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## INTRODUCTION

The PRPP System of Task Analysis has evolved through a process of research consisting of small clinical studies. This section outlines the early development of the instrument to its present form. Contemporary studies are focused on further establishing reliability and validity for its use among various diagnostic groups and its application to intervention. These studies are not documented in this section. They are in the process of publication and/or can be found on an updated occupational performance website: www.occupationalperformance.com

Early PRPP research was carried out in four phases – each is outlined below.

# PHASE ONE: Development of Stage One of the PRPP System of Analysis

25 male (15) and female (10) adults between the ages of 18 and 64 who did not have brain impairment were videotaped performing eating, dressing and meal preparation tasks. Their performances were analysed using a routine behavioural task analysis whereby the task performance was broken down into major motor steps. The task steps were then analysed to determine how similar the steps were among the 25 adults and to give the researchers some idea about the extent to which individual differences in performance of routine tasks were likely to be viewed as errors in performance. Although there were individual differences in the sequence of some tasks (e.g. sandwich making), there were not identifiable errors.

Test-retest consistency achieved for this analysis on each task among 6 trained testers ranged above 92%.

20 clients with brain injury who were inpatients in a brain injury rehabilitation unit were videotaped performing the same tasks.

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Patients had varying levels of physical and cognitive ability from severe physical limitations and residual post traumatic amnesia to independence in mobility and oriented to time and place. All patients were identified by their occupational therapists as having some difficulty with cognitive processes that interfered with optimum performance of occupational tasks.

The videotaped performances were analysed using the same task analysis format described above. Errors were catalogued and subjected to content analysis. Four main error types were identified from the analysis.

- → Errors of accuracy (steps were inappropriate or wrong)
- → Errors of omission (steps were left out)
- → Errors of repetition (steps were unnecessarily repeated)
- → Errors of timing (the total time taken to complete the task was too long, or too rushed)

Interrater agreement and intrarater consistency in error identification of this part of the analysis was above 90%.

This initial task analysis forms Stage One of the present two stage PRPP System of Analysis and is used to set the criterion against which performance mastery of any task is determined.



Figure 1: Current Stage One analysis format

## PHASE TWO: A system of classifying cognitive errors in performance of tasks (Stage Two analysis)

Although the Stage One analysis allowed therapists to identify breakdown in performance of tasks, and to identify the types of errors causing the breakdown in performance, more information was needed to determine the possible reason for errors from a cognitive perspective.

45 adults with brain impairment were videotaped performing dressing, eating, grooming and meal preparation tasks within their hospital environments. Stage One analyses were completed and errors of accuracy, omission, repetition and timing were noted.

Lists of errors were made and microanalyses were performed on each error. Over 4000 errors were catalogued for analysis. Categorisation of error types relative to the cognitive processes associated with the error fell into four broad error types.

#### **Errors of perception:**

Difficulties with attending to the task and perceiving all of its elements

## **Errors of recall**

Difficulties classifying objects and body parts, remembering how to use them and fitting objects into a functional context

#### **Errors of planning**

Difficulties in planning what to do and how to do tasks, problem solving before and during task performance

## **Errors of performance**

Difficulties in initiating task performance, knowing when to stop or continue performance to its completion

This formed the central core of the current PRPP System of Task Analysis conceptual model.



Figure 2: First central conceptual core of PRPP System: Four processing errors

# **PHASE THREE: Development of theory base**

A literature review of the body of knowledge of perception and cognition as it related to brain injury revealed one model of information processing that was congruent with the categorisation of error types identified in Phase Two. Romiszowski (1984) (See references in last section), an instructional psychologist, had developed a model of cognitive requirements for skilled performance of work tasks, which he called the Skill Wheel. He proposed that difficulties in work performance (for example, typing) could be explained relative to problems in perceiving, recalling, planning or performing aspects of the task. He further categorised these skill areas into 12 subcategories.

Using the Skill Wheel constructs, a content analysis on each of the error categories was done to determine if a similar breakdown of error type was possible relative to the performance of the 45 patients with brain impairment.

Errors were able to be divided into twelve distinct subcategories that were similar but not identical to Romiszowski's subcategories.

In two subsequent studies, using the twelve subquadrants, therapists were asked to view videotapes of clients with brain impairment (TBI (25) and Stroke (15)) and categorise performance errors. They were additionally asked to identify aspects of performance that were not able to be categorised.



Figure 3: The original twelve subquadrants of the PRPP System of Task Analysis

These studies revealed that all error types were able to be described using the constructs within the model in Figure 3, thereby lending support for the clinical validity of the model.

Therapists suggested that, although this descriptive approach was helpful to clinical practice, they needed a more concrete system of behavioural analysis that:

- → Was based on discrete, observable behaviours
- $\rightarrow$  Could be scored

# **PHASE FOUR: Development of the descriptor behaviours**

Using clients from a range of diagnostic categories across a number of studies (TBI, Stoke, Occupational Rehabilitation, Mental Health and Learning Disorders), videotaped performances were broken down into the twelve subcategories described in phase 3.

A total of 2001 errors in performance were catalogued across the twelve subcategories. Transcriptions of the videotaped errors were analysed to determine the key descriptive words that could be used to describe errors made in each of the subcategories.

A list of possible key words was studied and a final choice of single or paired words, termed 'descriptors' (because they described behaviour) was chosen according to the following five criteria:

- $\rightarrow$  They were 'doing' words
- $\rightarrow$  They described a cognitive event
- $\rightarrow$  They were observable
- → They were everyday words, rather than medical or jargon words (each word and its meaning was to be found in an English Dictionary)
- → Each word was judged to best reflect the error type according to a 'panel of experts'

Each descriptor was then operationally defined from three perspectives. First, the Macquarie Dictionary (Australian) was used to define the essential meaning of each word. Second, the original videotaped performances of adults without impairment were used to develop a definition of the descriptor word relative to the usual behaviour one would expect to observe during performance of any task. Third, the videotapes of clients with impairment were used to identify examples of the types of errors made relative to each descriptor.

A number of subsequent studies determined inter and intra-rater reliability of the descriptors. A few of the original descriptors were dropped from the test and others recategorised, as results of the studies and feedback from therapists who used the instrument indicated the strength or weakness of particular descriptors.

Over a six year period, the model pictured in Figure 5 emerged and remained stable for some years, and is the most familiar to people using the PRPP System.



Figure 4: PRPP System of Task Analysis Conceptual Model, 1999 - 2004

### 2005 Revision

Further changes to the central core concepts and the relationships between them were made in 2005 as a result of research. Differences between this conceptual model and the previous one depicted on page 3 include the following:

- Changes in the conceptualised direction of information flow from unidirectional to bidirectional. Information flow arrows between the quadrants indicate information flow in two directions. This more adequately reflects a contemporary multidirectional view of information processing theory (Hoffman, Paris & Hall, 1994), rather than the older unidirectional model (Broadbent, 1958). The concept of bidirectional arrows are the subject of further research in the developing PRPP System Intervention.
- Addition of an arrow between Perceive and Plan subquadrants. This arrow has been added on the basis of research using the PRPP System of Task Analysis that indicated a strong relationship between attention, sensory perception and planning in people with brain injury (Munkhetvit, 2005), mental health (Still, 2005), and autism (Lohri, 2005) (See following section).



Figure 5: Changes in the central concepts of the PRPP System and the relationships between them (2005)

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## **CURRENT FORMAT (2013)**

#### Changes:

Further research and clinical use of the PRPP in practice areas which target clients who experience sensory over-responsivity prompted an addition of one descriptor in the "Disciminating" subquadrant of Perceive. The additional descriptor is termed *regulates*, and refers to the extent to which a person is able to discriminate the magnitude of a sensory image during task performance. The current conceptual model is pictured in Figure 6.

As a result of widespread use in Australia, and non English speaking countries such as (French speaking Canada provinces). Sweden, Austria (German), Switzerland (German), Germany and Thailand, we have had the opportunity to further refine the language of the system, making the words clearer and more consistent as descriptors of behaviours that need to be observed. Changes to subquadrant names and selected descriptors can be found by comparing Figure 6 below with models on the previous pages. None of the central definitions of the words have changed. The following model is the one currently in use from 2012.



Figure 6: Current descriptors including changes to subquadrant names and selected descriptors

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## SUMMARIES OF EARLY AND UNPUBLISHED RESEARCH USING PRPP MEASURES AND CONCEPTS

The following are summaries of some of the research that has contributed to the development and validation of the PRPP as a measurement tool. Many of these abstracts have been prepared for peer reviewed papers at health science conferences, or are abstracts from research theses.

#### **BRAIN IMPAIRMENT**

## **<u>Cognitive Assessment in Patients with</u>** Acquired Brain Injury in Thailand

Munkhetvit, P. (2005). Unpublished PhD Thesis. Available from Faculty of Health Sciences, The University of Sydney. Australia.

## Background

Cognitive impairment is one consequence of acquired brain injury (ABI) and is reported to have a profound effect on patients' occupational performance. Occupational therapists, as members of rehabilitation teams in Thailand provide assessment and intervention for cognitive disorders that impact on everyday function after brain impairment. However, they do not have a suitable cognitive assessment method that is considered appropriate to Thai culture. The Perceive, Recall, Plan and Perform (PRPP) System of Task Analysis was developed in Australia for use by occupational therapists. Preliminary studies have demonstrated its acceptable reliability and validity, as well as clinical utility on samples of Australians with a variety of disabilities including brain impairment. The purpose this three phase study was to investigate the usefulness of this instrument in Thailand, and to further explore the reliability of a modified version of the PRPP System that was development specifically for use by occupational therapists in Thailand.

The first phase of the study was a small qualitative study that examined the needs of

Thai therapists relative to their perceived role in rehabilitation, and in cognitive assessment in particular. The findings indicated that western assessment instruments that had been in use in the country were considered inappropriate to Thai culture, language and role expectations. At the same time, however, therapists wanted a standardised way of measuring the impact of cognitive disorder on occupational performance as an alternative to subjective observation. The PRPP System of Task Analysis was identified as a potential measurement tool due to its ecological focus and its standardised format.

Phase two of the study piloted the use of a Thai language version of the Australian PRPP System with Thai patients who had sustained ABI. Statistical analysis demonstrated the capacity of the PRPP System to identify information processing deficits during performance of everyday tasks, as well as its sensitivity to performance change. Sixteen therapists who received training in a Thai translation of the original PRPP System of Task Analysis assessed 26 patients with ABI during drinking, eating, and dressing tasks and reassessed performance after two weeks. Results indicated that it was responsive to change and therefore potentially useful to measure change in both performance and processing skill.

Phase three investigated the reliability and usefulness of a simplified screening tool that modified the original 3 point scoring system to a dichotomised 2 point scoring system. modified version The demonstrated excellent test-retest reliability, whereby the intra class correlations (ICC) (McGraw & Wong, 1996) for total quadrant scores were .96 for Perceive and Recall, .94 for Plan and .92 for Perform. Test-retest reliability for subquadrants ranged from .72 (Controlling) to .96, with all but one subquadrant above .81. Test-retest reliability for 33 descriptors ranged from .75 to .99 across two tasks used for assessment (dressing and hygiene), with all but four significant at the 95% confidence level (Times .61 (hygiene); Recalls Steps .55; Starts .43; Coordinates .00 (dressing).

Inter-rater reliability of ten therapists assessing ten patients with ABI across two task areas (hygiene and dressing) indicated acceptable inter-rater reliability based on total quadrant scores, with ICCs ranging from .65 to .83. All but one subquadrant (Control .26) demonstrated acceptable interrater reliability (ICC ranging from .46 - .83). All but four of the 33 descriptors demonstrated acceptable inter-rater reliability (Analyses, Identifies Obstacles, Recalls Steps, Times), with ICCs ranging from .46 - .83.

Evaluation of its utility by Thai therapists who had received training indicated its effectiveness of use in Thailand and presents evidence of its cultural adaptability.

## **The Impact Of HIV1 Dementia (HIV1-D) On The Performance Of Everyday Tasks**

Ranka, J. (2011). DHlthSc Thesis Abstract. The School of Occupation and Leisure Sciences, The University of Sydney, NSW, Australia.

A common and clinically important of complication late stage human immunodeficiency virus Type 1 (HIV-1) infection is HIV-associated neurocognitive disorder (HAND). HAND encompasses three syndromes, HIV-associated asymptomatic neurocognitive impairment (ANI). HIV-1associated mild neurocognitive disorder (MND), and HIV-1associated dementia (HAD). It is estimated that 30-60% of all HIV-1 infected individuals will have at least mild neurocognitive impairment (MND), and 10-15% of those will develop HAD. Research conducted outside medicine has focused on identifying the type and pattern of neuropsychological impairments present in people with HAND, and to correlate impairments identified from neuropsychological testing with scores on laboratory-based tests of everyday task performance.

Typically, the performance of tasks and routines in daily life occurs in naturalistic contexts, and is orchestrated around the achievement of personally meaningful, needed and/or desired performance goals. It requires that one uses cognitive strategies to attend, perceive, remember, decide, plan and act on intentions within real-world contexts. Little is known about the impact of cognitive information processing strategy application impairments on the performance of meaningful tasks and routines carried out by people with HAND in contexts where performance would naturally occur.

This research addressed this gap by investigating the real-world impact of information strategy application disorder in a sample of 30 men diagnosed with HAD, the most severe form of HAND. The home contexts of those in the sample consisted of home, supported living and residential care.

The criterion-referenced Perceive, Recall, Plan and Perform (PRPP) System of Task Analysis was used to identify the level of task performance mastery demonstrated by men in the sample (Stage One), and the information processing strategy application errors that impacted on their performances (Stage Two). The Clinical Staging of AIDS Dementia Complex (CSADC) scale was used to identify the level of severity of HAD.

A total of seventy one task performances were assessed across the sample in a variety of naturalistic contexts. None of the men in the sample demonstrated mastery of task performance. The mean Mastery score was 30.07%. The predominant type of error made by men as they performed daily life tasks was Timing; they spent too much time completing tasks. This was followed by errors of Accuracy; they made mistakes in what they did.

Descriptive analysis of the PRPP Stage Two scores revealed that these men had difficulties across all domains of information processing strategy application but most notably with Plan Quadrant (Mean 30.75%) and Perceive Ouadrant (Mean 53.49%) application behaviours. Rasch strategy calibration of the ordinal PRPP Stage Two strategy application scores produced an interval-level linear hierarchy of information processing strategy application difficulties experienced by the group. Men in the sample demonstrated problems sequencing complex tasks, choosing plans and actions, analysing problems encountered, and monitoring sensorv changes during performances. Problems were also identified in their abilities to contextualise their performances to fit within time constraints (Contextualises to Duration), and enact plans in a fluid manner (Flows).

Differences in performances between men with mild dementia versus those with moderate/severe dementia identified using a 2 x 4 repeated measures ANOVA carried out on the Rasch-calibrated PRPP Stage Two scores revealed similarities in performance across Perceive, Recall, Plan and Perform Ouadrants but those with mild dementia performed better overall. Further analyses revealed specific differences in performance between those with mild versus those with moderate/severe dementia. Most striking about the findings was that men at both ends of the dementia spectrum had relatively good Recall Quadrant strategy application capacities (Mean 75.30%). Even those with the lowest total PRPP Stage Two scores, could recognize and use objects, and recall the procedures of known tasks. Α statistically significant predictive correlation was found between Plan Quadrant disorders and severity of dementia.

This pilot study demonstrated the utility of the PRPP System, a criterion-referenced,

occupation-embedded, ecological method of identifying task performance skill and information processing strategy application disorders impacting on performance, for use with people living with HIV/AIDS who have HAD. Identifying the specific impact of information processing strategy application disorders on real-world task performance provides occupational therapists with information necessary to more specifically tailor therapy to the individual performance and participation needs of people with HIV-1-associated dementia.

## Occupational performance and information processing in adults with agitation following brain injury

Nott, M. (2008). PhD Thesis Abstract. School of Occupation and Leisure Sciences, The University of Sydney, NSW. Australia (Supervisor, C. Chapparo, R. Heard)

Agitation following traumatic brain injury (TBI) is characterised by a heightened state of activity with disorganised information processing that interferes with learning and achieving functional goals. This thesis outlines a series of studies across four research phases, investigating how occupational performance of adults with TBI is affected by agitated behaviour and information processing difficulties.

Clinicians report the presence of agitation interferes with engagement in therapy and of rehabilitation achievement goals. Research Phase One used a retrospective chart review of 80 adults with severe TBI to identify a high incidence of agitated behaviour during inpatient TBI Agitated behaviour rehabilitation. was associated with lengthier rehabilitation admission, prolonged duration of postamnesia (PTA), and traumatic poor cognitive functioning at discharge. The association between agitation and poor cognition persisted for at least two years after discharge, highlighting the significant impact of agitated behaviour on people's

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ability to relearn cognitive skills for daily function. These initial research findings directed subsequent research phases, in which an information processing model was adopted to examine application of cognitive strategies during occupational performance.

An emerging occupational therapy assessment, The Perceive, Recall, Plan and Perform (PRPP) System of Task Analysis, was selected as the primary method for evaluating how application of cognitive strategies during occupational performance is affected in agitated patients.

Clinical utility of this measure was established in a case study of an adult demonstrating severely agitated behaviour during inpatient TBI rehabilitation, followed by examination of instrument reliability and validity with ten experienced occupational therapists and five adults with agitated behaviour following brain injury. The PRPP System of Task Analysis emerged as a valid and reliable method for determining strategy application deficits during occupational performance of adults with agitated behaviour, in acute stages of TBI rehabilitation.

Consistent patterns of processing deficits were related to the Perceive and Recall Quadrants of the PRPP System. The assessment tool forms part of a dynamic, interactive assessment and intervention system.

The PRPP System of Intervention was evaluated in the final research phase, using an experimental single case design with replication across eight adults. The effectiveness of PRPP Intervention was examined in comparison to conventional occupational therapy in an ABAB design. Efficacy of the PRPP Intervention was demonstrated, with patients applying significantly more information processing strategies to occupational performance tasks during PRPP Intervention than during conventional occupational therapy sessions. Agitated behaviour concurrently reduced over the period of the study. Relationships between information processing and agitated behaviour are hypothesised.

## <u>Cognitive strategy intervention for adults</u> with brain impairment in a Transitional <u>Living Unit</u>

Nott, M., Chapparo, C., Hummell, J., Pearse, S., & Hunt, J. (2013). Published Abstract: Occupational Therapy Australia, 25<sup>th</sup> National Conference and Exhibition, July. *Australian Occupational Therapy Journal*, *60, Supplement 1*, p.46.

Introduction: Cognitive rehabilitation is most effective when a specific treatment cognitive approach known as or metacognitive strategy instruction is used. The Perceive, Recall, Plan and Perform (PRPP) System is a dynamic assessment and intervention system based on cognitive application during everyday strategy functional tasks. To date the intervention component of this system has received limited investigation.

**Objective:** To compare functional, cognitive, and participation outcomes of a transitional living unit (TLU) occupational therapy programme based on the current intervention approach and following introduction of the PRPP System of Intervention.

Methods: Single controlled centre, comparison study. Projected sample of 20 adults with brain impairment (currently n=9). Changes from TLU admission to discharge were evaluated using the PRPP System of Task Analysis, neuropsychological tests, Mayo-Portland Adaptability Index, Care and Needs Scale, Functional Independence Measure, Rehabilitation Therapy Engagement Scale, Attainment. "Current" and Goal occupational therapy assumed a functional approach with graded support in a semistructured residential environment. The PRPP intervention used a cognitive strategy training approach in the same environment. PRPP Research Development: 2013

Therapy frequency was consistent between study interventions.

Results: Initial findings suggest increased use of cognitive strategies during occupational tasks following the PRPP Intervention. Findings to be presented include pre-post intervention comparisons between "current" occupational therapy PRPP (control) and Intervention (experimental). Differences in use of cognitive strategies, task performance, community adaptation, supports required, level of independence and goal attainment will be evaluated. Client engagement with each intervention will also be evaluated.

**Conclusion:** TLU outcomes may be enhanced by adopting a cognitive strategy based intervention.

## WORK Chronic pain: impact on information processing at work

Chapparo, C., Innes, E., & Ranka, J. (2005). Funded by a Research and Development Grant. The University of Sydney. Australia.

Chronic pain has been linked to reduction in short term memory, slow reaction times, poor attention, difficulties with problem solving and poor judgment (Bootes & Chapparo, 2002). There is little evidence of the extent to which pain impacts on information processing required for work.

This study used the Perceive, Recall, Plan and Perform (PRPP) System of Task Analysis to determine the impact of chronic neck and/or back pain on the efficacy of task-embedded information processing required for satisfactory job performance. Using a group comparison design. information processing abilities of 10 people with chronic neck/back pain who were in paid employment were compared with a matched control group of people without chronic pain. In addition, self-report

measures of processing by the employee were compared with those of an external evaluator.

Findings revealed the following: (1) pain subjects rated job tasks that were made "easy" or "difficult" based on their perceived impact of pain on information processing; (2) there were differences between pain and control group measures of perceived information processing ability to use attention, recall and planning strategies required for job tasks; and (3) there were differences in the impact of chronic pain on job related information processing ability, as perceived by pain subjects and their employers or an external evaluator.

The long term outcome of this study was to establish an assessment model suitable for use in the work environment that had the capacity to identify the impact of chronic pain on processing information required for work.

## <u>Cognitive Strategy Application:</u> <u>Measuring the Impact of Acquired Brain</u> Injury on Return to Work

Bootes, K., Chapparo, C., & Heard, R. (2013). Published Abstract: Occupational Therapy Australia, 25<sup>th</sup> National Conference and Exhibition, July. *Australian Occupational Therapy Journal, 60, Supplement 1*, p.107.

**Introduction:** Following Acquired Brain Injury (ABI), people may experience inefficient use of cognitive strategies which impact return to work. However, few workplace assessment tools capture the effect of cognitive difficulties upon work performance in situ. The Motor Accident Authority recommends that any testing of cognitive capacity of people with ABI be accompanied by interview with a significant other, and that data about performance be compared with the self-report from the person with ABI.

**Objective:** To discover difficulties with cognitive strategy use that is experienced by

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people with an acquired brain injury on return to work.

**Methods:** 32 people who had returned to work post-ABI (20M, 12F; 28-65yrs) were interviewed using the PRPP@WORK (Q/I), an interview form of the Perceive, Recall, Plan and Perform System of Task Analysis to determine their capacity to apply cognitive strategies while carrying out a specific job in their work environment. Data were obtained from the person with ABI, and an employer or supervisor. A many faceted RASCH model was used to examine the relationship between the person with ABI and the difficulty of each cognitive strategy measured by the PRPP@WORK.

**Results:** A hierarchical ordering of easiest to hardest PRPP@WORK (Q/I) cognitive items conformed to conceptual models of information processing. Higher order executive functions requiring problem solving, multiple feedback loops, working memory, and self-monitoring were found to be the most difficult during work performance.

**Conclusion:** The PRPP@WORK (Q/I) can be used to identify ease and difficulty in cognitive strategy use during work performance.

## <u>Is there a difference between the capacity</u> <u>to apply cognitive strategies during</u> <u>procedural and social components of job</u> <u>performance by people with ABI who</u> <u>return to work?</u>

Bootes, K., Chapparo, C., & Heard, R. (2013). Published Abstract: Occupational Therapy Australia, 25<sup>th</sup> National Conference and Exhibition, July. *Australian Occupational Therapy Journal*, *60, Supplement 1*, p.108.

**Introduction:** Difficulty with social and interactive components of work is thought to stem from the same disorder in cognitive strategy application after acquired brain injury (ABI). Few workplace assessment tools capture the effect of inefficient

cognitive strategy use upon both task and social aspects of work performance in situ.

**Purpose:** To determine whether people with ABI experience similar difficulties with applying cognitive strategies to social and procedural components of work performance. r

Methods: 32 people who returned to work post-ABI (20M, 12F; 28-65yrs) were interviewed using the PRPP@WORK (O/I), an interview form of the Perceive, Recall, Plan and Perform System of Task Analysis which examines the cognitive capacity to carry out both procedural (steps) and social (interactions) components of the job. Two separate ratings, one for task performance and one for social interaction for 34 cognitive strategy items were obtained from people with ABI and employers. A many faceted RASCH model was used to examine the relationship between the person with ABI, difficulty of each cognitive strategy measured, social and procedural dimensions of work.

**Findings:** Cognitive strategies that were most and least challenging during social interaction were similar to those required for successful task performance and included: recognising the meaning of interactions, using body language during social interaction, calibrating the proportion of social interaction and persisting with communication.

**Conclusion:** Similar cognitive strategies underpin both procedural and social work performance. People with ABI may experience additional difficulties with social interactions involving knowing, using and persisting in the use of appropriate behaviours during work tasks

## MENTAL HEALTH <u>Measuring function:</u> <u>The Perceive, Recall, Plan and Perform</u> <u>System of Task Analysis</u>

Still, M., Beltran, R., Catts, S., & Chapparo, C. (2002). Cognitive and functional assessment of patients with early psychosis. *Acta Psychiatrica Scandinavica Supplementum*, *413*(106), 40-41 Published abstracts from 3<sup>rd</sup> International Conference on Early Psychosis, Copenhagen, Denmark, September.

Still, M., & Chapparo, C. (2004). Australian Society for Psychiatric Research Conference. Queensland. Australia.

## Introduction

Despite the significance of functional impairments for people living with schizophrenia, appropriate evaluation of functioning has been under researched. Recent investigations linking functional outcomes and cognitive impairment have shifted the focus to measures that tap aspects of information processing.

## Method

23 Participants (22 M; 1F) were recruited from two early psychosis programs South West Sydney and Newcastle, Australia, as part of a larger study and rated using the PRPP System. Average number of years of formal education was 11.5 (SD = 2.0)

Inclusion criteria:

Within 2 years of first episode 18 – 25 years of age Reasonable English language skills Absence of major co-morbidity DIP rated *diagnosis:* 

17 paranoid schizophrenia

4 undifferentiated schizophrenia

1 schizoaffective disorder

1 other non-organic psychotic disorder

All were taking atypical neuroleptics

## PRPP Task Selection

For the purposes of the study, a common task was chosen for PRPP Assessment. Shopping for food was selected, as all patients have to go or have been to the shops at some point and participants reported problems with shopping after psychosis. The task was chosen because it involved some complex steps, limiting the chance of any ceiling effects. It could be easily used in both research sites and is an example of a task that occurs in a community environment, allowing assessment of how participant managed unexpected the utilized everyday situations and environmental cues. It was not culturally or gender biased, as the participants were able to select what they would normally need for eating.

Participants were then asked to perform the task. Specific instructions were provided regarding retaining receipts, and entering each shop only once. Once en route, participants were also asked to purchase a stamp. The assessment was well tolerated by all participants.

#### Results

Non-parametric and descriptive statistics were used to investigate relationships among the data collected.

**Stage One Analysis** - PRPP Total scores of Stage One above 80% generally indicates performance that enables safe, independent completion of all steps of the task. The results suggest this participant sample performed approximately 1 SD below a safe performance level. The most common error type in Stage One was errors of accuracy (M= 6.0, S.D = 3.0), followed by errors of timing (M = 5.6, S.D = 3.7), omission (M = 4.0, S.D = 2.7) and repetition (M = 3.1, S.D = 1.9).

**Stage Two Analysis** indicated the type of processing errors observed during task performance. The PRPP Total Stage Two performance score correlated with both the Recall ( $rs = .879^{**}$ , p < .001) and Plan ( $rs = .598^{**}$ , p = .003), suggesting that in this population, total performance is made up primarily of errors in planning and memory.

Correlational analysis among quadrants indicated significant relationship between Plan and Perceive (r = .686, p < .001), Plan and Recall (r = .666, p = .001) and Plan and Perform (r = .559, p = .006) Quadrants, suggesting that Planning is related to each aspect of task performance.

#### Conclusion

This exploratory data suggest that:

- Young people who present with first onset schizophrenia are likely to experience cognitive deficits that impact on their everyday performance.
- The absence of symptoms does not guarantee the absence of processing errors.
- Complex and open tasks are most likely to show cognitive deficits.
- Difficulties with planning accounts for many errors in performance.
- The PRPP is feasible for use in schizophrenia and may meaningfully gauge the impact of cognition on daily function.

## <u>The relationship between dimensions</u> <u>of insight, positive and negative</u> <u>symptoms in schizophrenia and</u> <u>information processing capacity</u> <u>during an everyday shopping task.</u>

Chapparo, C., Still, M., & Beltran, R. (2008). Abstract. OT Australia Federal Congress, Melbourne, September.

**Background:** It has been reported that lack of insight is significantly associated with cognitive disturbance, psychopathology and functional outcomes in schizophrenia. This exploratory study used a descriptive, cross correlation design to examine the relationship between dimensions of insight, positive and negative symptoms and information processing capacity during an everyday shopping task.

**Methods:** 23 young adults with first onset schizophrenia, and schizoaffective disorder

were rated on a functional measure of task embedded cognition (the Perceive, Recall, Plan and Perform (PRPP) System of Task Analysis), the Scale for the Assessment of Positive Symptoms (SAPS), the Scale for the Assessment of Negative Symptoms (SANS) and the Schedule for Assessing Insight-Extended (SAI-E). **Results:** Deficits ranging from mild to severe were found in all measures used. Results suggest that neurocognitive function during task performance is significantly related to clinical measures of schizophrenic psychopathology and insight in this first episode group. This suggests that therapists be aware of the need to assess cognition in early onset of the disorder and develop cognitively mediated strategies to enhance both occupational coherence and insight during everyday task performance.

#### AUTISM

## <u>Development of the PRPP Teacher</u> Questionnaire for Children with Autism

Lohri, J. (2005). Information processing and sensory processing abilities of young children with ASD. Unpublished Honours Thesis. Available from The School of Occupation and Leisure Sciences, The University of Sydney, NSW. Australia. (Supervisor, C. Chapparo)

Occupational therapists are interested in how perform school children occupations. Specifically, as modes of intervention become consultant and school based, rather than clinic based for children with learning and developmental disorders, the opinion of teachers is sought to assist in the assessment process. The PRPP Teacher Questionnaire was developed to obtain data about teacher's perceptions of children's ability to process information relative to school tasks that are considered important by them, their parents and their teachers. This abstract summarises a pilot study that established preliminary test-retest reliability for the instrument.

Five stages were involved in development of the instrument.

#### Stage One: Literature Review and PRPP Training

The first stage of creating the PRPP Teacher Questionnaire involved study of the existing PRPP System of Task Analysis tools, their structure and mechanics. An example of one such tool that applied to this study is the PRPP Rating Scales (Parent and Teacher) (Fordham, 2001). In addition, the researcher completed instrument training at a graduate level in the use of the parent tool, the PRPP System of Task Analysis and was deemed to have established reliable use in the terms and constructs as well as the scoring system (Chapparo & Ranka, 2004).

In addition to reviewing the PRPP System and associated instruments, the general abilities of children in a school context were studied. Since this instrument was developed specifically for use with children who have problems with learning (learning disabilities, ASD), meetings were arranged with delected children with learning problems, their parents, carers and teachers. Through these resources, information was gathered about the expectations of teachers, parents and carers, some of the typical occupational performance abilities the children were required to perform in class, as well as the types of assessments that would be the most useful for the assessment of information processing.

## Stage Two: Creating the Questions

Once the background research was completed, an initial list of 80 possible questions was developed by converting each PRPP descriptor into a question that was relevant to children with learning disabilities in primary (grade) school. Out of these 80 initial questions, 34 were chosen for the final questionnaire. The questions that remained were judge by one of the developers of the PRPP System of Task Analysis (Chapparo, 2004, personal communication) to be the best examples of the target descriptor, based on:

- The extent to which each question reflected the original PRPP descriptor
- Ease of understanding by people who are not trained in its use, such as teachers
- Brevity
- Application to school context.

## Stage Three: Scoring

Once the format of the questions was finalized, scoring criteria were developed. A five point rating scale was used to:

- Increase the accuracy of the PRPP System by providing a larger variety of possible performance indicators
- Formulate a scoring system that coincided with the five point scale obtained on other measures commonly used with the instrument (e.g. The Sensory Profile)
- Overcome reported difficulties in statistical analysis of the 3/2/1 scale of the parent tool (Bryman & Cramer, 1997).

The scoring of the questionnaire ranged form a score of 1 which indicates that the child 'very seldom' performs the target behaviour (e.g. concentrate without being distracted long enough to do the task), to the highest score of 5, indicating that the child 'almost always' performs this behaviour when needed.

## Stage Four: Instructions

The final stage of development prior to completing the pilot study on this questionnaire was to write a comprehensive yet simple explanation of how to complete the questionnaire. This information was written to ensure that the questionnaires were completed in the same manner by all teachers. In addition to instructions for scoring, a section was created requiring teachers to list five tasks against which *PRPP Research Development: 2013*  performance was rated. This was included to ensure that the questionnaire was completed in the manner expected of a criterion referenced assessment, dealing with particular criterion for particular contexts, rather than judgment of abilities in general.

## Stage Five: Pilot Study

The instrument was trialled on a small sample population of ten teachers. The objective of the pilot was to measure testretest reliability. This type of reliability is the most common indicator questionnaire reliability (Litwin, 1995). For the purpose of this study, teachers from Specific School Program (SSP) classes in the Sydney area completed the questionnaire two times, a fortnight apart. The target sample was children with ASD.

## Results

Mean scores of the children were calculated for Test One and Test Two. These scores were then placed into a category of 'acceptable performance' (31-45 Recall and 28-40 Perceive and Perform): Plan: 'probably difficulty' (24-30 Recall and Plan; 21-27 Perceive and Perform); and 'definite difficulties' (9-23 Recall and Plan: 8-20 Perceive and Perform). This scale was based on each descriptor question yielding a score of '1' or ' $\hat{2}$ ' (definite difficulty); '3' (probable difficulty), or '4' or **'**5' (acceptable performance).

All the total quadrant scores except for 'Recall' fell into the same category in Test One and Test Two (See Table 1).

Quadrants	Test	Test	Test 1	Test 1
	1	2	Category	Category
Perceive	24.83	25.17	Probable	Probably
			difficulty	difficulty
Recall	32.17	28.67	Acceptable	Probable
			_	difficulty
Plan	23	22.17	Definite	Definite
			Difficulty	Difficulty
Perform	19.17	18.67	Definite	Definite
			Difficulty	Difficulty

#### Table 1: Test Retest Quadrant Raw Scores and Categories

All but the 'Control' sub quadrant scores fell into the same category in Test One and Test Two (See Table 2). Although the Recall and Control scores fell into different scoring categories between tests one and two, the difference was minimal, as both mean scores were on the fringe of each category.

Sub	Test	Test	Test 1	Test 1
Quadrants	1	2	Category	Category
Attending	8.33	9.33	Prob.	Prob.
_			difficulty	difficulty
Sensing	9.17	9.5	Prob.	Prob.
			difficulty	difficulty
Discriminating	6.83	6.33	Def.	Def.
_			difficulty	difficulty
Remember	10.67	8.83	Def.	Def.
facts			difficulty	difficulty
Remember	10.67	9.5	Prob.	Prob.
scheme			difficulty	Difficulty
Remember	10.83	10.33	Prob.	Prob.
steps			difficulty	Difficulty
Mapping	7.83	7.33	Def.	Def.
response			difficulty	difficulty
Programming	8.17	8	Prob.	Prob.
			difficulty	Difficulty
Evaluating	7	6.83	Def.	Def.
			difficulty	difficulty
Initiating	4.17	4.83	Def.	Def.
_			difficulty	difficulty
Continuing	6.67	6.33	Def.	Def.
			difficulty	difficulty
Controlling	8.33	7.5	Prob.	Def.
			difficulty	difficulty

## Table 2: Test Retest SubQuadrant Raw Scores and Categories

Intraclass correlational techniques were used to measure the relationship between Tests One and Two. Intraclass correlation was considered the most reliable test to measure the test-retest reliability for this pilot study. An intraclass correlation above 0.75 indicates good reliability (Portney & Watkins, 2000). Table 3 shows the results of this analysis for the total quadrant scores.

Quadrants	ICC	Lower CI	Upper CI
Perceive	0.89	0.41	0.96
Recall	0.87	0.38	0.98
Plan	0.97	0.84	0.99
Perform	0.96	0.76	0.99

 Table 3: PRPP Teacher Questionnaire Quadrant

 Intraclass Correlation (ICC) showing the lower 95%

#### confidence intercal and the upper 95% confidence interval for test-retest reliability

Out of the four PRPP Quadrants, all were whoen to have significantly high ICC scores indicating the stability of the total quadrant score on the Teacher Questionnaire. The PRPP Subquadrants scores were also found to be stable, except for discriminating (Perceive) and initiating (Perform), as shown in Table 4, which achieved moderate reliability.

SubQuadrants	ICC	Lower	Upper
		CI	CI
Attending	0.84	0.31	0.98
Sensing	0.94	0.65	0.99
Discriminating	0.64	-0.23	0.94
Remember facts	0.81	0.08	0.97
Remember scheme	0.81	0.23	0.97
Remember steps	0.91	0.56	0.99
Mapping response	0.85	0.31	0.98
Programming	0.99	0.91	0.99
Evaluating	0.96	0.77	0.99
Initiating	0.74	0.08	0.96
Continuing	0.96	0.77	0.99
Controlling	0.93	0.31	0.99

Table 4: Intraclass correlation coefficient (ICC), the lower 95% confidence interval and upper 95% confidence interval for test-retest reliability of the PRPP Teacher Questionnaire Subquadrant scores

#### **Summary**

This article describes the process used to develop the PRPP Teacher Questionnaire for use with children with learning and developmental difficulties such as ASD. A pilot study gathered data from 10 teachers of children with ASD who assessed their primary school students two weeks apart using the PRPP Teacher Ouestionnaire. Results of analysis using intraclass correlation coefficient indicated the total quadrant and subquadrant scores to be a stable measure of information processing. Further research is required on larger samples of teachers and children to further confirm its reliability.

## <u>Sensory and Information Processing of</u> <u>Children with ASD at School</u>

Lohri, J., & Chapparo, C. (2005). Assessing sensory processing and praxis in children with ASD. *Book of Abstracts: Skills for Kids OT Australia Paediatric Conference*, p.57, Melbourne, Australia.

#### Background

Autism Spectrum Disorder (ASD) is a neurobiological disorder identified by three diagnostic markers: impairment in social interaction and communication, and a restricted, stereotypic mode of behaviour (APA, 1994). Although poor processing and regulation of sensory input is a primary source of behavioural disturbance of young children with ASD (Walting, Deitz & White, 2001), little is known about its impact on cognitive and motor abilities, except that it disrupts home and classroom performance.

#### Purpose

The purpose of this non-experimental, exploratory study was to examine the sensory and information processing abilities of young children with ASD within the context of school performance.

#### **Participants**

30 primary school children with formal diagnosis of ASD (m=25, f=4: mn age = 6.4 years).

#### **Research Question 1**

What are the in-class sensory processing abilities of young children with ASD in comparison to typical children?

#### Instrument

Short Sensory Profile (SSP) (Dunn, 1999) judgement А reliable, based caregiver/teacher questionnaire, rating the frequency of four behavioural response typologies that are thought to relate to a sensory threshold across seven sensory processing domains, indicating hypersensitivity ("Sensory input to Sensitivity" and "Sensory Avoidance" behaviours) hyposensitivity ("Poor or

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*Registration*" and "*Sensation Seeking*" behaviours) (See Figure 1).

Teachers rated children with ASD relative to their usual classroom performance on the SSP items. Scores were computed for each sensory processing domain and assigned a category of "definite difference", "probably difference" or "typical performance" when compared to normative data.

#### Results

• A significant majority of children was judged by their teacher as demonstrating sensory processing that was different from typical children in the first four domains of sensory processing listed in the following table and typical performance in the last three.

Underresponsive/Seeks sensation
Taste/Smell Sensitivity
Auditory Filtering
Tactile Sensitivity
Low Energy/Weak
Movement Sensitivity
Visual/Auditory Sensitivity

Table 1: Teacher judgements of sensory processing difficulties in children with ASD across 7 sensory processing domains in rank order

• Children with ASD demonstrated both underresponsivity and hyperresponsivity in different sensory systems

#### **Research Question 2**

What are the in-class information processing abilities of young children with ASD in comparison to criterion performance?

#### Instrument

<u>Perceive, Recall, Plan and Perform System</u> <u>of Task Analysis (PRPP)Teacher</u> <u>Questionnaire</u> (Chapparo & Ranka, 2003) A reliable criterion referenced assessment whereby teachers rate the effectiveness of 34 observable information processing behaviours during task performance across four processing domains: attention and sensory perception; recall; planning and controlling motor performance, and twelve related subcategories. Scores were computed as "definite difficulty", "probable difficulty" or "acceptable performance" for each processing domain and subcategory.

## Results

• A significant majority of the children found 'Plan' behaviours the most difficult (see shaded subcategories in the following table)

• Teachers judged 'Recall' of known classroom routines (procedures and facts) as the most effective information processing abilities, except when behaviour had to be contextualised in time and place (Task Scheme)

PRPP Subcategory
Continuation (effort)
Action Map (outcome plan)
Initiation (starting/stopping)
Evaluation (self assessment)
Tactics (planning how to do)
Task Scheme (knowing when/where/how
Attention
Control (timing actions)
Image Formation (sensory perception)
Task Procedures (remembering routines)
Image Discrimination (sensory)
Classification (knowing facts)

Table 2: The 12 information processing subcategories of the PRPP System in ranked order of difficulty as judged by teachers

## **Research Question 3**

What is the relationship between sensory processing and information processing abilities in children with ASD during classroom activities?

Using the data generated by the SSP and the PRPP Teacher Questionnaire, intercorrelations among the subsections of the two measures indicated relationships between underresponsiveness to sensory input and difficulties with attention, PRPP Research Development: 2013 planning and task persistence, as indicated in the table below. Sensory sensitivities noted previously were not linked to difficulties in information processing for planning.

PRPP measures, mapping or planning responses and attention, were linked to auditory filtering on the SSP, probably indicating the need for sufficient language to follow commands and focus attention in order to plan.

PRPP	SSP
Mapping response (planning)	Underresponsive/ seeks sensation
Attention (On task focus)	Underresponsive/ seeks sensation
Continuation (task persistence)	Underresponsive/ seeks sensation
Self Evaluation	Underresponsive/ seeks sensation
Attention (task focus)	Auditory Filtering
Mapping response (planning)	Auditory Filtering

 Table 3: Relationships between subquadrants on PRPP

 Teacher Quesionnaire and sections of the Short Sensory

 Profile.

## Summary

A significant majority of children in this sample had sensory processing that was different from typical children in four domains of sensory processing and similar to typical performance in three. Α significant majority of the children found 'Plan' behaviours the most difficult information processing during class tasks. 'Recall' of known classroom routines was the most effective information processing ability during class tasks, except when behaviour had to be contextualised in time and place. There is a stronger link between underresponsivity to sensory input and selected information processing strategies, between hypersensitivities than and information processing.

## <u>Classroom Based Sensory Diets for</u> <u>Children with Autism Spectrum</u> <u>Disorders (ASD): A pilot study using</u> single system design

Mills, C., & Chapparo, C. (2013). Published Abstract: Occupational Therapy Australia, 25<sup>th</sup> National Conference and Exhibition, July. *Australian Occupational Therapy Journal*, 60, Supplement 1, p.34-35.

**Introduction:** Although research indicates the presence of sensory processing difficulties in children with ASD, limited evidence supports use of sensory based interventions to improve school function. Use of a sensory diet may allow children to meet their sensory needs throughout the day and support their participation in class activities.

**Objectives:** The purpose of this study was to determine whether sensory diets are effective in supporting participation in classroom task and reducing challenging behaviours in school children with ASD.

Method: This study used a single system AB design involving six children with ASD who attended an autism specific special school. Children with sensory processing difficulties which negatively affected their school performance were selected. A baseline was determined for each child before the commencement of sensory diet intervention. Data were collected using video recording and behaviour scatter plots to measure instances and severity of challenging behaviour over multiple time points. Challenging behaviour addressed was pre-determined by the child's teacher and family. The Perceive, Recall, Plan, Perform (PRPP) system of task analysis was used to measure the level of children's participation during class activities.

**Results:** Preliminary results indicated sensory diets used by teachers in the classroom under the guidance of an occupational therapist supported children's task performance and task-embedded

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cognitive processing such as attention, as measured by the PRPP System of Task Analysis.

**Conclusion:** This study contributed to the evidence base for sensory diet intervention for children with ASD and adds to the practice knowledge of professionals working in this area of practice.

## SOCIAL BEHAVIOUR: CHILDREN

## Information Processing and Social Competence

Wight, M., & Chapparo, C. (2005). Impact of information processing on social competence. *OT Australia: Skills for Kids Paediatric Conference Book of Abstracts, p.42.* Melbourne, October. Wight, M. (2005). *Information processing and social competence.* Unpublished Honours Thesis. Available from School of Occupation and Leisure Sciences, The University of Sydney, NSW, Australia. (Supervisor C. Chapparo).

Children with learning difficulties are reported to be vulnerable to deficits in social competence. However, there is little data to indicate which social skills are problematic for this population (Karvale and Forness 1996; Gresham & Elliott, 1989). Social competence has been linked to efficiency in information processing, but there has been little research exploring the nature of this relationship. Although models of occupational performance place social tasks in a position of prominence for children, research exploring social competence in children with learning difficulties during occupational performance is negligible.

This study used the Perceive Recall Plan Perform (PRPP) System of Task Analysis (Teacher Questionnaire) and a Teacher Social Skills Rating Scale to assess the information processing abilities of 22 primary school aged children with learning difficulties during age expected social performance tasks in the school context, compared to a control group. This was a pilot study that used descriptive statistics to describe children's information processing performance on five expected social tasks as measured the PRPP Teacher bv Ouestionnaire. Children's social competence was also evaluated by the Teacher Skillstreaming Checklist. The outcome of this study is a quantitative description of the specific information processing components that are closely linked to social competence for this sample. The study was organised around three research questions.

## Participants

A convenience sample of 22 male children with learning difficulties and 22 comparison children were selected for this study. Children with learning disabilities who participated were aged between 5 and 11 years of age, identified as having a learning difficulty by their teachers in the classroom and social difficulties as indicated by their respective classroom teachers. Children in the comparison group were matched for age, gender, lack of learning disability and school class placement.

#### **Research Question 1**

Is there a difference in performance on measures of social competence between children with learning difficulties and their typical peers as measured by teachers?

#### Instruments

The Teacher Skillstreaming Checklist (McGinnis & Goldstein, 1997) is part of a social skills training approach used by teachers. The theoretical roots of Skillstreaming are entrenched in Bandura's social learning theory (Bandura, 1977). It is a 60 item checklist which assesses difficulty with social skill at school. The teacher rates social abilities using a list of 60 skills categorized into five sub scales: classroom survival skills, friendship-making skills, skills for dealing with feelings, skill alternatives to aggression and skills for dealing with stress. Examples of classroom survival skills include 'asking for help', 'listening', 'beginning a conversation' or 'ignoring distractions'. Ratings on a 1-5

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scale are given for each skill (1 = almost never, 2 = seldom, 3 = sometimes, 4 = often, 5 = almost always).

#### Results

Results of a pointbiserial analysis (Tabachnick & Fidell, 1996). showed that all of the children with learning difficulties performed significantly poorer than their comparison peers. The findings indicated that there was a strong relationship between each social competence subscale and the type of participant ranging from 72% to 85%. The significance levels and strength of relationship for each subscale are noted in the below table.

Teacher Skillsstreaming Checklist Sub	Correlation Coefficient	P value
Classroom	0.85	<0.001
Survival Skills	0.85	<0.001
Skill Alternatives	0.79	< 0.001
to Aggression		
Friendship	0.79	< 0.001
Making Skills		
Skills for Dealing	0.78	< 0.001
with Stress		
Skills Related to	0.72	< 0.001
Feelings		

N.B. Significant p value is set at 0.05

Table 1: Correlations between type of participant and subscales on the Teacher Skillstreaming Checklist

#### **Research Question 2**

Is there a difference between children with learning difficulties and typical peers on teacher's measures of information processing ability during social tasks?

## Instruments

The Perceive, Recall, Plan and Perform (PRPP) System of Task Analysis is an occupation centered assessment that was derived from the Occupational Performance Model (Australia) (Chapparo & Ranka, 1997a). This model examines the cognitive component of occupational performance of

everyday routines, tasks and subtasks (Chapparo & Ranka, 1997b).

This study used The PRPP System of Task Analysis Teacher Ouestionnaire, which was developed out of the PRPP System of Task Analysis as a means of allowing children's teachers to evaluate cognitive component performance during everyday tasks in a quick and easy manner. The PRPP Teacher Questionnaire is a criterion-referenced assessment where real-world task performance is measured against what is expected of children in their specific contexts. All of the questions within the PRPP Teacher Questionnaire were answered relative to 5 specific social tasks nominated by the teachers. The tasks chosen by the teacher were specific social tasks that the teacher expected that particular child to be able to perform in the school environment. For example, one teacher nominated the social tasks important to one child as being able to:

- Actively listen for instructions for social tasks
- Work as part of a group on a school project
- Share equipment with others
- Maintain friendships
- Listen to peers and respond appropriately during conversation

Errors in performance in the questionnaire were indicated through a 1-5 rating scale of performance (1 = very seldom, 2 = seldom, 3 = sometimes, 4 = usually and 5 = almost always).

#### Results

A pointbiserial correlational analysis was used to test the difference in performance between the children with learning difficulties and their comparison peers on the 4 information processing subscales of the PRPP Teacher Questionnaire, and the 12 PRPP subquadrants. Results indicated that there was a strong relationship between each information processing subscale and the type of participant (learning difficulty present or comparison child) ranging from 75% to 86%. The significance levels and strength of relationship for each subscale are noted in the table below.

PRPP Quadrant Sub Scales	Correlation Coefficient	P value
Perform	0.86	< 0.001
Plan	0.83	< 0.001
Recall	0.80	< 0.001
Perceive	0.75	< 0.001

N.B. Significant p value is set at 0.05

#### Table 2: Correlations between type of participant and subscales on the PRPP Teacher Questionnaire

Further pointbiserial analysis was conducted to investigate the 12 sub sections within each of the information processing quadrants. These results identified which subsection was contributing most to the significant correlations between type of participant and information processing quadrant performance. Results are noted in the table below.

PRPP Subquadrant	Correlation	Р
Subscale	Coefficient	value
Perceive		
Attention	0.76	< 0.001
Sensing	0.67	< 0.001
Discriminating	0.77	< 0.001
Recall		
Remembers facts	0.76	< 0.001
Remembers scheme	0.74	< 0.001
Remembers	0.81	< 0.001
Procedures		
Plan		
Mapping	0.83	< 0.001
Programming	0.83	< 0.001
Evaluating	0.78	< 0.001
Perform		
Initiating	0.79	< 0.001
Continuing	0.85	< 0.001
Controlling	0.84	< 0.001

N.B. Significant p value is set at 0.05

Table 3: Correlations between type of participant and subsections within each of the quadrants within the PRPP Teacher Questionnaire

#### **Research Question 3**

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## What is the relationship between information processing and social competence abilities during task performance at school?

The data obtained from the Skills streaming Checklist and PRPP Teacher Questionnaire was used for this part of the study.

## Results

A hierarchical multiple regression analysis was performed to determine whether the information processing subscales could predict social competence. The four information processing quadrant subscales (Perceive, Recall, Plan and Perform) were used together in a regression equation to predict each of the 5 social competence dependent variables (Classroom survival skills, Friendship-making skills, Skills for dealing with feelings, Skill alternatives to aggression and Skills for dealing with stress). Results indicated that all four subscales predicted social competence.

The combination of the 4 information processing subscales in the regression equation caused multicolinearity due to the high correlation between each information processing subscale. The highest rated information processing predictor variable, Recall, was therefore used in the regression analysis to predict social competence. Results were that Recall (which could be substituted for any of the information processing variables) was able to accurately predict each of the social competence subscales including Stress Skills, Friendship Making Skills, Skills Alternatives to Aggression Classroom Survival Skills and The following table Feeling Skills. summarizes the findings of each of the 5 regression equations listed from most to least accuracy of prediction.

Dependent Variable	R Square value	p value (Sig.)	Mahal Distance Min.	Mahal Distance Max.	pı pe pı
Stress Skills	0.79	< 0.001	0.896	8.908	in
Friendship	0.77	< 0.001	0.896	8.908	co
Making					

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Skills				
Alternatives	0.76	< 0.001	0.896	8.908
to				
Aggression				
Classroom	0.74	< 0.001	0.896	8.908
Survival				
Skills				
Feeling	0.72	< 0.001	0.896	8.908
Skills				

Predictor: (Constant), Recall

#### Table 4: Regression between Recall information processing predictor and each social competence subscale (dependent variable)

In a subsequent analysis, the type of participant variable (whether the participant has a learning difficult or not) was added into the equation and found to significantly impact the predictive ability of the information processing variables on social competence scores. The following table summarizes the findings of each of the 5 regression equations incorporating the effect of adding the predictor of type of participant into the Recall prediction equations:

Dependent	R Square	p value
Variable	value	(Sig.)
Classroom	0.815	< 0.001
Survival Skills		
Friendship	0.791	< 0.001
Making Skills		
Feeling Skills	0.724	< 0.001
Alternatives to	0.786	< 0.001
Aggression		
Stress Skills	0.805	< 0.001

Predictors: (Constant), (Recall Sum) Type of Participant

#### Table 5: Regression indicating if type of participant predictor had any influence on Recall predictions of each social competence subscale (dependent variable)

#### Summary

There appears to be a significant relationship between information processing abilities of children with learning difficulties and their oficiency in all areas of social erformance. These findings support reviously reported links between formation processing social and ompetence (Crick and Dodge, 1994) where

specific information processing components have been more successful in predicting children's social adjustment than global constructs. This pilot study highlights the assessing of children's importance abilities information processing when problems in social competence are present. occupational therapy Implications for practice are that difficulties in social competence may be treated more effectively using information processing instructional strategies. Further study is required in this area

## LEARNING DIFFICULTIES: CHILDREN

## Assessing information processing deficits in children: The PRPP System of Task Analysis

Pulis, J., & Chapparo, C. (2002). Assessing information processing deficits in children: The PRPP and the PEEX. *Action for Health in a New Millenium, Abstract Book (CD).* 13<sup>th</sup> World Congress of Occupational Therapists, Stockholm, Sweden. June.

Pulis, J. (2002). Assessing information processing deficits in children: The PRPP System of Task Analysis. Unpublished Honours Thesis. Available from The School of Occupation and Leisure Sciences, The University of Sydney, Australia. (Supervisor, C. Chapparo)

Helping children become better processors of information is an important educational and therapeutic goal (Swanson, 1987). This goal arises from the growing awareness of information processing problems that exist in children with learning difficulties and the impact these have at school and at home. There is limited research in occupational therapy literature that describes the type of information processing problems occurring in children with learning difficulties or how these problems impact on task performance. This pilot study aimed to describe the types of information processing difficulties experienced by children with learning difficulties as measured by the PRPP System of Tasks Analysis during the performance of eight school tasks.

A convenience sample of 27 (21=M:6= F) children was selected according to the inclusion criteria set (Kumar, 1997): 6 - 8 years; identified by their school as having a specific learning disability; referred to occupational therapy.

#### Instruments

The PRPP System of Task Analysis (Chapparo & Ranka, 1997) was used to rate children's videotaped performance of eight school tasks: colouring, cutting and pasting, drawing, writing a story, paper folding, tying shoelaces, catching a ball and skipping. These tasks were chosen based on the reasons for referral to therapy and because they were tasks that children of this age range are commonly required to perform at school. The eight school tasks were administered and videotaped in a standard format and order, and in a context using tools that were familiar to the children.

Performance was rated by the primary researchers using standardised PRPP scoring format (1 = definite difficulty; 2 = probable difficulty; 3 = acceptable performance).

The videotapes were used for scoring the children's performances and to check inter rater, and test reliability. The videotapes of 10 children were given to an independent therapist who was experienced in this area of practice and trained in the use of the PRPP System. To check test-retest stability, scores derived by the research raters were compared to a second set of scores generated four weeks apart. These scores, as well as sets of scores from the research raters and the independent rater were compared using a technique based on graph and simple calculation along the x and y axis (Bland & Altman, 1986). Acceptable test-retest and inter rater reliability was obtained.

Analysis of the data obtained was organised around three research questions.

## **Participants**

**Research Question 1** 

## What types of information processing difficulties do children demonstrate during typical school tasks as measured by the PRPP System of Task Analysis

#### Results

A combined total quadrant score (Perceive, Recall, Plan and Perform) for all eight tasks was used to determine whether there was a difference in the children's overall performance between each of the four PRPP quadrants. The Friedman test, followed by a series of Wilcoxon signed ranks test showed that there was a significant difference between scores for all quadrants (p<.01) except Recall and Perceive (p>.01). When the scores for all eight school tasks were combined, a direct ordering of the quadrants was found with Plan emerging as the most problematic quadrant, followed by Perform. Similar analyses were performed on the PRPP Subquadrants. When the children's scores for each of the eight school tasks were combined, it was found that the most problematic PRPP subcategories were Evaluation and Tactics (Plan). Table 2 shows the rank order of problematic subquadrants from most to least.

SUBQUADRANT
Evaluating (Plan)
Programming (Plan)
Remembering Procedures (Recall)
Controlling (Perform)
Mapping (Plan)
Continuing (Perform)
Sensing (Perceive)
Remembering Scheme (Recall)
Attending (Perceive)

 Table 1: Most problematic subcategories in rank order
 (All tasks combined)

A further analysis determined whether there were differences in performance between the PRPP quadrants across each of the school tasks. The results indicated a distinctive ordering of the fours quadrants for each individual school task and that this ordering was different for each task, as shown in the following table.

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TASK	ORDER OF QUADRANT PERFORMANCE (Most disordered to Least	
Colouring	Plan, Recall = Perform, Perceive	
Cutting and Pasting	Plan, Perform, Recall = Perceive	
Drawing	Plan, Recall - Perform, Perceive	
Writing a Story	Plan, Recall = Perceive = Perform	
Folding Paper	Plan, Recall – Perceive = Perform	
Tying a Shoelace	Plan, Perform, Recall, Perceive	
Catching a Ball	Plan, Perform, Perceive, Recall	
Skipping	Plan, Recall = Perceive = Perform	

Table 2: Ordering of Quadrant performance for each	h
school task (Most difficult to Least difficult).	

These findings indicate that when the scores for each of the eight school tasks were combined, Planning was the most difficult for children in this sample. Programming, Evaluating and Remembering Procedures were the most difficult subquadrants. Although this trend was also observed in individual school task scores, it was apparent that different tasks posed different processing difficulties for children.

#### **Research Question 2**

Are there differences between the task performance of 6,7, and 8 year old children as measured by the PRPP System?

The expected criterion for performance on the PRPP descriptors for all children was 100%. Visual analysis of the data indicated that all three groups of children performed lower than the expected criterion on all tasks, indicating difficulties. The task of writing a story was the most bothersome.

A one way ANOVA was used to determine the difference between the three age groups on the eight tasks. Results indicated that there was a difference between 8 year olds and 6/7 year olds on colouring and writing a story (p<0.01), and cutting/pasting, tying a shoelace, and skipping (p<0.05). The limited numbers of children in each group demands that these results are interpreted with caution. However, the results do indicate support for 1) the sensitivity of the PRPP System of Task Analysis to measure age related changes, and 2) that although older children's performance on practiced tasks may improve, children do not 'grow out of' processing difficulties.

## **Research Question 3** Do children demonstrate different information processing strengths and weaknesses on each of the eight school tasks?

Using the data obtained from the PRPP. non-parametric Spearman's correlation was used to explore the strength of the relationships between children's performance across the four PRPP quadrants and twelve subquadrants. The following table indicates the strong relationships that were identified between the quadrants for each task, and additionally shows that the number and type of relationships changed according to the task.

Task	Quadrant	R Value
	Relationship	
Colouring	<b>Recall/Perform</b>	.85
Cutting/pasting	Recall/Plan	.89
Writing a story	<b>Perceive/Perform</b>	.85
Folding paper	Recall/Plan	.89
	Plan/Perform	.86
Tying Shoes	Recall/Plan	.89
	<b>Recall/Perform</b>	.86
	Plan/Perform	.85
Catching Ball	Perceive/Recall	.87
	Perceive/Plan	.86
	Perceive/Perform	.91
	Recall/Plan	.91
	<b>Recall/perform</b>	.89
	Plan/Perform	.91
Skipping	Perceive/Recall	.89
	Perceive/Plan	.91
	<b>Perceive/Perform</b>	1.00
	Recall/Plan	.88
	<b>Recall/Perform</b>	.89
	Plan/Perform	.91

**Table 3: Strong Relationships Between Quadrants** 

This data offers preliminary empirical support for the central processing arrows in the central PRPP model which depict the relationship between quadrants. In addition,

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the data suggests a further theoretical arrow between Perceive and Plan, particularly for complicated motor activity such as skipping and catching a ball. The relationship between Perceive and Plan in these two tasks probably reflects the need for sensory input to program motor activity and to evaluate results of motor actions.

#### **Summarv**

The limitations of the study were associated with the sample being convenience rather than random, small and containing a high percentage (77%) of males. Care should be taken when making generalisations from the study. However, the study demonstrated the sensitivity of the PRPP System of Task Analysis to differences in age performance in children with learning difficulties. Information processing difficulties were found in all quadrants across eight commonly performed school tasks in the sample, with planning operations the most vulnerable to disorder. The results indicated that the majority of this sample had difficulty with organisation, sequencing and choosing performance operations, and in evaluating their own performance. The study highlighted the importance of using a variety of school tasks during assessment of information processing in children with learning disabilities. No two tasks identified the same pattern of processing disorder.

## Perceive, Recall, Plan and Perform (PRPP) Rating Scales (Parent and **Teacher): Preliminary Reliability and** Validity

Fordham, M. (2001). Perceive, Recall, Plan and Perform (PRPP) Rating Scales (Parent and Teacher): Preliminary Reliability and Validity. Unpublished Honours Thesis. Available from the School of Occupation and Leisure Sciences, The University of Sydney, NSW, Australia (Supervisor, C. Chapparo).

Fordham, M., Chapparo, C. (2002). Information processing rating scales (Parent and Teacher): Reliability and validity. Action for Health in a New Millenium, Abstract Book (CD). 13th World Congress of Occupational Therapists, Stockholm, Sweden. June.

One framework for describing the cognitive performance deficits of children with

learning disabilities is information processing theory (Swanson, 1987). The PRPP System of Task Analysis is an assessment that employs task analysis methods to determine problems with cognitive information processing function during task performance. The PRPP Rating Scales (Parent and Teacher) (Lowe & Chapparo, 2000) have been developed from this tool to allow therapists to obtain parent and teacher perceptions of cognitive aspects of children's performance. Parent and teacher scales have long been used occupational therapists to assess children's performance and to establish the need and focus of intervention in an ecological way. However, very few rating scales have wellpsychometric established properties (Swanson, 1991). This study aimed to the preliminary reliability establish parameters of the PRPP Rating Scales (Parent and Teacher) through two research questions.

## **Research Question 1**

What are parent's and teacher's perceptions of the information processing deficits of primary school children with learning disabilities, as measured by the PRPP Rating Scales (Parent and Teacher)?

#### Instrument

The PRPP Rating Scales (Parent) is a questionnaire consisting of 69 items comprising seven subscales that covered both occupational performance tasks (personal care, gross motor, fine motor), and information processing (Perceive, Recall, Plan, Perform). The PRPP Rating Scale (Teacher) is a 72 item version comprising the same subscales with additional items in the Plan and Fine Motor subscales. Both scales required parents and teachers to rate items according to a '3' (no difficulty), '2' (questionable difficulty) or '1' (definite difficulty) scale. The rating scales contained written instructions and were completed by parents and teachers without additional education from therapists.

#### Sample

Secondary data on 59 children that had been referred to occupational therapy in the Sydney area was collected from therapists in private practice who had used the PRPP Rating Scales (Parent and Teacher) as a routine part of assessment prior to intervention. The children were aged from 6 to 11 years and enrolled in regular grade schools.

#### Results

A large percentage of children were identified by their parents as having difficulty with occupational performance tasks, as shown in Table 1.

Occupational Performance Skill	Percentage of children with difficulty
Shoelaces	43.9
Puzzles	40.5
Colouring	56.8
Drawing	56.8
Cutting	54.5
Pasting	56.7
Handwriting legibility	94.2
Handwriting speed	53.7

## Table 1: Difficulty with occupational performance tasks (Parents)

Parent's perceptions of their children's difficulty with information processing are listed in Table 2.

Information Processing Behaviours	Percentage of children with difficulty	
Perseverance with difficult	62.5	
tasks		
Stay focussed to finish	53.7	
Finish a task without help	52.6	
Shift attention	42	
Focus regardless of	55/8	
motivation		
Attend to detail	40.5	
React appropriately to	48.3	
distractions		
Follow instructions	51	
Think before doing	50	
Get ready	42/2	
Use strategies to do a task	41.8	
Choose the best strategy	50	

Prepare for the next task	46.8
Plan a sequence of small	54.8
steps	
Question if there is a better	52.6
way	
Complete tasks in time	75.6

 

 Table 2: Difficult Information Processing Behaviours (PRPP Rating Scale Parents)

Teachers' rating of the children's occupational performance at school resulted in a list of tasks that they considered most bothersome based on the PRPP Rating Scale (Teacher) (Table 3).

Occupational Performance Skill	Percentage of children with difficulty
Ball skills	51.4
Skipping	41.2
Balance	44.8
Coordination	57.6
Colouring	67.3
Drawing	69.4
Cutting	56.5
Folding paper	41.7
Handwriting legibility	56.1
Using ruler	60
Handwriting speed	67.9
Copying	61.4

## Table 3: Difficulty with occupational performance tasks (Teachers)

Similarly, teachers generated a list of what they perceived to be the most bothersome information processing behaviours to children based on their observation of task performance at school. Percentages of the children who were perceived to experience difficulty and the tasks are listed in Table 4.

Information Processing Behaviours	Percentage of children with difficulty
Persisting with difficult tasks	42.3
Staying focused	50
Finishing a task	48.1
Saying alert	44.2
Trying hard (effort)	40.4
Focus on important details	49
Focus regardless of	52.1
motivation	
Attend to detail	51.5
Manage distractions	41.1
Think before doing	55.1
Get ready for tasks	46.9
Choose best strategy	52.6

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Prepare for next task	52	
Plan a sequence of small	51	
steps		
Identify obstacles to task	55.6	
Assess task performance	57.9	
Question better/different	65.7	
ways		
Complete task in time	50	
Keep worksheets in order	42.9	

 Table 4: Difficult Information Processing Behaviours

 (PRPP Rating Scale Teachers)

# Correspondence between teacher and parent raters

While there are a small number of different items on the Parent and Teacher Scales, the majority of items appear on both scales. Scores of identical items on the scales were correlated to determine the degree of correspondence between parent and teacher raters. The results are listed below.

PRPP Rating Scale Item	ICC	p value
Clothes	0.65	0.001
Shoelaces	0.64	0.000
Jumping	0.44	0.012
Handwriting speed	0.38	0.004
Cooperation	0.40	0.001
Willingness to attempt tasks	0.61	0.001
Actively listen	0.32	0.020
Listen to all instruction	0.44	0.006
Stay focused to finish task	0.35	0.005
Finish task without help	0.31	0.012
Try hard: effort	0.28	0.017
Shift attention when required	0.39	0.003
Focus on important detail	0.30	0.011
Attend to detail	0.38	0.016
Understand goal of task	0.35	0.023
Plan a sequence of small steps	0.36	0.012

#### Table 5: Correspondence between parents and teachers on PRPP Scale items

Of 59 similar items, there was significant agreement between parents and teachers on only 16. This may have been because it is difficult to achieve a high correlation between raters when ratings are based on a three point scale (Polgar & Thomas, 1998), or that parents and teachers view children doing different tasks and have different criteria about expected performance. Of more importance is that the items listed in Table 5 may be central to occupational performance required for school and home contexts.

There was, however, general agreement between parent and teacher scores for each subscale, with the exception of the subscale, 'gross motor', indicating that in general terms, parents and teachers were in agreement with not only the problem area, but the severity of difficulty experienced by children (Figure 1).



Figure 1: Correspondence between parent and teacher raters on the PRPP Subscales

## **Research Question 2**

Can the PRPP Rating Scales (Parent and Teacher) reliably measure information processing deficits in primary school children with learning disabilities?

## Internal Consistency:

The Cronbach Alpha measure was employed to determine the internal consistency of the parent and teacher versions of the PRPP Rating Scales. Internal consistency is the extent to which results on the different items of a test correlate with one another (Polgar et al, 1999). An internal consistency result of 0.8 or higher is considered sound. Results of this analysis should be viewed cautiously due to the small sample size used to obtain internal consistency results (Parent: N = 22, Teacher N = 12). Internal consistency results for each subscale area are listed below in Tables 6 (Parent) and 7 (Teacher).

Subscale	Chronbach Alpha	
Personal care	0.722	
Gross Motor	0.692	
Fine Motor	0.727	
Perceive	0.861	
Recall	0.890	
Plan	0.874	
Perform	0.616	
TOTAL SCORE	0.914	

Table 6: Internal Consistency of PRPP Rating Scale (Parent): Subscales and Total Score

The personal care subscale was not included in the teacher ratings in this analysis because most of the small number of items were found to have zero variance and therefore had to be deleted from the analysis.

Subscale	Chronbach Alpha	
Personal care	-	
Gross Motor	0.697	
Fine Motor	0.755	
Perceive	0.826	
Recall	0.904	
Plan	0.922	
Perform	0.713	
TOTAL SCORE	0.924	

 Table 7: Internal Consistency of PRPP Rating Scale

 (Teacher): Subscales and Total Score

Both Parent and Teacher Rating Scales indicate strong internal consistency.

#### Test-retest reliability

A PRPP Rating Scale was completed on two occasions by a total of twenty two parents and 12 teachers, two weeks apart prior to the commencement of intervention. An intraclass correlation coefficient was employed to analyse the test-retest reliability of the data. Results were obtained for the subscale areas making up the PRPP Rating Scales (Parent and Teacher). The results are provided in the following Tables 8 (Parent) and 9 (Teacher).

PRPP Subscale	ICC	p value
Personal care	0.68	0.000
Gross motor	0.77	< 0.001
Fine motor	0.35	0.044
Perceive	0.75	< 0.001
Recall	0.66	0.000
Plan	0.53	0.004
0.59	0.59	0.001

Table 8: Test-retest reliability PRPP subscales (Pare
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Based on an ICC of +0.7 or above as indicative of good reliability, two of the seven parent subscales achieve sound levels of test-retest reliability, while the others achieve moderate reliability. However, based on a 95% confidence interval (p=0.05), all subscale areas with the exception of 'fine motor' displayed significant levels of test-retest reliability (p<0.05).

PRPP Subscale	ICC	p value
Personal care	-	-
Gross motor	0.87	0.000
Fine motor	0.86	0.000
Perceive	0.72	0.001
Recall	0.87	< 0.001
Plan	0.90	< 0.001
0.59	0.86	< 0.001

#### Table 9: Test-retest reliability PRPP subscales (Teacher)

All six areas (minus personal care) of the PRPP Rating Scale (Teacher) achieved ICC greater than +0.7 indicating sound test-retest reliability.

#### Summary

Statistical analysis of data generated from the PRPP Rating Scales (Parent and Teacher) yielded results about parent and teacher perceptions of the information processing deficits experience by children with learning disabilities during occupational performance. From the perspective of parents, the information processing behaviours involving perception appeared to and planning be most problematic, predominantly affecting fine skills performance. Similarly, motor teachers perceived that perception and planning behaviours were bothersome. **PRPP Research Development: 2013** 

impacting on both fine and gross motor skill. This results offer preliminary support for using information from the PRPP System of Task Analysis in the form of a questionnaire, and that the data obtained is useful for identifying difficulties from the perspective of parents and teachers. The PRPP Rating Scales (Parent and Teacher) therefore offer an additional ecological vehicle for obtaining relevant information to assist intervention.

While a general pattern of agreement was obtained between parent and teachers perceptions of difficulty, the number of individual items in agreement was low. This lack of correspondence between raters on specific behaviours may be attributed to the inexperience of parents in rating their children on specific behaviours that are not usually noted. The findings of this study are generally consistent with other studies concerning correspondence between raters. For example, Sikora and Plapinger (1997) found statistically significant correlations between parent and teacher perceptions of academic performance, but failed to find significant correlations between parent and teacher perceptions of specific processing skills underlying academic performance.

High internal consistency of the subscales indicates that the items making up each of the scales are measuring the same construct. It could be hypothesised that as the PRPP Rating Scales measures both occupational performance skills and information processing behaviours, that there is a strong relationship between the two.

The test-retest reliability of subscale areas making up the PRPP Rating Scales indicates greater stability of teacher perceptions over time. It may be that training and experience of teachers makes them more attentive to the specific information processing behaviours of their students. Parents commented informally that doing the rating the first time made them more conscious of the specific behaviours of their children, therefore impacting on subsequent ratings. The testretest reliability of the parent version of the PRPP Rating Scales may be improved clinically through some parent education before its use.

## Assessing Information Processing in the Context of Pretend Play: A Study of the PRPP System of Task Analysis (PRPP) and the Child Initiated Pretend Play Assessment (ChIPPA)

Boland, K. (2004). Assessing Information Processing in the Context of Pretend Play: A Study of the PRPP System of Task Analysis (PRPP) and the Child Initiated Pretend Play Assessment (ChIPPA. Unpublished Honours Thesis. Available from School of Occupation and Leisure Sciences, The University of Sydney, NSW. Australia. (Supervisor, C. Chapparo).

Increasingly, early identification of learning disability prior to formal schooling is a goal, and the preschool years are a time of increased referral to occupational therapy for assessment and intervention (Stagnitti, Unsworth & Rodger, 2000). Occupational therapy's unique contribution in the assessment of children with learning difficulties is to provide information about the impact of information processing deficits on children's performance of tasks that are personally and contextually important (Cook, 1991). One area of assessment that is contextually relevant to the preschool years is play. Although errors in information processing are thought to lead to impairments in play, there is limited research to describe children's occupational performance difficulties in terms of deficits in information processing during play. This study examined children's performance on a pretend play task when assessed by the Perceive, Recall, Plan and Perform System of Task Analysis (Chapparo & Ranka, 1997), a measure of information processing ability, and the Child Initiated Pretend Play Assessment (ChIPPA) (Stagnitti, 2000, a measure of pretend play. The PRPP and ChIPPA both purport to assess aspects of cognition. A further aim of this study was to compare the two assessments and their PRPP Research Development: 2013

ability to measure a child's performance on the same task. The focus of the

## **Participants**

Videotapes of 19 children aged three and four years doing two play tasks expected by the ChIPPA (Symbolic Play using 'junk' toys and Conventional Play using farm animals and a truck) were used as secondary data for PRPP observation.

10 children (8 M; 2 F) were reported to have difficulties with preschool and were flagged as children with potential learning difficulties, as determined by the ChIPPA, Miller Assessment for Preschoolers, Leiberman's Test of Playfulness and their preschool teacher. 9 (7 M; 2 F) were considered 'typical'.

The researcher and supervisor were blinded to the grouping of the children until the PRPP Observations had been scored.

## Instruments

The PRPP System of Task Analysis (PRPP) was used to rate the information processing ability during the two play tasks according to standard PRPP protocol (Chapparo & Ranka, 1997). A total PRPP score, Perceive score, Recall score and Perform scores were used in this study. Small sample numbers precluded use of subquadrant and descriptor scores in this study.

The Child Initiated Pretend Play Assessment (ChIPPA) is a standardised measure of play that identifies the child's ability to engage in cognitive aspects of play through a semistructured pretend play task. Prior to the commencement of the study, an independent rater had scored the children's performance on the ChIPPA. Three major characteristics of pretend play are scored on the ChIPPA. 1) Percentage of Elaborate Pretend Play Actions (PEPA), which are functional actions that are used in a sequence, theme or context of constructive play (Stagnitti et al, 2000). 2) Number of Object Substitutions (NOS), which is the number of times in play that each object is deliberately substituted for something else (Stagnitti et al, 2000). 3) Numer of imitated actions (NIA), whereby the child copies modelled actions of the examiner.

#### **Research Question 1**

Is there agreement between the ChIPPA and the PRPP in the identification of children with deficits in pretend play?

#### Results

The Kappa coefficient was used to determine the agreement of grouping of children between the two independent measures. This indicates the proportion of agreement after chance has been excluded. The Kappa value of 0.789 (N=19; p=0.01) shows that agreement between the PRPP and the ChIPPA total scores used to identify children with and without dysfunction is substantial.

## **Research Question 2**

Is the PRPP able to predict performance on the ChIPPA?

#### Results

Findings indicated that the PRPP scores were able to predict performance in symbolic play components of the ChIPPA. Specifically, the Perceive Quadrant Score during symbolic play (p=<0.001) and the PRPP Total Score during symbolic (p=<0.001) and conventional play (p=0.002)predicted the amount of elaborate play as measured by the ChIPPA. The Plan Quadrant Score was the best predictor of numbers of object substitutions (p=0.01) as measured by the ChIPPA. These findings underscore the importance of information processing, particularly planning in pretend play.

There was no association between the PRPP Perform Quadrant Score and any of the ChIPPA play component scores (, possibly indicating that motor performance is not a major factor in play.

#### **Research Question 3**

How does children's performance on the PRPP differ between those children with and without pretend plan deficits as determined by the ChIPPA?

#### Results

Findings indicated a significant difference in median performance between typical and dysfunctional groups for the following:

- PRPP Total Score, Perceive Quadrant Score and Plan Quadrant Score during symbolic play tasks
- PRPP Total Score, Recall Quadrant Score and Plan Quadrant Score during play with conventional toys

There was no significant difference in median performance between typical and dysfunctional groups on:

- PRPP Recall Quadrant Score during symbolic play
- PRPP Perceive Quadrant Score during play with conventional toys
- PRPP Perform Quadrant Scores during either symbolic or conventional play

In summary, this study examined the play performance of children with and without pretend play deficits using the PRPP System of Task Analysis and the Child Initiated Pretend Play Assessment. Results of the study found that the PRPP is successful in discriminating between children with and without pretend play deficits. Findings showed a substantial level of agreement between the PRPP and the ChIPPA. Certain areas of information processing, as defined by the PRPP appear to be more important than others for pretend play, specifically Plan strategies. This study supported the notion that planning is critical in pretend play.

## <u>Cognitive strategies and school</u> <u>participation for students with learning</u> <u>difficulties</u>

Lowe, S. (2010). PhD Thesis Abstract. School of Occupation and Leisure Sciences, The University of Sydney. NSW. Australia. (Supervisors: C. Chapparo and R. Heard).

Students with learning difficulties comprise one of the main groups of children referred for assessment to Australian occupational therapists. Teachers and parents typically express concern regarding difficulty with participation during school occupations. In particular, teachers and parents describe the cognitive aspects of participation as being a challenge. While much research has focused on the concept of participation for students with physical disabilities, little is known about the impact of cognitive dimensions of a learning difficulty on school participation. There are few ecological assessments which document difficulties with the cognitive aspects of school participation relative to the expectations of task performance. Specifically, there is a lack of standardised assessments which utilise the perspectives of teachers and parents.

The initial purpose of this study was to explore the concept of participation and how students with learning difficulties used cognitive strategies to participate successfully in school occupations. The second purpose of the study was to develop a teacher and parent questionnaire that might assist in the occupational therapy assessment of the cognitive aspects of a student's school participation. A review of the literature was motivated by the need to better understand the construct of participation and to determine how best to measure cognitive strategy use as a component of school participation. The subsequent research was then carried out in three phases. Phase One explored difficulties in school participation using a longitudinal retrospective case study PRPP Research Development: 2013

of one student with a learning difficulty over 13 years. In addition, 50 teachers and 44 parents were surveyed regarding participation. Data collected from this phase formed the basis of Phase Two in which a teacher and parent questionnaire was constructed following principles of questionnaire construction.

An instrument, PRPP@SCHOOL-Version 1(Teacher Ouestionnaire Parent and Ouestionnaire). was developed which empirical reflected theoretical and descriptions of cognitive strategies and descriptors used in an existing instrument, the Perceive, Recall, Plan, and Perform (PRPP) System of Task Analysis. These questionnaires, designed to form a companion instrument to the PRPP System of Task Analysis, were trialled on 355 children, referred to a private occupational therapy clinic in Greater Western Sydney.

Data were analysed to determine the viability of the measure in Phase Three of the study which comprised reliability and validity testing on the PRPP@SCHOOL-1 (TQ & PQ). Intraclass correlations indicated excellent test-retest reliability with a high level of agreement for the PQ.

Content validity was determined through consumer review, peer review, and an expert panel review. Discriminant validity testing confirmed that the PRPP@SCHOOL-1(TQ & PQ) was able to differentiate between typically developing students and students with learning difficulties.

Construct validity was assessed. Five factorsemerged from the analysis which also demonstrated that the PRPP@SCHOOL-1(TQ & PQ) was functioning as a multidimensional measure.

Findings indicated that for children in this study, participation in school occupations was undermined by challenges with inefficient cognitive strategy use. Teachers and parents were able to observe and clearly identify these difficulties using the PRPP@SCHOOL-1(TQ & PQ). This research adds a companion instrument to the PRPP System of Task Analysis in the form of teacher and parent questionnaires to be used with students who experience school participation difficulties. In so doing, the research contributes to the expansion of occupation-focused, criterion-referenced ecological instruments recommended by the profession as best practice assessment.

## The PRPP@SCHOOL (Teacher and Parent Questionnaire) and children with learning difficulties: An exploration of <u>construct validity</u>

Chapparo, C., Lowe, S., & Heard, R. (2013). Published Abstract: Occupational Therapy Australia, 25<sup>th</sup> National Conference and Exhibition, July. *Australian Occupational Therapy Journal*, 60, Supplement 1, p.60-61

The impact of physical and sensory difficulties on participation in school occupations is well documented. Less is known about the impact of cognitive dimensions of a learning difficulty on participation in school occupations.

**Aim:** To identify cognitive factors within the PRPP@SCHOOL (TQ & PQ) that may explain difficulties with participation in school activities in children with learning (K - 6) who have been referred to occupational therapy.

**Methods:** 624 PRPP@SCHOOL (TQ & PQ) were obtained for 355 children enrolled in mainstream K-6 classes participated. Exploratory factor analysis was used to examine inter-correlations among test scores and resulted in extraction of a set of five factors that conceptually represented common cognitive difficulties experienced.

**Results:** Five factors emerged from the data. Factor One consisted of items from the Plan category of the PRPP@SCHOOL and related to social interaction. Factor Two also consisted of Plan items targeting goal setting generating alternative responses. and evaluating and problem solving. Factor Three consisted of Perceive and Perform items which targeted attention, persistence and continuation of performance. Factor Four consisted of Recall items which targeted understanding, remembering and following steps in the task, rules and procedures. Factor Five consisted of Perceive and Plan items that focused on listening and 'getting ready' for engagement in activities with others.

**Conclusion:** Data from factor analysis identified five factors describing the nature of reduced cognitive strategy use in students with learning difficulties. The patterns described in these factors contribute to understanding the concept of cognition as it may apply to participation in school occupations.

## <u>The PRPP@SCHOOL (Teacher</u> <u>Questionnaire): Examination of</u> <u>discriminant validity</u>

Chapparo, C., Lowe, S., & Heard, R. (2013). Published Abstract: Occupational Therapy Australia, 25<sup>th</sup> National Conference and Exhibition, July. *Australian Occupational Therapy Journal*, *60, Supplement 1*, p.61

Introduction: Participation in school occupations is thought to be undermined by challenges from inefficient cognitive strategy use in children with learning difficulties. The PRPP@SCHOOL (Teacher Questionnaire) was developed from a cognitive strategy observation instrument, the Perceive, Recall, Plan and Perform (PRPP) System of Task Analysis to identify cognitive difficulties which hampered school performance teachers' from perspectives.

**Aim**: To determine whether the PRPP@SCHOOL (Teacher Questionnaire) differentiated between cognitive strategy use

in children with and without learning difficulties.

Methods: 363 students (K - Yr6) from the western suburbs of Sydney comprised two independent groups. Group One (n=292) contained students with learning difficulties occupational therapy referred to for problems performing school activities. Group Two (n=71) were 'typically developing children'. There were no significant differences between the two groups in representation of grade, gender or age. Scores representing four cognitive typologies processing on the PRPP instrument (Perceive, Recall, Plan and Perform) were obtained as well as a Total PRPP Score. Independent group t-tests determined the level of difference between the two groups on PRPP@SCHOOL.

**Results:** Students without learning difficulties had higher mean scores for all four PRPP cognitive strategy category scores, as well as for the total questionnaire score than students with learning difficulties (p=<.001), indicating that items on the PRPP@SCHOOL (Teacher Ouestionnaire) discriminated between students with learning difficulty and their typical peers in this sample.

**Conclusion:** This research supports use of the PRPP@SCHOOL (Teacher Questionnaire) to obtain teachers' perspectives about the impact of cognitive strategy use disorder on school occupations.

## Using the PRPP@School (Parent and Teacher Questionnaire) to identify patterns of cognitive strategy application in children with learning difficulties

Chapparo, C., Lowe, S., & Heard, R. (2013). Published Abstract: Occupational Therapy Australia, 25<sup>th</sup> National Conference and Exhibition, July. *Australian Occupational Therapy Journal*, 60, *Supplement 1*, p.42-43.

**Introduction**: The PRPP@School is a questionnaire where parents and teachers

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can rate children's use of cognitive strategies during participation in school and home occupations. There are three versions of the PRPP@School (pre-school, primary school or high school) all of which summarise cognitive strategy use into four categories of cognitive processing: attention, memory, planning and doing.

**Aim:** To compare the pattern of children's cognitive strategy application in the four categories of cognitive processing: attention, memory, planning and doing as rated by parents and teachers across school stages (pre-school, primary school, and high school).

**Method:** PRPP@School questionnaires were collected for 233 children with learning difficulties referred to occupational therapy in the western suburbs of Sydney. A total of 74 children attended pre-school, 96 attended primary school and 63 attended high school. Between group ANOVA and post hoc analysis were used to compare the pattern of performance of children from each of the three school stages.

**Results:**For teacher ratings of cognitive strategy use, no significant difference was found between the school stage groups with planning emerging as the most problematic area for children in all school stages. Parent rating scales identified a significant difference for Planning (p<.001) and Attending (p<.05) categories with children attending primary school and pre-school rating lower in these areas than children in high school.

**Conclusion:** Parents and teachers identified different patterns of cognitive strategy use for children in the different school grades however, the area of planning was the area most consistently rated as a difficulty for all children.

## <u>The effectiveness of the Perceive, Recall,</u> <u>Plan Perform (PRPP) System of</u> <u>Intervention on the social skills of</u> <u>children with learning difficulties</u>

Challita, J., Chapparo, C., Hinitt, J., & Lowe, S. (2013). Published Abstract: Occupational Therapy Australia, 25<sup>th</sup> National Conference and Exhibition, July. *Australian Occupational Therapy Journal*, 60, Supplement 1, p.43.

**Introduction:** The Perceive Recall Plan Perform (PRPP) System of Intervention is an intervention approach based on cognitive strategy application which can be used with children with learning difficulties who also experience difficulties with social participation.

**Aim**: To investigate the effectiveness of a social skills camp that utilises principles of the PRPP System of Intervention to develop playground social skills for children with a learning difficulty.

Methods: An ABA single system research design will be employed with six primary school children with a learning difficulty who have been referred to an occupational therapy social skills camp. The PRPP System of Task Analysis will be used to measure children's cognitive strategy application for social performance during each of the three study phases: Phase A, prior to camp; Phase B, during the camp; and a second Phase A, after the camp. Parent/Teacher questionnaires and Goal Attainment Scaling will also be used as pre and post measures.

**Results**: Findings presented will include visual representation of the data collected at each of the three study phases (A-B-A) to examine change in performance as a result of the intervention. Results from statistical analysis conducted to compare each phase will inform if any significant change in performance occurred during the intervention. These will be supported by findings from pre and post measures. **Conclusion**: This study contributes to research regarding the effectiveness of the PRPP System of Intervention in the form of a social skills camp to address issues of social competence in children with learning difficulties.

## CURRENT AND ONGOING RESEARCH

Research continues on the PRPP System of Task Analysis. To date, it has been applied to all areas of practice where occupational therapists are required to examine the impact of information processing deficits on *those tasks that are important to the client*. Researchers continue to work towards generating evidence about its effectiveness, and we are indebted to their endeavours and contribution to instrument development for OT clinical practice.

All of these projects reviewed have made a considerable contribution to the development of the tool and the evolving intervention component of the PRPP system.