
# STRATEGY

**S**egmental **T**raining **R**esearch **a**nd **Te**aching **G**roup

# Newsletter December 2013

**Research**

Research is currently based in five centres in USA (2), UK, Denmark and Hong Kong.
A short summary of the status at the individual centres is outlined below:

### *1. Hartford, Connecticut*

**Study 1.1** Working title 'Sensory Contributions to Typical and Atypical Development of Trunk Control.'

Sandy Saavedra and Adam Goodworth are conducting a study that will identify sensory reliance and sensory reweighting for postural control in typical infants longitudinally, from 1-8 months of age and children with moderate-to-severe cerebral palsy (GMFCS 3-5).

Status: The motorized platform with servo-motor control has been built and is operational. The custom trunk support device and visual surround are expected to be completed before the end of December. We hope to be ready to start collecting pilot data by February 2014.

**Study 1.2** Working title 'Development of Trunk Stability (DOTS): Normalization of SATCo in Typical Infants.'

Sandy Saavedra and her DOTS research team are preparing a study to determine normalised development of segmented trunk control in TD infants using AIMS and SATCo. Our goal is to obtain SATCo and AIMS scores for 160 infants, twenty for each age category (1-8 months). We have 76 data points from previous longitudinal studies at University of Oregon and University of Michigan so we will collect 84 more data points.

Status: Ethical review paperwork will be submitted next week with a goal of beginning data collection by February 2014.

**Study 1.3** Working title 'Parental sensitivity and responsiveness to their infant's segmental level of trunk control.'

In conjunction with the normalization study (1.3), we will record and score video data of parents' spontaneous hand placement on their infants' trunks when asked to support them in sitting and standing positions for a visual discrimination task. We will compare parental support to the infant's SATCo score to determine if parents automatically adjust their support as infants gain segmental control of the trunk.

**Study 1.4** working title ‘Repeatability and validity of magnetic tracking for head position using TrakSTAR magnetic tracking.’
Sandy Saavedra is planning a method study with a biomechanical engineering student at UHart to evaluate the repeatability and validity of head CoM and kinematics of TrakSTAR magnetic tracking compared to Optotrack optical tracking.

Status: Student has done background reading and is presenting his proposal for this project in December. Data collection will be planned for March 2014 using healthy young adult participants.

**Study 1.5** Working title ‘effectiveness of segmental training on trunk control in children with moderate-to-severe motor impairment: a case series’
A case series including 11 children with neuromotor deficits that interfered with trunk control for independent sitting. Intervention was TT, 20 minutes per day, 5-6 times a week for 6 months. Article will include a series of ‘case studies’ showing video data of before and after function as well as excerpts of the training program.

Status: Sandy has processed kinematics and EMG. Beginning to explore data and prepare for statistical analysis.

**Study 1.6** Working title: 'Non-linear analysis of the segmental contributions to trunk control in children with moderate to severe cerebral palsy’
Carol Costa, a PhD student from Brazil, plans to calculate approximate entropy, correlation dimension and lypenov exponent, and conduct a surrogate analysis of postural sway data as measured by head or trunk movement and examine stability with different levels of trunk support. This is a retrospective study using data collected by Sandy Saavedra during her PhD.

Status: Carol arrived in Connecticut this week for a 6 month research scholar visit. She will be observing the children in the Targeted Training series and helping to collect data for the visual and vestibular studies in addition to working on the data analysis and manuscript preparation for this nonlinear analysis.

## *2. Eugene, Oregon*

**Study 1.1** Working title ‘Spinal segmental contributions to sitting and reaching in cerebral palsy’
Marjorie Woollacott and her graduate students, Victor Gonzalez and Jaya Rachwani, are examining the influence of SATCo level and external support on reaching kinematics in children with cerebral palsy. Sandy Saavedra is a consultant on this study.

Status: Recruiting study group, data collection in progress.

**Study 1.2** Working title: ‘Spinal segmental contributions to sitting and reaching during typical development’
Marjorie Woollacott in conjunction with her doctoral students is examining the influence of SATCo level and external support on reaching kinematics during typical development. Sandy Saavedra is a consultant on this study.

Status: Longitudinal data has been collected from 10 infants (2.5 months -8 months of age). Data is currently being analysed.

### *3. Copenhagen*

**Study 3.1** Working title ‘The effect of trunk control on gait kinematics and kinetics in children with CP GMFCS I and II’
A masters group will carry out a study looking at the effect of trunk control on gait kinematics and kinetics in children with CP GMFCS III-V. The protocol will include test-retest of SATCo on the children intra- and interday and intra and inter-tester. Participants will be SATCo-tested twice on the same day by 3 testers (2 inexperienced, 1 experienced) and twice again later in the same week or next week. SATCo will be scored by the tester and video scored by experts (at The Movement Centre). The test-retest will include 6 GMFCS I and 6 GMFCS II with video sagittal and $45^{o}$ from the front.
Status: The protocol is nearly finished and will be sent to the ethical committee as soon as it has been circulated to PB and SS for comments.

**Study 3.2** Working title ‘SALLCo test (the name of this test needs confirmation!) - Development of test score sheet and instructions’ (and if time allows, a test-retest study).
A bachelor group will hopefully carry out this study. PBB has sent videos to DC illustrating the test.
Status: Recruiting study group

**Study 3.3** Working title ‘Danish translation of the SATCo test’
A bachelor group have translated and DC has back-translated the SATCo test to Danish. The back translation will be sent to PBB for approval.

**Study 3.4** Working title ‘Effect of Targeted Training on gross motor function in children with CP’
An RCT including 28 children with CP GMFCSIII-V. Intervention is TT, 5 times a week for 6 months and control is treatment as usual.
Article will include a ‘case study’ showing data from a child illustrating the method including data GMFM-IS, PEDI, GAS, SATCo
Status: DC is currently processing kinematics from RCT and will send data to SS and MW. Focus is on the targeted training level only with data from both 15 seconds unsupported sway and full trial. Full trial will be coded to ‘normal’ and sway in three planes away from normal (pitch, sway and yaw) described as %.

**Study 3.5** Working title ‘Normative unsupported sway data in TD children’.
A study of 20 children documenting repeatability and normal values for sway in an unsupported seated position.
Status: Article is circulated to co-authors and DC will submit in December 2013.

**Study 3.6** Working title ‘Study of kinematics in static and active sitting with support at multiple levels in children with CP. Does this change following a course of TT?’
Using data from the RCT study 2.4, this study will explore active sway data: plot CoM over base of support and report head yaw angular velocity/accelerations. We expect to see different relationships between head sway with lower support in different children: we expect GMFCS V to have poorer control and steadiness with lower support in active and static.
GMFCS IV Better control with lower support in static (stiffening), poorer control with lower support in active.
GMFCS III Same as GMFCS 5 but pattern starts at a more caudal support level.
Does TT change this pattern?
Status: Data currently being processed.

**Study 3.7** Working title ‘Validity of the SATCo test’
Data from the RCT will be used to explore the concurrent validity of the SATCo test with GMFCS and PEDI-test.
Status: Work in progress

### *4. Oswestry*

PhD student, Maria Sanchez will be doing her PhD at Manchester Metropolitan University/The Movement Centre. Her supervisors are Prof Ian Loram and Prof. Paul Holmes, Manchester Metropolitan University with Dr Cornelis Van de Kamp providing supervision and support at MMU. PBB will provide supervision at TMC.
Ian Loram’s interest is in the sensory system. One possible study could be the effect of TT on perception, communication and use of vision in children with CP.
PBB is interested in developing new clinical outcome measures to measure progress in children training with CP. This could be validated using instrumented movement analysis.
PBB is also interested in trunk modelling in the movement lab.
There is to be a meeting in December to discuss the direction of the PhD.

### *5. Hong Kong*

Dr. Tamis Pin is currently looking at working with the SATCo test, working with the psychometric properties on a group of preterm infants and typically developing peers (reliability and known-group construct validity), as well as looking at concurrent validity with the AIMS, Movement ABC or Peabody etc. For older children with motor dyspraxia, she is interested in looking at concurrent validity with Pediatric Reach test, Pediatric Balance test or BOT-2 etc.
Status: Awaiting further information.

**Clinical development**

***1. TT in Hartford***

There are currently 4 children in the Hartford area who are in the process of being set up for Targeted Training. Danni Bellows and Sandy Saavedra will be supervising the training. We will aim to produce case studies for publication an promotion of TT in the USA.

Device measurements have been completed for 2 children and are scheduled for the remaining two children during the next week.
Outcome measures are:
-SAROMM (spinal alignment and range of motion measure)
-GMFM
-SATCo
-HAT (hypertonicity assessment tool)
-BAS (Barry Albright Dystonia Scale if the HAT indicates dystonia)
-CVI screening test (visual function)
-anthropometrics
-Functional goals or Goal Attainment scale

***2. TT in Copenhagen***

There are currently 3 children in a course of TT in Copenhagen, two at Kirkebækskolen and one at Geelsgårdskolen. DC is supervising the training. The aim at both schools is to produce case studies for publication and promotion of TT in Denmark. Outcome measures at Kirkebækskolen are:
- Range of joint movement (limbs and trunk
- SATCo.
- Functional goals (specific and timed
- PEDI (at start and end of a (9) month course of TT
- GMFM (at start and end of a (9) month course of TT
The two children started their course of training in September 2013.

Outcome measures at Geelsgårdskolen are:
- PEDI (at start and end of a (9) month course of TT
- GMFM (at start and end of a (9) month course of TT
- Functional goals (specific and timed)
The two children started their course of training in September 2013.

We are using TT equipment loaned from The Movement Centre in Oswestry.

**Other Issues**

***1. STRATEGY annual meeting***

We have decided to meet at least annually somewhere in the world, maybe in connection with a congress. Are there any suggestions of when and where – maybe fall 2014?

## 2. Equipment

R82 have a schedule for the development of the TT equipment as follows: Start development again around December 1, 2013. First prototypes ready for assembly around April 1, 2014. Refine these for sending to TMC at end April 2014.TMC to test these for 2-3 months with reports back at a steady to allow continuous work improving the design. Design freeze early September 2014. First products ready from production series in March 2015.

## 3. SATCo levels

A discussion of the use of numbering to identify the SATCo control level in research is in process.

## 4. STRATEGY's role in research and clinical work with TT

This discussion is ongoing.

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