e.g. Willoughby, Wirth, Blair and Greenberg, 2012). It is metacognition that can be accessed more or less directly, not the neurological processes that they regulate (Lidz, 2014).

Teaching in a metacognitive way, is recognised as an important target in teacher training (Black and Wiliams, 1998, 2006; Hattie, 2009; Presseisen, 1992) and its benefits have been demonstrated. For example, in a UK study of primary school pupils, gains in academic achievement and motivation, when measured by standardised curricular achievement scores were found to be strongest for pupils taught in a metacognitive teaching style, in comparison with the benefits of other programmes or services. The added value of metacognitive teaching was also estimated in terms of relative cost of the intervention, compared to financial investment in other school initiatives over one school year (Sutton Trust, 2014; O'Hanlon, 2011).

This latter point links with one of the observations of a number of EPs in this study, that involvement in the CAP process and its subsequent follow up depended a lot on the individual motivation of teachers. Development and maintenance of motivation is linked to availability of both training and ongoing support. Such support works at both the classroom and systemic level, i.e. the encouragement and facilitation of 'learning to learn' approaches as part of the philosophy and commitment of the whole school. This has been pointed out in studies of successful implementation of process- oriented teaching in schools. It cannot be left at the level of the individual teacher. The system as a whole has to be a facilitating and supportive context (see for example, Scottish Curriculum for Excellence, 2011, 2016). In a cross-national study of implementation of Instrumental Enrichment Basic, a younger-years adaptation of Feuerstein's IE programme, the most successful implementation as shown in pupil gains on standardised tests was in a school which has a whole-school approach to teaching and learning in a mediated way (Kozulin, Lebeer, Madella-Noja, Gonzalez, Jeffrey, Rosenthal, Koslowsky, 2009).

Hasson (2011) found similarly in her study of language- based DA – by SLT's, that specifically mediational metacognitive techniques such as emphasising meaning of the session to the child, or ensuring the child's awareness of the role of the therapist in helping him learn a skill, and how that skill would be useful in other contexts, all of which are required components for an interaction to be deemed mediational, were not evident. Because studies of transfer during DA found that mediational strategies were most effective, Hasson concludes that it might be recommended that more explicit training in mediation is needed if therapists (and in the case of the CAP, EPs, teachers and therapists) are to derive the maximum benefit from carrying out evaluations and interventions based on principles of DA and related intervention programmes.

The issue of training of teachers to carry out cognitive/mediational interventions following their CAP ratings, was not directly addressed in this study, because the study focused on the CAP itself, its reliability and validity. If adequate levels of validity and reliability have been established for the CAP tool itself, then a focus on training for identifying cognitive processes in a wide range of activities and techniques of cognitive interventions and mediated learning experience, could be a future topic for study. This aspect is discussed

later in this chapter when addressing limitations of this study and directions for further research.

Reflecting upon the IRR results, and also considering user skills and confidence as reported in the perception questionnaires (RQ iv), this study confirms that concepts underpinning DA, even when not used in direct 1:1 assessment, do need to be taught in a structured way. Their use in consultation, rather than in direct assessment, does not do away with the need for some prior knowledge and experience, which needs to be taught, especially as cognitive education is not typically included in teacher training. And again, the use of specific frameworks that differ from each other, means that there needs to be a clear common understanding of the terminology and what this means in practice.

8.5.1 Analysis of Case Studies

Are there findings which may have wider implications for CAP use and further research?

The two cases reported in the Results chapter were chosen to illustrate a more- and a less-successful use of the CAP. Whilst being cautious not to over -generalise from individual cases, they illustrate the fact that the CAP may not always be more sensitive at detecting difficulties or change than regular practice, and it is useful to use these presentations to explore why this might be. For Case study 1 (girl, 9) where the CAP resulted in positive outcomes, 3 quite closely related targets were selected (strategic thinking). This may have helped teachers to focus in on the relevant behaviours. This contrasted with Case study 2 where the targets were less connected with one another. Indeed, in case study 1, the EP praised the teacher's skill and initiative. Nevertheless, the teacher's *curriculum* concerns were not seen as having benefitted from CAP use, especially the teacher's concerns re: literacy. Thus, despite the successful change seen in this case, there was clearly also a disconnect between the teacher's identification of the pupil's curricular needs and the cognitive targets focussed on via the CAP. It is not known whether the teacher thought that the CAP would directly address literacy issues and it would appear that there was little shared understanding (between EP and teacher) of how cognitive interventions may impact on curricular needs or that this indirect effect would be unlikely to be seen in such a short

space of time. This may have led to frustration on the part of the teacher who noted cognitive improvements, but not curricular gains.

This case study also highlights that the CAP can achieve successful results in less than ideal contexts. As reported, the teacher herself had a lot of misgivings about the school in general. Her expressed negativity, yet successful cognitive interventions is of interest. In informal discussion with the EP following the completion of all stages of the research, the EP expressed the view that the teacher was fairly inexperienced especially in inner city schools, where she was finding the overall levels of the children alarmingly low, and difficult to track. The CAP approach may therefore create a tension for teachers in the short term where documented gain on curriculum skills needs to be shown.

For Case Study 2, Child F (boy, 8) was one of two pupils from the same class selected by the teacher for the research. There was a discrepancy between the teacher's review rating scores for child F (no progress on any of his three targets) and the results of the independent tests, which showed some improvements. The teacher acknowledged 'hardly' delivering the interventions and the EP provided no support written or verbal. It is of interest to investigate why this teacher might have felt unable to do so. One possible reason is that there appeared to be a lack of communication between the initial consultation and the target setting, the latter of which was done by the EP alone. There was no checking by the EP as to whether the teacher understood the targets or whether she had any awareness of how to implement them. Whilst in case study 1, the EP acknowledged that the teacher had skills which she was able to use to good effect, in case study 2, it would seem that the teacher did not have these skills independently, could not interpret the suggested targets and strategies and was given no materials to read or direct support to implement these. Whilst the EP in case study 1 did try to check if the teacher understood what to do, it appears that there was no such attempt to follow up by the EP in case study 2 . Therefore, a factor which emerges from comparing these case studies is the need for skilled EP discernment about a given teacher's abilities, and the resources to support the process where needed.

It is recognised however that this situation could have been partly caused or exacerbated by the instructions given by this researcher to all participating EPs. Because of this, researcher's aim of making the CAP use as similar as possible to any other form of consultation the EP may use, and because the aim of the research was not an intervention study, the EPs were not directed to support the interventions and arrange follow up with the teachers. As a result, some did and some did not. However, this may have made the use of the CAP less successful in some cases and perceived as less successful by EPs and teachers struggling with unfamiliar concepts. As shown in the analysis of EP perceptions of the CAP in the Results chapter, because of the novelty of the CAP concepts, more ongoing support was identified as needed for the majority of teachers. Thus, this aspect of the research design, may have negatively impacted on perceptions of usefulness of the tool. Additionally, not offering the teacher (case study 2) even the published materials of the CAP which are designed for hands on practitioner use, may have left the teacher even more at a loss as to how to implement the assigned cognitive targets. In the following section this issue is taken up again and wider implications for the work of EPs and training of teachers is raised.

8.6 Strengths of the study

This study, to the best of this author's knowledge, is the first attempt to adapt principles derived from DA testing into a structured consultation format, as a response to consistently noted challenges to the use of DA. Although initial training has been shown to be needed for the CAP, it can probably be accomplished in less time than required for training in confident use of DA, so long as structures for mentoring and support for CAP users are in place. Thus, adaptation of DA into a consultative framework can potentially accomplish a practical contribution to EP and classroom practice.

Secondly, aspects of validity and reliability have been investigated in an ecologically valid way, ensuring that the psychometrics reported relate to real world use. These indicate that CAP can be regarded as a tool with adequate levels of validity and reliability, thus adding to the body of assessment materials, which are not standardised and yet can demonstrate features of robustness in the hands of multiple users, many of whom have had minimal training.

A novel aspect of the CAP is its adaptation of the neuropsychological system of analysis proposed by Luria. As highlighted by other researchers "DA is very comfortable with the principles of neuropsychology for its assumptions, descriptions and evidence" (Lidz, 2014). In DA, as in the CAP, we are less interested in what the child cannot do than in what we can do to promote development and competence. Brain research promises increasing evidence of such possibilities, with specific entry to compensatory processes through metacognitively based interventions. High levels of internal consistency of the CAP domains would appear to lend some support to Luria's concepts, as applied within an educational framework, and is the first adaptation of this model for an assessment outside formal testing procedures.

A further strength of this study is that it provides evidence that consultation in educational psychology practice can be very structured and use a specific, clearly articulated approach and techniques. This finding supports and perhaps extends the use of EP consultation which is widely regarded as a valuable approach in professional practice, but which to date has been found to be somewhat unstructured and undefined both to its professional users and its recipients. Consultation, as shown in this study, can be more rigorous, more structured and more methodologically oriented, to the clarity and benefit of its users. Indeed, measuring the impact of consultation, as part of establishing evidence -based practice, as shown in the literature review in this study, has been quite limited to date, with lack of agreement of the purposes of the consultation and defined goals for providers and potential beneficiaries (Leadbetter, 2006; Farrell and Woods, 2015). Consultation approaches rarely seek inter-rater reliability and the fact that it was investigated here, and found to be largely adequate could be regarded as a strength in this study. The comment of one EP as quoted above in relation to her experience with the CAP, suggests that a tool in itself however well validated, cannot explain impact without consideration of broader contextual factors. In the words of the EP quoted in relation to Case study 1 (Child S) use of the CAP "*would be affected by the same factors affecting all other consultations, openness of staff on both sides, willingness to do the work; motivation of staff and their relationships etc.".* Thus, broader factors need to be addressed if a tool, especially with novel content, is to make a potential positive difference to its users. This point was expressed in the first chapter of this study by Hessels (2006) when noting that several well researched DA tests with good psychometric properties are hardly used. Is it that the concepts are felt to be too complex

for 'everyday use'? Is it only about additional time- needed or perceived user ease such as minimal interpretive demands? Is it related to challenges of developing interventions based on the relationship between cognitive abilities and curriculum topics, which requires deeper understanding? Does that imply that tools such as the CAP will not realistically be found "one in each classroom in the country" and will be used more by specialists rather than by class teachers? Herein lies a challenge to the CAP to continue to address issues identified for a long time for the field of DA and cognitive education in general. (Haywood and Lidz, 2007, Lidz and Elliott 2000).

Furthermore, despite the constraints of the research structure, which meant limited training time and relatively small numbers of participants, the IRR results provide evidence that it is possible to statistically test a consultation model, providing that the content of the consultation is set up in a clear framework with structured items and not left open and vague. As noted in the literature review (chapter 3), although some consultation models are associated with certain theoretical orientations, these seem at present to be limited to conceptual intent, but have not been operationalised. This has not only lead to confusion, amongst all levels of users and clients (Cording, 2011; Henderson, 2013) it has also meant that there is no common ground for measurement of efficacy, client understanding, measures of satisfaction or indicators of progress.

It is hoped that the inter-rater reliability findings of CAP consultation may make a worthwhile contribution to an area of investigation in professional psychology practice that is still considered to be under researched (Leadbetter, 2006; Kennedy, 2009).

8.7 Limitations of the study

Investigation of the validity, reliability and usefulness of the CAP was carried out via a number of different avenues of investigation. All pupils selected for CAP use in the two CAP user groups (services A and B) were tested independently on a selection of standardised tests before and after use of the CAP. The control group pupils (service C, non-CAP users) who met identical selection criteria were also tested. The CAP was used for discussion and rating of selected pupils, by the classroom teacher in a consultation session facilitated by an educational psychologist who had no previous knowledge of the pupil. Coming to a

consultation 'cold' would not happen in real world use of the CAP, or indeed in any EP/ teacher consultation, but these strict criteria were imposed for the research to ensure the greatest level of objectivity possible across all the research groups. Similarly, the school SENCO was not present at the consultation so that any other sources of information or prior knowledge of the pupil typically available, could not be used to influence CAP ratings. These features of the design whilst adding rigour, may have affected the ecological validity of the findings.

Ratings of pupils' cognitive abilities, strengths and weaknesses by the teachers were used as a baseline for choosing appropriate intervention targets for teachers to implement, and these pupils were re-rated after a period of 3-4 months during the same school year. One would not generally re-rate performance on standardised measures within such a brief time scale which may have limited the opportunity to test the effect of CAP use per se on pupil progress. Comparison of independent pre- and post-test results across all three groups showed unsurprisingly that all pupils improved over time. Nevertheless, in services that had used the CAP there was greater improvement in post-test results on some standardised tests. Changes to teacher awareness and their chosen teaching targets, as well as perceptions of the EPs involved, indicated an uptake of recommendations for intervention, albeit informally. This was accompanied by a generally positive response about the usefulness of the information obtained from the CAP. Thus, in this study of the CAP, whilst some aspects of validity and reliability and user-friendliness were selected as foci for the research, not all areas could be addressed, especially given realistic time constraints of the participating EPs and teachers and the time span of the research itself. Furthermore, although IRR was conducted in two ways in an attempt to capture real world reliability, there were limitations to the methods used. For the larger sample, the same teachers were involved with both ratings even though for the reliability check a different EP conducted the consultation. Although this was necessary because the pupil's teacher needed to be the respondent in both cases, the lack of independent rating likely raised the IRR scores here. On the other hand, this study does indicate that teachers were able to come to similar conclusions with different professionals about the same pupil, which is the most likely scenario in actual educational practice. It would have been ideal to offer more training, or different amounts of training to investigate the effect this has on the usefulness of the CAP.

Furthermore, the participating teachers received no training at all in the methodology of the CAP, in order to ensure as similar conditions as possible for all three services. Thus, the onus for explaining the concepts and using the CAP lay with the EPs who themselves had received minimal training of one day. This meant that the levels of support available from the researcher may have been lower than in actual practice, and that the natural timescales of assessment for teachers were lost. It is likely, for example, that progress for children identified with learning needs is much slower and takes much longer than the thesis timescale allowed. The effect of CAP use on pupil progress, as recorded by standardised measures, was therefore fairly limited and non-conclusive. However, at an individual level, rather than whole group measurement, the CAP findings led to further work with a number of pupils, which was reported informally by several EPs and teachers in the study in both CAP user services. The approach of single-case research to DA or DA based approaches is highly relevant and recommended, e.g. Riley-Tillman & Burns (2009) and could be further implemented in future.

This was a small-scale study, with approximately half of each Local Authority EP service participating and 47 year 4 and 5 pupils across all three services. Given the real-world context of the study, it was challenging to recruit and maintain involvement of all participants, EPs and teachers throughout the whole project. It was not always possible to use the same EP or teacher for each stage of the study. Thus, a further aspect of testing the robustness of the CAP and clarity of concepts occurred in practice, as two EPs (of 9) in service A had to take over the reviews of colleague EPs who were unable to complete the project.

Furthermore, there was a minority of cases – 3 in all – where it was not possible to complete the review of the CAP within the same academic year. This meant that even if the same EP was still available, there was a change of teacher, who had no involvement with the baseline CAP ratings for that pupil. Again, this was a real-world test of the clarity of CAP concepts and items to be rated in the hands of a teacher who was coming 'cold' to the review. It also challenged the EP to have to be really clear in their own understanding of CAP items.

It was also not possible in a mainstream primary school classroom, to recruit a different teacher for IRR purposes (as would be in a more typical IRR study) for every pupil assessed in the study, which makes the data in the first inter-rater reliability study more difficult to interpret with confidence. On the other hand, this does reflect educational practice well. However, despite small numbers in the IRR studies, each EP who conducted an IRR CAP had not worked at all in the school in which they were asked to conduct the IRR CAP.

A further challenge at the time of this study was that all EP services were experiencing financial and staff cutbacks to their services. The uncertainty of their posts made this a time of considerable stress for some participants. The decision for individuals to conduct this study against a background of professional and economic challenges was often difficult and may have led to different responses from professionals compared to periods of less austerity. Nevertheless, the limitations addressed here in the structure and conduct of this first CAP study, are likely to have led to stricter and more conservative findings. The fact that this study has shown the CAP to have good psychometric properties in non-optimal situations means that findings are robust, even given the circumstances that regularly occur in EP services and schools.

8.8 Future directions

In summary, the main aims of developing the CAP were to provide:

1. A psychometrically robust tool consistent with theoretical concepts derived from DA sources and Luria's neurological concepts.
2. A practical way of applying concepts of DA outside of direct testing and whether the CAP can support the goal of enabling classroom teachers (as compared with professionals trained in DA) to implement DA derived concepts.
3. A method accessible to users, who are typically but not exclusively psychologists and teachers, who may or may not have met these concepts previously. Training in the CAP is an important requirement, as has been shown to be necessary in use of other DA approaches.

4. A sufficiently user-friendly tool to realistically meet the time constraints of EPs and teachers.
5. A measure with the potential to add value for its users, thus helping their work with a range of clients, not limited to school age pupils.

Some of these aims have been evaluated in the current thesis, however future research would be useful to further improve and test the CAP tool. First, a replication of this study with larger numbers may be a useful research goal in the future. For example, it would allow for more complex statistical analysis, give more confidence in the findings and allow for subgroups of children to be investigated.

Secondly, it may be useful to conduct further research investigating training needs, both for the CAP and in consultation in general. Evidence from EP reports and specifically from both case studies, was that both for themselves and for the teachers, more help was needed both in initial training and in ongoing support, to understand the meaning of the cognitive abilities; to identify examples of their use and to relate them to the more typical concerns raised by teachers which are often lack of progress in curricular targets, literacy, numeracy and written language. This includes both provision of more initial training to EPs and specialist teachers and providing ongoing mentoring and support for classroom teachers, a role that many EPs cannot readily undertake due to their own time constraints.

Thus, it may be feasible to conduct future research in which classroom teachers are given training in identifying CA's and mediational techniques, which in this study was limited to the EPs who facilitated the CAP. Emphasis would be on within-curriculum and subject teaching, as generalisation and transfer of CA's should be tied as closely as possible to the curriculum (Haywood and Lidz, 2007; Kaniel, 2010). This goal would be consistent with the findings of meta-analytical studies of what works in successful classrooms and how it might be achieved within initial and further teacher training.

Beyond features of the CAP, which are investigated in this study, there are wider issues which impact on successful implementation not only of the CAP, but of other approaches in EP work and supporting teachers' skills.

A further focus could be research using the whole CAP. In this study, only section A was used. Future work could include section B (focus on the teachers' use of metacognitive strategies) and section C (structured classroom observation) to look at the impact of the whole tool on pupil progress. Thus, a future study could follow the whole structure of the CAP examining the impact of all three components of the tri- partite learning model as described in the literature review of this study.

Finally, as the CAP is not age normed, it may be useful to test its potential value with a wider range of clients – not limited to school age pupils- to include older adolescents and young adults, whether in formal or informal educational contexts, and activities of daily living.

8.9 Implications for practice

Educational Psychology as a profession in the UK has in recent years emphasised some principles and practices that are relevant to CAP use.

Increased use of consultation in EP practice, as discussed in this thesis, is evidence of the importance which EPs attach to the use of systemic and solution-focused work through active involvement of those with and around the learner, moving away from the more traditional focus on within-child testing. This broader approach has widespread acceptance in the profession, but as pointed out by Farrell and Woods (2015), EPs "slip back" into use of traditional tests even when there is questionable test validity. As Lidz highlights: "We keep saying that assessment practices should change. We have come a long way in developing such changes, yet we continue to engage in variations on the same old behaviours we complained about years ago" (Lidz, 2014).

Despite the increasing and impressive availability of research and procedures, DA remains on the periphery of frontline practice in schools and clinics (e.g. Lebeer, Candeias and Grácio 2011). Among its challenges are the limited number of trainers, the increased 'greying out' of the pioneers and trainers, and the reluctance of training institutions to include DA in their graduate curricula (Lidz, 2014).

In order to widen the EP menu to respond to different referral issues, one essential requirement is to give EPs, teachers and therapists a choice of tools in which they are well trained and which they can use with confidence. It would not be reasonable to expect greater use of DA, or similar approaches, as has been shown in many studies, without adequate training and support (Haywood and Lidz, 2007). This is one of the core purposes for which CAP was developed. The CAP may thus potentially fulfil a dual role. It is a DA-like instrument; but it is also a structured, reliable and validated tool for consultation as has been shown in this study. There is room for diversity in DA models and procedures and such diversity is not only welcome but also necessary. It is hoped that CAP will add to the tools available to a range of users, enlarging the scope of choices in assessment and intervention procedures.

The CAP would appear to be consistent with and support recent changes in Special Educational Needs and Disability (SEND) guidelines and legislation, as set out in the SEND Code of Practice (England, Wales and N. Ireland) and the introduction of EHC Plans (Department for Education and Department of Health, 2015). SEND guidelines emphasise person-centred planning; involvement of parents or other representatives and advocates for the individual; the recognition of the need to assess and plan interventions in a multi-professional collaboration, to include not only Education, but also Health and Care – the EHC joint contributions. Scotland's Curriculum for Excellence, launched in 2011, additionally specifies the need for metacognitive teaching practices and Educational Psychologists in Training (EPIT) curriculum for Scotland has incorporated dynamic assessment into its core curriculum. The CAP fits into these agreed goals and practices. The mandatory Northern Ireland Curriculum for Key Stage 3 (2006), emphasises the importance of thinking skills and metacognitive teaching and learning embedded in all areas of the curriculum (McGuinness, Scullion, Gallagher and Bianchi, 2007).

Furthermore, as suggested, in the context of current UK EP practice, the CAP might be potentially added as a tool for profiling of cognitive strengths and challenges and interventions needed to benefit the widened client groups for EPs, now defined as birth to age 25 years (DfE and DoH, 2015). The needs of those with English as an additional language (EAL), refugee and asylum seekers, who are part of diverse and ongoing

demographic realities must be addressed appropriately (Pilpovic-O' Connell, 2017). Responding in culturally fair ways, whether by means of procedures such as DA, which are designed to bypass to an extent, cultural specificity, the CAP, similarly, can support a focus on underpinning skills separated to some degree from specific culturally embedded knowledge.

This study has limited itself in the first instance to a school population and to date, training in the CAP in the UK, has involved mostly EPs and school staff. Elsewhere, the CAP has also attracted attention from clinical and neuropsychologists and therapists as part of their assessment tools. Training in CAP use should include other potential users in line with the fact that CAP is not limited to school populations, but the challenge remains to put this information comfortably into the hands of the individuals who will do the work with the learner (Lidz, 2014). For this CAP has built in the step of *follow-up*. CAP's incorporation of *consultation* should assure that the teachers, parents, and other mediators understand and accept the recommendations and feel (and become) competent to deliver the appropriate interventions. The resources that will help them carry out these recommendations need to be put in place as well.

In the process of standardisation of cognitive tests, it is well accepted clinically that scores at the extremes i.e. for very low or very high functioning individuals, are less reliable. Thus, for low scoring test performers, the CAP may be able to capture functioning in a way that cannot always be reliably accessed in traditional testing. In terms of age ranges, the reliability of standardised test scores is highly problematic in the under 5's (Lidz, 2003), yet neurological research is demonstrating increasingly the importance of assessment and intervention for pre-schoolers (Diamond, 2007; Gillberg, 2012). Without a requirement for age norms or the use of direct testing, the CAP may be able to play a part in meeting this need.

In EP consultation, a variety of models have been proposed along a continuum, from the exclusion of direct testing of a learner, to the possibility of including direct testing as part of a broader definition of consultation. In situations where direct testing is not being used, it is

helpful to be able to access an alternate framework such as the CAP, for consultation and observation.

Reasons for using DA remain as relevant today as when first proposed (Hessels, 2006). Cultural and linguistic diversity across large sectors of the population in the UK and other countries, challenge the cultural content of many traditional tests, yet as Elliott pointed out (2000) and similarly Sternberg and Grigorenko (2002), it is easier to administer traditional tests than to involve oneself in interaction with the learner which is individualised, not pre-scripted and requires ongoing analysis and responsivity.

On the ground, the economic realities reflected in recent UK SEND guidelines, is that the long standing 'dowry' which schools could access via the banding system of standardised test results is less and less available. Not only does this mean that the EP can no longer be regarded by schools as a gateway to resources, but it raises challenges as to the added value of EP work for schools (Farrell and Woods, 2007; Ashton and Roberts, 2007). Schools are expected to operate inclusive educational policies for pupils with a wide a range of learning and behavioural challenges in mainstream classrooms, but with little corresponding increase in human or financial resources.

Training mainstream or SEN teachers in additional skills is a recognised need, but there remains a considerable challenge to narrow the gap between intent and reality in teacher training and skills development, both in initial or post qualification training. Economic pressures increase the gap between intention and feasibility. As has been shown in surveys of DA training, very brief introductions to DA, tempting, because less time means less cost, do not result in adequate learning or confidence in practice. Use of e-learning technology, as a partial contribution to increasing cognitive education for assessment and implementation, is another future direction to explore. It is hoped that the CAP, used as a training and ongoing practice tool, for EPs and teachers may be a potential useful contribution to addressing some of these challenges.

8.10 In Conclusion

There is widespread agreement that the challenges for which DA was developed and which were the catalysts for this study, have not yet been fully met (Lidz and Elliott, 2000; Sternberg and Grigorenko, 2002; Lidz, 2014). Previous research has not often been in real world contexts, but using highly trained specialists in artificial settings; well-validated tests have not entered mainstream practice (Hessels, 2006). Skills training and support remain issues and certainly not less so in times of austerity.

Can the benefits of individualised DA, enlightening but time consuming, survive as a practice? Can there be adaptations which are more economically viable, yet still maintain core principles of DA? The CAP is offered within this context, and suggests that DA-based approaches might be a way forward. The hope is that this research alongside other continuing efforts in this area might make an impact in the changing and continuously challenging context of today's educational and psychological practices.

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CAP™ Cognitive Abilities Profile

Appendix 1

Record Form

Name:	
Name of profiler:	
Registered CAP user no:	
How was the information for the profile gathered? (eg observation, consultation, etc)	

Date of profile:	
Date of birth:	
Age at time of profile:	
Gender:	
School(s):	
School year & teacher:	

Section A: The cognitive abilities of the learner

ATTENTION (AA)

Cognitive Ability		Assessment Question	Profile Scores*				Evidence / Source
			BP	R1	R2	R3	
AA1	Regulation of attention (all or any phase)	How well can the learner regulate their attention?					
AA2	Selective attention (all or any phase)	How well can the learner filter out distractions?					
AA3	Shifting attention (all or any phase)	How well can the learner shift their attention from one stimulus to another?					
AA4	Sustained attention (all or any phase)	How well can the learner sustain attention over time?					
Total score for AA items (i)							
Number of scored items in this section (ii)							
Average score for this subsection (i) divided by (ii)							

*BP=Baseline Profile, R1=Review 1, R2=Review 2 and R3=Review 3

Notes: Which factors affect the learner's attention? Are these modality specific?

At all or any phase

Scoring Key

N	1	2	3	4
Not observed / Not applicable	Not able, even with support	Only able with support	Sometimes able / Inconsistent	Independently able

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PERCEPTION (AP)

Cognitive Ability		Assessment Question	Profile Scores*				Evidence / Source
			BP	R1	R2	R3	
AP1 ▶	Perceiving visual information	How well can the learner effectively gather visual information?					
AP2 ▶	Perceiving auditory information	How well can the learner effectively gather auditory information?					
AP3 ▶	Perceiving kinaesthetic information	How well can the learner effectively gather kinaesthetic information?					
AP4 ▶	Perceiving spatial relationships	How well does the learner perceive spatial relationships?					
AP5 ▶	Perceiving temporal relationships (sequencing)	How well does the learner perceive temporal relationships (sequences)?					
AP6 ▶	Noting more than one source of information	How easily can the learner consider more than one source of information at a time?					
Total score for AP items (i)							
Number of scored items in this section (ii)							
Average score for this subsection (i) divided by (ii)							

*BP=Baseline Profile, R1=Review 1, R2=Review 2 and R3=Review 3

Notes:

Phase Key

▶ INPUT ▲ ELABORATION ◀ OUTPUT

Scoring Key

N	1	2	3	4
Not observed / Not applicable	Not able, even with support	Only able with support	Sometimes able / Inconsistent	Independently able

MEMORY (AM)

Cognitive Ability		Assessment Question	Profile Scores*				Evidence / Source
			BP	R1	R2	R3	
AM1 ▲	Short-term memory	How well can the learner recall immediate information?					
AM2 ▲	Using working memory	How well can the learner hold information in their head while working with it?					
AM3 ▲	Memory of visual information	How well can the learner remember visual information?					
AM4 ▲	Memory of auditory information	How well can the learner remember auditory information?					
AM5 ▲	Memory of kinaesthetic information	How well can the learner remember kinaesthetic information?					
AM6 ▲	Long-term memory	How well can the learner remember past learning experiences or knowledge that will help solve the problem?					
Total score for AM items (i)							
Number of scored items in this section (ii)							
Average score for this subsection (i) divided by (ii)							

*BP=Baseline Profile, R1=Review 1, R2=Review 2 and R3=Review 3

Notes:

Phase Key

▶ INPUT ▲ ELABORATION ◀ OUTPUT

Scoring Key

N	1	2	3	4
Not observed / Not applicable	Not able, even with support	Only able with support	Sometimes able/inconsistent	Independently able

LANGUAGE & COMMUNICATION (AL)

Cognitive Ability		Assessment Question	Profile Scores*				Evidence / Source
			BP	R1	R2	R3	
AL1 ▶	Receptive language (content)	Does the learner have the necessary receptive language for the task?					
AL2 ◀	Expressive language (content)	Does the learner have the necessary language (verbal, sign or symbols) to give their answer?					
AL3 ◀	Communicating a response taking account of the needs of the listener (function)	How well can the learner communicate taking account of the needs of the person to whom they are responding (verbally or in any other form)?					
AL4 ◀	Language Structures (form)	How well does the learner structure their use of language in sentences and phrases (correct grammar)?					
Total score for AL items (i)							
Number of scored items in this section (ii)							
Average score for this subsection (i) divided by (ii)							

*BP=Baseline Profile, R1=Review 1, R2=Review 2 and R3=Review 3

Notes: Comment on speed of processing, articulation, volume, pitch and clarity etc, if relevant.

Phase Key

▶ INPUT ▲ ELABORATION ◀ OUTPUT

Scoring Key

N	1	2	3	4
Not observed / Not applicable	Not able, even with support	Only able with support	Sometimes able / Inconsistent	Independently able

REASONING/LOGIC (AR)

Cognitive Ability		Assessment Question	Profile Scores*				Evidence / Source
			BP	R1	R2	R3	
AR1 ▲	Comparing items and concepts	How well can the learner compare two or more items/ concepts in a systematic way?					
AR2 ▲	Classifying and grouping	How well can the learner put items/concepts into classes, sets or groups?					
AR3 ▲	Conserving constancies	Can the learner conserve constant features while other variables change?					
AR4 ▲	Establishing cause and effect relationships	How well can the learner use logical reasoning to establish cause and effect relationships?					
AR5 ▲	Using analogy	How well can the learner use analogical reasoning to solve problems and make predictions?					
AR6 ▲	Using inference	How well can the learner infer a relationship that is not obvious or directly given in the information provided, and make predictions?					
Total score for AR items (i)							
Number of scored items in this section (ii)							
Average score for this subsection (i) divided by (ii)							

*BP=Baseline Profile, R1=Review 1, R2=Review 2 and R3=Review 3

Notes:

Phase Key

▶ INPUT ▲ ELABORATION ◀ OUTPUT

Scoring Key

N	1	2	3	4
Not observed / Not applicable	Not able, even with support	Only able with support	Sometimes able / Inconsistent	Independently able

STRATEGIC THINKING / METACOGNITION (AS)

Cognitive Ability		Assessment Question	Profile Scores*				Evidence / Source
			BP	R1	R2	R3	
AS1 ▲	Understanding what to do	Does the learner understand what they have to do when presented with a problem or task?					
AS2 ▲	Selecting what is relevant to the task	Is the learner able to distinguish what is relevant and irrelevant to the task?					
AS3 ▲	Creating and testing a hypothesis	How well can the learner consider alternative explanations and test out their hypotheses?					
AS4 ▲	Systematic/ Planning behaviour	Does the learner plan the steps in the stages of problem-solving and show a systematic approach in the organisation of their work?					
AS5 ▲	Precision and accuracy	Does the learner feel a *need* to be accurate in their working? Does the learner show an appropriate level of accuracy in order to meet the demands of the task?					
AS6 ▲	Flexibility/ Generating alternative solutions	Does the learner consider and apply alternative strategies?					
AS7 ▲	Transfer and generalisation	How well does the learner generalise strategies and principles from one learning situation to another?					
AS8 ▲	Self-evaluation	Does the learner evaluate and adjust their performance?					
Total score for AS items (i)							
Number of scored items in this section (ii)							
Average score for this subsection (i) divided by (ii)							

*BP=Baseline Profile, R1=Review 1, R2=Review 2 and R3=Review 3

Notes:

Phase Key

▶ INPUT ▲ ELABORATION ◀ OUTPUT

Scoring Key

N	1	2	3	4
Not observed / Not applicable	Not able, even with support	Only able with support	Sometimes able / Inconsistent	Independently able

BEHAVIOURS AFFECTING LEARNING (AB)

Cognitive Ability		Assessment Question	Profile Scores*				Evidence / Source
			BP	R1	R2	R3	
AB1	Openness to intervention of adults	How well does the learner respond to the intervention of adults? How open are they to mediation?					
AB2	Openness to intervention of peers	How well does the learner respond to intervention, help or ideas from peers?					
AB3	Self-regulation of emotions including overcoming blocking	How well can the learner regulate and manage their emotions and overcome blocking and frustration?					
AB4	Self-regulation of movement	How well can the learner regulate and control their movements?					
AB5	Motivation	Is the learner easily motivated by a range of learning experiences?					
AB6	Curiosity	Does the learner demonstrate curiosity in a range of learning experiences?					
AB7	Response to challenge	Does the learner respond well to challenge, wanting to progress to more difficult skills levels?					
AB8	Persistence and task completion	Does the learner show persistence and a need for task completion?					
Total score for AB items (i)							
Number of scored items in this section (ii)							
Average score for this subsection (i) divided by (ii)							

*BP=Baseline Profile, R1=Review 1, R2=Review 2 and R3=Review 3

Notes:

At all or any phase

Scoring Key

N	1	2	3	4
Not observed / Not applicable	Not able, even with support	Only able with support	Sometimes able / Inconsistent	Independently able

CAP™
Cognitive Abilities Profile

Appendix 2

Summary Form

❑ Basline Profile ❑ Review 1 ❑ Review 2 ❑ Review 3

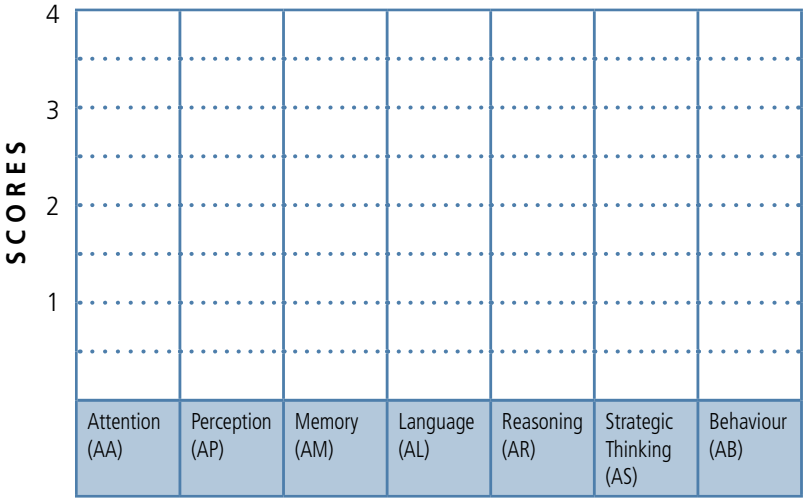
Registered CAP user number: _____

Initial reason for profile:

Name:	
Date of profile:	
Date of birth:	
Age at time of profile:	
Gender:	
School(s):	
School year and teacher:	
Name of profiler:	

How was the information for the profile gathered?
(eg observation, consultation, etc)

Average scores from Section A: Cognitive Abilities of the Learner (shade the columns to show the average score for each subsection)



Scoring Key

N	1	2	3	4
Not observed / Not applicable	Not able, even with support	Only able with support	Sometimes able / Inconsistent	Independently able

SECTION A: Cognitive Abilities of the Learner

Areas of strength:

Areas of difficulty:

SECTION B: The Learner's Response to Teaching and Mediation

Strategies the learner most responded to:

Strategies the learner least responded to:

SECTION C: Task Analysis for Classroom Observation

Task aspects which lead to success:

Task aspects which lead to difficulty:

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CAP Intervention Plan

Name:	Date:	Review date(s):

Area of difficulty to be targeted		Target set	Strategies: mediation, type of task, elements which lead to success	Outcome / Evaluation	
Take from section A	Current CAP score	Set target score	Note strategies (Section B), task elements (Section C) and other suggested strategies	Date of target review	New score and observations

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Appendix 3: Extract from the CAP Manual (2010), chapter 1: Description of Sections B and C

B. Teacher intervention: The Learner's Response to Teaching and Mediation

The second area of observation is the student's response to teacher intervention, that includes both direct instruction and elements of mediation that the teacher is offering. Section B is based on Lidz's (1991, 2003) Mediational Rating Scales adapted and combined with targets derived from analyses of thinking skills in the classroom (Black 1998, 2002) and curriculum related targets. Section B of the CAP consists of a checklist of questions about a learner's behavioural responses to mediation and teaching. These behaviours are rated using Rating Scale B.

Lidz explored MLE from two perspectives: the adult's use of MLE and the learner's response to mediation. All MLE is reciprocal, that is the adult leads an interaction and the learner responds, or the MLE is provoked by the learner who engages with the adult, thus leading to an adult response to the learner's initiative. Hence observations of the use of MLE in learning contexts is always bidirectional and incorporates both quantitative (how much?) and qualitative, (where, when, what type?) aspects of the interaction.

Section B enables the assessor to observe and rate the learner's responses rather than directly evaluating the quality of teaching, as this could be seen as judgemental, rather than consultative. However, should one wish to carry out an analysis of mediational techniques used in the classroom, by agreement with the class teacher, this can be undertaken. For teachers who have an awareness of MLE principles, this can be helpful and constructive and enables teachers to match their mediation to the chosen cognitive targets. This may include classroom observation by another teacher or psychologist trained in detailed observation of MLE, or analysis of a short video excerpt of a typical lesson (see also Lidz, 2003).

The purpose of Rating Scale B is to develop strategies that can be used by the teacher to develop, strengthen or 're-mediate' intellective, as well as emotional and behavioural cognitive abilities. Such teacher strategies support the goals of Formative Assessment, for teachers to enhance processes of learning ie assessment for learning in contrast to the tendency of over emphasis on assessment of learning (Black, 1998; DCSF, 2009).

C. Task Analysis and the Context of Learning

The third area for observation, Section C, provides a framework for task analysis. This section is based on Feuerstein's Cognitive Map, which he uses in the LPAD as a tool for the mediator to examine variables relating to the context of learning. Section C is used to describe the task observed or discussed and analyse task variables in order to assess the correspondence and "fit" between, for example, the cognitive demands of a specific curriculum area and the needs of the learner. Analysing task components informs intervention and differentiation of the curriculum. Lidz's Curriculum Based Assessment model (Haywood & Lidz, 2007) begins a DA investigation with task analysis and the assessor then selects and matches the DA procedures to the cognitive challenges in the task. For the experienced EP this can be an efficient approach in DA. Instead of applying DA tests in a general way, the EP starts by analysing the functions contained in a particular area that has been identified as an area of difficulty for the learner.

This approach accords with the view of cognitive processes as domain specific, in contrast to some DA models based on identification of more general cognitive abilities. The CAP enables the assessor to approach profiling flexibly. Where appropriate the assessor can begin with task analysis (Section C) focusing on a specific curriculum area and use that as a basis for structuring the cognitive investigation. In other situations, starting with a more general approach via sections A or B may be the order of choice.

Proceeding from curriculum to DA test, rather than from test to curriculum application, requires a high level of familiarity with cognitive task analysis. In our experience of training EPs and teachers one of the areas of DA practice found to be most challenging is task analysis.

This shows itself in two ways. Practitioners do not find it easy to observe subject teaching and analyse topics into their contributory cognitive processes. The reverse is also true. Practioners who have carried out DA tests find it difficult to match their insights to the curriculum. The CAP will require practice and proficiency in these tasks which are central to the EP or advisory teacher's consultative role in DA. The difficulty we have perceived in this area of application may stem from the fact that EPs (many of whom were classroom teachers!) together with the teachers they are trying to support, have been trained to teach subjects, ie content, without focusing on contributory cognitive processes, ie task analysis. It is our view that without actively making these links and applications, testing on its own is of limited value.

The variables of task analysis are as follows:

1. Content and Familiarity
This refers to the knowledge and information that is required in the task. The role of prior knowledge and experience is an integral aspect of assessing achievement. The assessor needs to consider the novelty or familiarity of the information load of the task.

2. Modality of presentation and response
A task may be presented in a variety of modalities such as oral/verbal, written, graphical, numerical, pictorial or a combination of these. The observer needs to note the modalities of presentation as well as the output or response modalities. Typically, tasks may involve more than one mode of responding, which may differ from the modality in which the task was presented. For example, a mathematics problem may be presented in a few narrative sentences, but the expected output may be numerical, graphic, or symbolic (e.g. expressed as a formula). These variations must be considered as possible sources of difficulty for the learner, as well as identifying preferred modalities of learning.

3. Cognitive functions required by the task
The assessor needs to analyse the task separately from analysing the learner, in order to pinpoint the elements of the task in which certain cognitive abilities will be required. For example, does the task require comparative behaviour, classification, use of spatial concepts or hypothetical thinking? Just as we can analyse the learner's cognitive abilities, we can apply the same analytical process to the requirements of the task. From this, the assessor can gain a clearer picture of the match or mismatch between the task and the learner's current cognitive skills. This important information can lead to the ability to manipulate different aspects of the task, in order to differentiate the task for individual learners or groups of pupils.

4. Complexity
The notion of task complexity relates to the number of units of information to be processed for successful task performance. This can affect simultaneous and sequential processing and working memory. Complexity is also linked to the effects of practice and familiarity with the task. A task that in itself may require processing a lot of information, may nevertheless be managed well by a student due to sufficient practice. An example would be learning to drive a car.

5. Abstraction
Successful development of learning abilities leads to manipulation of ideas with increasing abstraction and decreasing reliance on concrete or sensory support. The extent to which a task requires abstract and representational thinking needs to be considered, as it may be a source of difficulty for the learner. As with the other parameters of task analysis, once the level of abstraction is understood by the observer, it can be adjusted and manipulated to meet the needs of the learner more effectively. Learners at Key Stage 1 will be working with concrete applications of cognitive abilities, e.g. categorising concrete materials. During Key Stage 2, there are increasing expectations to deal with concepts and move toward abstract relational thinking. At secondary school, Key Stages 3 and 4, the learner is strengthening and using cognitive abilities without the need to rely on manipulating concrete materials. The secondary school student should be problem solving abstract ideas and concepts through mental representation, no

longer dependent on real world experiences. The Key Stage 3 and 4 student will be increasingly conscious of choosing and weighing up alternate strategies for problem solving. The development of insight into one's own learning strategies, metacognition, is positively associated with successful learning. The degree or level of abstraction required in the task, is measured by the concept of the 'distance' between the task itself and the learner (Feuerstein *et al*, 2008). A scale of distance would describe at one end the most concrete learning experiences, where the learner can directly touch or sense the content of the task (for example, building blocks). At the other end of the scale, highly abstract concepts (such as formulae in maths and physics) may be used to explore phenomena that cannot be directly sensed and only conceptually represented.

6. Efficiency
Task efficiency is composed of three elements: *Speed*, *Accuracy* and *Effort*.

- *Speed* – how fast must the task be performed? Is time an important element in this kind of task?
- *Accuracy* – how precisely does the task have to be performed?
- *Effort* (energy) – what is the physical/mental effort involved in the task?

The assessor needs to consider when analysing efficiency that the more time needed, the more concentration will be required. Can the task be broken into chunks or is fluency and continuous involvement essential? Does the learner have to sit for a long time in one place? How may such task requirements affect energy levels and task efficiency? Each task, in order to be performed at an efficient level, requires a balance between these three aspects. The assessor needs to consider each element in order to understand possible sources of difficulty for the learner. In the CAP, two of the three elements in understanding task efficiency are rated – speed and accuracy. The notion of effort is an important concept, but in our experience, it is difficult to separate from the person doing the task, that is, measuring effort is highly contingent on the way the task is performed. Further observations on this concept will be found in the Scoring Guidelines for Section C (Chapter 5).

Appendix 4: Participant information sheet

Participant Information Sheet

Dear Parent,

The Cognitive Abilities Profile (CAP):

I would like to introduce myself to you and tell you about a research project I am planning to do, looking at how to help different children learn.

My name is Ruth Deutsch. I am an educational psychologist (EP) and have been working with children, their schools and families for many years.

Children are often tested during their school years to measure progress. I have developed the Cognitive Abilities Profile (CAP) which is a questionnaire for psychologists and teachers to use when looking at how children learn. It is not a test of children's school achievements, but helps teachers to discuss important thinking and learning skills that may help a child to make more progress in all areas of learning. It consists of a series of questions that help the teacher and EP to work out useful targets for the teacher, to best meet each child's needs.

So that I can see whether the CAP is any better than testing children directly, my plan is to assess the educational skills of a number of children twice, once before and once after their teachers start using the CAP. As part of our project, your school's own educational psychologist will carry out a consultation twice with the teacher to discuss how your child learns and how they've progressed over a few months.

I would like to invite your child to take part in the project.
You will see that I have attached a consent form. No child will be involved in this research without you, the parent(s), being happy about it.

Why has my child been selected?

I would like children between years 4 and 6, to be in the project, as I want them to feel part of what is going on and that it is for their benefit. I only have time to see a few children at each school. So I have asked your teacher to pick someone who might benefit from a consultation and advice to help them progress in their educational targets. I am trying to include children who learn in all sorts of different ways and have different skills so that a wide range of children and schools are involved.

What will my child do?

1. A brief visit by me to your child at school, during the school day, where I will test your child's learning skills. Your child will get all their normal breaks. This will take no more than 1 hour and will be in the form of games and activities. You will receive all the results if you would like them. The school are happy for me to do this.
2. The EP and teacher will discuss your child's learning needs and they will agree some strategies and targets for making further progress. You are welcome to join this discussion, and in any case will be told the day and time that your child's assessment and this discussion are taking place. However you don't have to come to this if you would prefer not to. You will receive the Summary Form of this discussion, which will outline areas in which the teacher and EP believe your child can be helped to learn

best.

There will be no formal files opened on your child, just my own files to collect the project information.

3. The teacher will then work with the targets which have been agreed to help build your child's thinking skills in all classroom activities.

4. 4- 6 months later, the EP will come back. S/he will be asking the teacher how s/he got on and how your child has progressed. They will review their teaching targets and change the targets if necessary.

5. I will also come back and carry out the same learning tests on your child, to see if how they've got on. Again it should not take more than 1 hour. *You will get all test results if you would like them.*

Will the research be confidential?

All of the research we undertake and the way we record all information is confidential. When we produce the results your child's results will be part of a group of children's results and your child, family or school will not be named in any way.

Who should I contact if I have more questions?

You are welcome to discuss the research project at any time. If you have queries or you are worried about anything please contact either myself, Ruth Deutsch, researcher or Nicola Botting, the project supervisor as below.

Ruth Deutsch,
c/o Department of Language and Communication Science,
City University,
Northampton Square,
London, EC1V 0HB
[redacted]

Nicola Botting,
Department of Language and Communication Science,
City University,
Northampton Square,
London, EC1V 0HB
020 7040 8314
[redacted]

If you would like independent advice about participating in a research study please contact the university research development manager quoting the title of the project as "The Cognitive Abilities Profile (CAP): Evaluating a new tool to help psychologists and teachers assess a pupil's learning needs " :

Anna Ramberg,
Research Development Manager,
City Research Development and International Relations Office,
City University,

Northampton Square,
London, EC1V 0HB
Tel: +44(0)20 7040 3040
[redacted]

Important information to remember:

You ***DO NOT*** have to join the study. You are free not to be in this study or to drop out at any time. If you decide not to be in the study, or to drop out, this will not change your child's lessons in any way.

What should I do next?

If you understand all the information in this letter and are happy for your child to take part please complete the form and return to your child's teacher.

If you would rather not take part, please still return the form so that we can invite someone else.

In summary…
This is how it should work:.

- I show the EP's how to use the CAP questionnaire.
- The CAP is used by the teacher and EP together to discuss how your child learns.
- I come to school and test your child before and after the use of the CAP.

I want to let you know that having worked with children for 20 years, most children feel really relaxed and usually love the extra attention.

It is very important to for you to know that not only will I do NOTHING without your complete comfort and agreement, but that you and your child can also drop out of the project at any time even after it has started. Your child's lessons will not be affected in anyway if you choose not to take part.

Thank you for reading through this letter.

Thank you for your help.

Ruth M Deutsch

Appendix 5: Participant consent form

Participant Consent Form

Project Title: The Cognitive Abilities Profile (CAP): Evaluating a new tool to help psychologists and teachers assess a pupil's learning needs

I have read the information letter, which I can keep.

I have had the chance to talk more with someone about the study if I wanted to.

I understand that all information from the study will be treated confidentially and that no-one will be able to tell how my child did on the tasks except the research team and child's school.

My child's name won't be written into any reports or be kept on any computer files.

I agree to City University keeping and using this anonymous information for research purposes. I understand that the answers I give will be used only for the study and to inform my child's teacher.

The University promises to stick to the rules of the Data Protection Act 1998.

I understand that no-one will visit me at home or contact me at my home address.

I understand that agreeing to take part means that I am happy to: Let my son/daughter complete the tests given by the researcher on 2 occasions in the year

- This will take place at school on a normal school day
- Let my child's teacher have an interview with the routine Educational Psychologist about my child's education on two occasions in the year

1. Have you read the Information Letter?	**YES/NO**
2. Have you been told enough information about the study?	**YES/NO**
3. Do you understand that you do not need to take part in the study and if you do take part you and your child can change your mind and drop out:- * at any time (even after the study has started) * without having to give a reason for dropping out * and without disadvantage to you or your child?	**YES/NO**
4. Do you agree to take part in this study?	**YES/NO**

Your child's name:……Your child's date of birth……..

Your child's school……Your name: ……..……..……

Signed: ..... **Date:** …….....

Please give this form back to your child's teacher

This project has been approved by the City University Research Ethics Committee

---

Child Information letter

Dear ……

My name is Ruth Deutsch.

In my job, I try to help children become better at learning. I work with teachers, because teachers want all the children to be happy and learn well at school.

I am doing a new PROJECT. Would you like to be my HELPER? You do lots of projects at school.
My project is about finding out how children learn things and how they think. Then I can work out with the teachers lots of ideas to help all kinds of children THINK and LEARN best.

This is what will happen:

- I will do some thinking games and activities with you. I will see what you find easy and hard. You can tell me what you would like to get better at doing.
- Your teacher is going to answer some questions too.
- A few months later, I will come back and see you again.
- We'll do our thinking games together and see how you are getting on.

- I work with lots and lots of children. They are mostly happy and we have fun together.
- BUT if you do not want carry on, you can just say NO THANKYOU and we will STOP. And that is really OKAY.

- Your parents and teachers will be proud of you whether you become a Project helper or not.

- PLEASE read all the words on this page as many times as you like. This sheet is FOR YOU.

- If there is anything you want explained, or if there are some hard words, you can ASK. And that's really OKAY.

IN FACT…. Asking questions to check if you have understood things right is a GREAT way to learn!

I hope to see you soon

Best wishes from

Ruth Deutsch

Appendix 6

CITY UNIVERSITY LONDON

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Ref: PhD/09-10/09

15 June 2010

Dear Ruth

Re: The Cognitive Abilities Profile: A study of its validity and reliability

Thank you for forwarding amendments and clarifications regarding your project. As mentioned in the Chair's email, please let this office know when the project receives CRB clearance, providing the date and reference of this.

Please find attached, details of the full indemnity cover for your study.

Under the School Research Governance guidelines you are requested to contact myself once the project has been completed, and may be asked to complete a brief progress report six months after registering the project with the School.

If you have any queries please do not hesitate to contact me as below.

Yours sincerely

[redacted]

Carol Dossett
Research Administrator

[redacted]

CITY UNIVERSITY LONDON

School of Community and Health Sciences

Please note that City University has extensive insurance cover in place for the academic year 2009/2010, relevant details of which currently are:

1. Employers Liability
This is cover for legal liability to employees for death, injury or disease arising out of the business of the University. The limit of indemnity is £50,000,000 for any one claim.

2. Public and Products Liability
This is cover for legal liability to third parties for accidental loss of or damage to property or for death, injury, illness or disease arising out of our business and including liability arising from goods sold or supplied. The limit of indemnity is £50,000,000 for any one claim.

3. Professional Indemnity
This is cover for legal liability to third parties for breach of professional duty due to negligent act, error or omission in the course of our business. The limit of indemnity is £15,000,000 for any one claim.

Clinical trials cover is included within the above insurances in place.

Ken

Ken Cridland
Head of Finance
(Financial Accounting and Payables)
City University
Northampton Square
London EC1V 0HB

[redacted]