

Functional Strength Training Treatment Manual

TIDieR section 4. Procedures, activities, and/or processes used in the intervention

4.1 Individual exercises for Muscle Strength and Muscle Endurance

Although not directly related to function, progressive resistance training (PRT) of individual specific muscles is considered an important background to functional tasks. The aim of this section was to incorporate all the specific movements of the upper limb, in relation to both the gross proximal movements and the finer, more dextrous, distal movements. The therapist would then be able to choose appropriate movements depending on the participant's areas of weakness and voluntary muscle activity. For the strength training sections, it was decided to give separate guidelines for 'strength' and 'endurance' training. The PRT consists of two parts:

4.1.1.PRT to increase the endurance of muscle performance;

The PRT to increase endurance consisted of basic resistance training for healthy adults, using progressive resistance¹ and an increasing number of repetitions in sets of 10 (to a maximum of five sets).

4.1.2.PRT to increase strength.

To ensure that practice was of sufficient intensity to cause an increase in muscle strength, a way of quantifying the load called the Functional Repetition Maximum (FRM) was used where possible. The repetition maximum is defined as the load that can be lifted a number of times without resting. For example, the 6RM is the maximum load that can be lifted repeatedly, without rest, 6 times and no more. In the treatment manual we used the FRM where the load was defined either by the weight lifted, or in other functional ways such as the distance or height moved or the size of the object. To obtain an increase in muscle strength, it is recommended that a repetition maximum of between 6RM and 9RM is used. The 9RM is easier than the 6RM. The choice of which FRM was based upon the therapist's assessment of the participant's ability and their observation of adverse effects such as excessive activation of muscles not involved in the exercise, excessive fatigue, and pain. The FRM was assessed regularly to ensure progression of the load as appropriate.

4.2. Functional training

Functional training included both whole and part component practice of functional tasks^{2 3 4}. The rationale for inclusion of component practice is that the components may be practised in the relevant functional position only. This was to distinguish FST from task-specific practice, in which component parts may be practised in positions that are different from the functional position in which the task would normally be performed.

4.2.1.Hand Reaching/Retrieval Activity

The activities in the reaching and retrieval section were developed by our team based on everyday tasks performed in healthy adults. The reaching and retrieval activities can be practised while sitting, standing, or lying, and are progressed by increasing size and weight of each object, height of shelf, moving objects further away (and therefore increasing force required to reach it) and moving faster or by decreasing the amount of support from the environment to support the weight of the arm. Reaching and retrieval to objects both at the front and the side of the participant were included.

4.2.2 Hand Grip

Aiello and Dean⁵ produced a detailed account with associated illustrations of different hand grips. This work was used in conjunction with work by Elliott and Connolly,⁶ who published a classification of hand movement, and discussion with a hand therapist, to produce five different types of Hand Grip with associated functional activities. The five different hand grips were:

- Pinch / precision – one or more fingers and thumb gripping a small object
- Hook – with the fingers in flexion, for example when carrying a shopping bag
- Power – squeeze – for example when holding onto a bar or umbrella
- Power – disc – for example when unscrewing the lid of a large jar
- Flat hand – for example when carrying a plate, with the hand outstretched underneath

Associated functional activities have been sourced either from the literature above, or devised by the research team at St George's University of London. Equipment was obtained from North Coast Medical, Hand Therapy Catalogue 2003-2004 and Nottingham Rehab Supplies 2003/04, from local shops or made to specification. Any equipment that has been made, such as the 'block' for attaching bull-dog clips and the 'nuts and bolts' underwent a risk assessment by the health and safety representative prior to use.

4.2.3 Hand Manipulative Activity

Elliott and Connolly⁶ published an excellent classification of the patterns of hand movement when manipulating objects and detail three classes of intrinsic movements – that is, "coordinated movements of the digits to manipulate an object within the hand". These specific movements and associated functional activities were incorporated into the 'Exercises for specific activities' section of the manual.

4.2.4. Progression of Functional Strength Training Practice

The functional training interventions could be progressed by increasing the repetitions of the specific task,⁷ increasing the weight, height or resistance in the exercise, by altering the size and/or shape of the object (either larger or smaller) to be more challenging,⁶ or by progressing to a more difficult task. It is important to sustain the participant's level of attention, as this may be linked to functional outcome.^{8, 9} Suggestions for progressing each exercise are given in the 'Exercises for specific activities' section of the treatment manual.

Therapists were instructed to try to minimise the presence of compensatory muscle activation from muscles not involved in performance of the exercise or activity, by choosing the appropriate level of difficulty of exercise or activity for the participant to practice.

4.3. Facilitating skill acquisition

The following section applied only to the practice of functional activities and exercises, and not the muscle strength exercises.

4.3.1. Motivation through goal setting

It is essential that patients feel motivated to engage in their rehabilitation. Goal setting can enhance motivation and engagement in rehabilitation and clinical guidelines for stroke recommend goal setting as an integral part of rehabilitation.¹⁰ Therefore, the participant and therapist discussed the activities to be prioritised, and documented these on the treatment record sheets.

4.3.2. Structure of practice

Practice has an important influence on the learning process.^{11, 12} The therapist assessed the participant's ability to perform each of the functional activities at the beginning of the training session and noted the movements and movement components which were difficult to perform. The guidelines below for structuring practice were followed.

Whole/ part practice: assessment commenced with whole practice, to enable the therapist and participant to identify which components (if any) were more problematic than others. If the participant was able to correct the problematic component(s), then whole practice could be used. However, if they were unable to do so, practice focused on the components that were problematic. Where possible, the practice session ideally finished with whole practice to enable the participant to put the component into context, and practice the dynamics of the task as a whole (and thus the entire motor programme). Whether whole or part practice was employed, the amount of movement required was made clear by placement of targets or objects.

Constant/variable practice: constant practice involves the repetition of exactly the same task, whereas variable practice involves practice of different variations of the same category of tasks. Activities of daily living are inherently variable, so as the participant begins to master an activity or exercise under constant conditions, variable practice should be introduced. Variable practice was achieved by many means, for example, using different start and end points (e.g. reaching in different directions), different postures (e.g. sitting/ standing) as well as using different objects. Over the course of treatment (either within a treatment session or over a number of sessions), practice was progressed from constant to variable with the aim to increase the complexity of the task, to continue to challenge (but not discourage) the participant and to facilitate transfer to activities of daily living.

4.4. Feedback

Augmented feedback (i.e. feedback provided by the therapist) is one of the most important influences in the skill acquisition process, and therefore its application needs to be carefully considered.^{11, 12} Augmented feedback pertains either to the *pattern* or the *outcome* of the movement:

Feedback about the movement pattern is known as Knowledge of Performance (KP). An example is stating to a patient that they leaned sideways or elevated their shoulder during reaching.

Feedback about the movement outcome is known as Knowledge of Results (KR). Examples include stating to a patient how long it took them to reach, how much grip force they produced, or what their accuracy was in an aiming task.

4.4.1. Amount and frequency of feedback

The amount of feedback delivered to participants was an important consideration because despite evidence that it can speed up learning and allow a higher level of skill to be achieved, and that people with impaired intrinsic feedback processes rely more on augmented feedback, it is insufficiently used in clinical practice.^{13, 14} A *faded* feedback schedule was recommended, whereby feedback was given frequently in the early stage of learning, and less frequently as the participant progressed. This is based on work in healthy participants¹⁵ and people with brain injury¹⁶ which has shown that providing feedback on 50% of the attempts at a task is often more effective than providing feedback on 100% (i.e. every time) of attempts. This finding can be explained by the notion of independent problem solving; where possible, patients benefit from working things out for themselves.

Another strategy for fading feedback was by providing *bandwidth feedback*, which is where feedback is given only when performance falls outside the specified criteria. For example, a person with stroke may use his/her trunk movement to reach forward for a cup. The therapist may want to discourage this compensatory movement and stimulate active shoulder flexion instead. By placing an object so that the participant's trunk touches it if the trunk moves forward too far, the participant will realise his/her mistake. Note the participant only receives this feedback if he/she does something wrong, otherwise practice continues with the participant knowing his/her performance is correct. This type of feedback promotes consistency of performance.

Periodically, it was recommended that a *summary* of feedback or an *average* feedback score was provided to the participant, formulated in constructive terms. An example of summary feedback is the number of times out of 5 attempts that the movement was performed correctly. An example of average feedback is the average measured height that the participant could lift an object over 5 attempts. Both of these methods means that feedback is not provided after each attempt, but only after a certain number has been completed. Both summary and average feedback are postulated to be more effective than feedback provided on every attempt by providing the learner with an opportunity to process their intrinsic feedback and reduce reliance on the augmented feedback.

4.4.2. Attentional focus of feedback

Feedback can induce an internal focus of attention in the learner (about the body and body parts) or an external focus of attention (about effects of the movement on the environment). A considerable body of evidence suggests that external focus feedback is more effective for the acquisition of a range of skills compared to internal focus feedback in healthy people^{17 18} and there is also some evidence for this in stroke.¹⁹ For example, to encourage greater extension of the elbow in a reach-to-grasp movement, saying 'next time, move closer to the cup' (external focus) could be more effective than 'next time, straighten your elbow more' (internal focus). The predominant explanation for this finding is that feedback with an internal focus may interfere with automatic motor control processes.²⁰ Participants need to be provided with some essential internal focus information in order to avoid movement patterns that are potentially detrimental, but the evidence suggests that thereafter feedback inducing an external focus of attention will be more effective.

4.5. Order of activities in each treatment session

Within the functional portion of FST, the therapist managed practice of up to 3 activities in each treatment session. If a smaller number of activities needed to be trained, the time was spent on practising several exercises for the same activity. For example, if only one activity needed to be trained, 3 exercises for this one activity could be undertaken. The practice for each activity began with an assessment/reassessment of the functional activity to be trained. Performance of the activity was observed, and the therapist decided which component(s) would be practiced in the session, depending on the participant's areas of weakness and voluntary muscle activity.

For each activity, individual muscle strength exercises were performed first, followed by whole and part practice of functional activities. Within the individual exercises for muscle strength, endurance exercises were performed before strength exercises. Activities and exercises were chosen from the menu contained in the 'Exercises for specific activities' section of the treatment manual. The activities were progressed by modifying the weight or size of object used, and the number of repetitions. The participant was either seated at a table, standing at a counter, or if necessary lying, when practising the activities. Within the task-related exercises, the whole task was practised first, followed by part practice exercises for the activity.

Exercises for specific activities

1. Muscle group specific movements: muscle strength

Activities for strengthening specific muscle groups²¹ can be seen in Table 6.1 below. Activities should be increased to three sets of 10 repetitions before the resistance is increased. In this study 'North Coast Exercise Band' was used (levels 1,2,3,5,7) to increase the resistance.

Table 1. Muscle Group Specific Movements in Functional Strength Training

Movement	Activity	Comments
Finger and thumb adduction/ abduction	Adduction/ Abduction using theraband and with forearm and wrist supported	
Finger and thumb extension	Using theraband with forearm and wrist supported	Progress with different resistive theraband
	Pulling Velcro apart with loop for finger	Progress with Velcro of different width
Individual and simultaneous finger flexion	Digital spring strength trainer	Progressive with digiflex of different resistance
Thumb flexion and opposition	Using theraband with forearm and wrist supported	Progress with different resistive theraband
Lumbrical flexion	Forearm in full pronation with forearm and wrist supported by table. Flexion at MCPs	Weights over fingers to progress as appropriate
Wrist flexion/ extension	Forearm in mid-pronation and elbow at 90° directly inferior to the shoulder, and proximal two-thirds of forearm supported on a side-table.	Progression by increasing the number of sets of 10 attempts to a maximum of 5 sets of 10. Weights of up to 2kg may then be added to the palm/dorsum of hand.
Wrist ulnar/ radial deviation a	Using theraband with forearm supported	Progress with different resistive theraband
Supination / pronation	Forearm supported and move between pronation to supination. Object may be held in hand	Progress with weight and/or lever arm, e.g. start with rolled newspaper and progress to rolling pin
Elbow flexion/ extension	Elbow and shoulder supported as required	Progress with free weights or theraband
External/internal rotation at gleno-humeral joint	Forearm in mid-pronation and elbow at 90 directly inferior to the shoulder. Take lower arm across/ away from body	Progress with theraband of different resistance
Adduction and abduction at gleno-humeral joint	Wrist, elbow and shoulder support as required	Progress with free weights or theraband of different resistance
Flexion / extension at the gleno-humeral joint	Wrist, elbow and shoulder support as required	Progress with free weights or theraband of different resistance
Shoulder elevation	Shoulder elevation with support to arm as required	Progression with manual resistance by the therapist

2. Hand Reaching/Retrieval Activity

The activities in the reaching and retrieval section were developed by our team based on normal movement patterns in healthy adults. These were broken down into components from which to instruct and encourage the participants through verbal and visual feedback.^{22, 23, 24} The reaching and retrieval activities are practised while sitting or standing, and are progressed using different heights of table or shelf, moving objects further away (and therefore altering the lever arm), altering the size, shape and weight of each object, reducing the amount of support provided by the environment and performing faster movements. This was a functional task in that it involved reaching for every day shopping items (listed with their weights in the results section) as well as removing the shopping items in and out of shopping bags.

The shelf height is approximately 4 feet from the floor, with a counter height of approximately 3 feet from the floor. The participants were able to stabilise themselves with their non-paretic limb when in standing, as required.

Table 2.1. Items used in the reaching and retrieval activities

Item	Size / Weight
Baked beans (small tin)	200g
Corned beef (tin)	340g
Milk - Long-life UHT (small carton)	500ml
Milk – long-life UHT (large bottle)	1 litre
Pasta (bag of penne)	1000g
Pilchards (small tin)	155g
Salmon (small tin)	105g
Salt (large)	750g
Soup (tin)	400g
Spam (tin)	200g
Tomato puree (tin)	140g
Crispbread (packet)	
Matches (small box)	

Table 2.2. Hand Reaching/Retrieval Activities

Functional activity	Required movement components	Progression (easier to harder)
1.. Reaching to object on table whilst side-lying	Lateral rotation and protraction of shoulder girdle Flexion at glenohumeral joint with lateral rotation Elbow extension with some supination Wrist extension and finger extension Abduction of thumb and extension of fingers to grasp	Progress by decreasing amount of assistance provided by the environment to support the arm (e.g. towel or skateboard underneath forearm progressing to unsupported arm movement)
2. Retrieval of object from table whilst side-lying	Medial rotation and retraction of shoulder girdle Extension and of glenohumeral joint with lateral rotation Elbow flexion with some supination Wrist extension Abduction of thumb and extension of fingers to release	Progress by retrieving objects of larger or smaller sizes and shapes and heavier weights of objects
3. Reaching to object on floor	Protraction and lateral rotation of scapula Flexion, abduction and lateral rotation of glenohumeral joint Elbow extension with some supination Wrist extension and radial deviation Abduction of thumb and extension of fingers to grasp	Progress by retrieving objects of larger or smaller sizes and shapes and heavier weights of objects Progress by reaching for objects further away therefore increasing the muscle force required
4. Retrieval of object from floor	Retraction and medial rotation of scapula Extension and adduction of glenohumeral joint Elbow flexion with some supination Wrist extension and radial deviation Abduction of thumb and extension of fingers to release	Progress by performing faster movements which require greater muscle force
5. Reaching whilst seated at a table, object in front	Protraction and lateral rotation of scapula Flexion and lateral rotation of glenohumeral joint Elbow extension with some supination Wrist extension and radial deviation Abduction of thumb and extension of fingers to grasp	Progress by decreasing amount of assistance provided by the environment to support the arm (e.g. towel or skateboard underneath forearm progressing to unsupported arm movement) Progress by reaching for objects further away therefore increasing the muscle force required
6. Retrieval whilst seated at a table, object at front	Retraction and medial rotation of scapula Extension of glenohumeral joint Elbow flexion with some supination Wrist extension and radial deviation Abduction of thumb and extension of fingers to release	Progress by retrieving objects of larger or smaller sizes and shapes and heavier weights of objects Progress by performing faster movements which require greater muscle force

7. Reaching whilst seated at a table, object at side*	As for 5 plus: Adduction, horizontal flexion, medial rotation to reach across body Abduction, horizontal extension and lateral rotation to reach away from body	Progress by reaching for objects further away therefore increasing the muscle force required Progress by retrieving objects of larger or smaller sizes and shapes and heavier weights of objects
8. Retrieval whilst seated at a table, object at side*	As for 6 plus: Abduction, horizontal extension and external rotation to retrieve object away from body Adduction, horizontal flexion, internal rotation to retrieve object across body	Progress by performing faster movements which require greater muscle force
9. Reaching to shelf whilst seated	As for 5 plus Increased amounts of glenohumeral joint flexion, scapular protraction and lateral rotation required	Progress by increasing the height of the shelf Progress by retrieving objects of larger or smaller sizes and shapes and heavier weights of objects
10. Retrieval from shelf whilst seated	As for 6	Progress by performing faster movements which require greater muscle force
11. Reaching whilst standing at a counter	As for 5 Decreased amounts of glenohumeral joint flexion, scapular protraction and lateral rotation required	Progress by reaching for/ retrieving objects further away Progress by retrieving objects of larger or smaller sizes and shapes and heavier weights of objects
12. Retrieval whilst standing at a counter	As for 6	Progress by performing faster movements which require greater muscle force
13. Reaching to shelf whilst standing	As for 5	Progress by increasing the height of the shelf Progress by retrieving objects of larger or smaller sizes and shapes and heavier weights of objects
14. Retrieval from shelf whilst standing	As for 6	Progress by performing faster movements which require greater muscle force

* Reaching and retrieval activities to the side are similarly practised at the counter, to the shelf, and to the floor

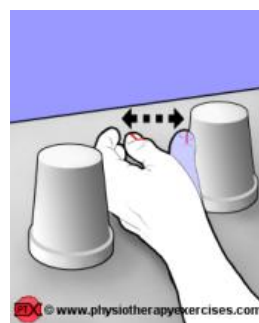
Figure 2.1. Client's aim: To strengthen the muscles at the front and back of your shoulder. **Client's instructions:** Position yourself lying on your side with a splint on your uppermost arm and a slide-board under your arm. Start with your arm down beside your body. Finish with your arm out in front of your body. Perform ... sets of ... repetitions. Do ... sessions per week. Exercise sourced from: www.physiotherapyexercises.au



Table 3. Hand reaching/retrieval: exercises for movement components within activities (examples)

Functional activity	Required Movement component	Exercise
Reaching to object on table whilst side-lying	Lateral rotation and protraction of shoulder girdle	Elbow straight, push arm forward away from body to push an object off the table. Elbow straight, holding object, move object forward, away from the body Vary the direction in which the arm moves
	Flexion at glenohumeral joint with lateral rotation	Elbow straight, move arm from bottom to top of table (or in range appropriate for patient) (Figure 1, below) As above, holding object As above, reaching for object
	Elbow extension with some supination	Holding object and sliding it away from the body. Holding object, extend elbow, keeping upper arm still. Lift arm and extend elbow to grasp an object away from the body
	Wrist extension and finger extension	Forearm in mid-pronation, extend wrist or fingers to push object away. Forearm in mid-pronation, holding object, extend wrist. Forearm in pronated position, extend wrist or fingers, with or without holding an object
	Abduction of thumb with extension of fingers to grasp	Forearm in mid-pronation, abduct thumb to push object away. (Figure 2, below) Abduct thumb to target and maintain position for several seconds. Forearm in mid-pronation, abduct thumb and extend fingers to grasp an object a short distance away

Figure 2.2. Client's aim: To improve your ability to open your thumb to help pick up a cup or glass. **Client's instructions:** Position yourself sitting with your hand resting vertically on a table in front of you and your wrist bent back. Position a cup near your thumb and another cup touching your knuckles. Practice opening your thumb to touch the cup. Ensure that you keep your knuckles in contact with the other cup as you move your thumb. Perform ... sets of ... repetitions. Do ... sessions per week. Exercise sourced from: www.physiotherapyexercises.au.



3. Hand Grip

The Hand Grip interventions were based on work by Elliott and Connolly ⁶ and Aiello and Dean. ⁵ Some of the exercises are progressed using a therapy putty of different resistance. For the purpose of this study 'Sammons Preston Therapy Putty, by Roylans' was used (resistance levels: soft, medium, firm, extra firm).

Table 3.1. Hand grip activities used in Functional Strength Training

Movement	Activity and Items used	Comments
Pinch/ Precision (pad to pad and lateral key/ pad to side)	Pulling out the pegs from a solitaire set	Progress with smaller buttons and zips / smaller laces
	Doing up/undoing buttons / zips	Progress with different widths of velcro
	Lacing a shoe	Progress using pegs of different resistance
	Peeling velcro apart	Progress with clip size and thickness of wood
	Using clothes pegs	Progress with clip size and thickness of wood
	Opening bulldog clips for paper (or wood blocks of different thickness)	Use keys of different lengths/ sizes
	Turning keys in a lock	
Hook	Picking up and placing a bag	Progress with different weights in bag
	Using plastering tool	Progress with weights on tool
Power - Squeeze	Pouring water from jug to cup	Option of stabilising with other hand
	Squeezing digiflex	Progress with increasing amounts of water. Mark jug/cup to measure Progress with increasing resistance of digiflex
Power - Disc	Opening and closing jars	Different sizes and types
	Picking up a ball and placing in boxes	Progress size and / or weight of ball e.g. ping pong, tennis ball, cricket ball
Flat hand	Squashing ball of putty to flat disc	Use putty of different resistance
	Carrying a plate	Different weights on plate

4. Hand manipulative activity

Patterns of hand movement when manipulating objects have been classified⁶ into three classes of intrinsic movements or “coordinated movements of the digits to manipulate and object with the hand”:

- Simple synergies – simultaneous use of the digits in a single pattern such as pinching, where all involved digits are acting simultaneously and in the same direction (ie flexion). Simple synergies include: pinch, squeeze, dynamic tripod
- Reciprocal synergies – such as when unscrewing a lid with thumb and index finger. Reciprocal synergies include: twiddle, rock, radial roll, index roll, full roll
- Sequential patterns - include digital step; linear step; palmar slide

These patterns reflect normal spontaneous hand movements involved in manipulation of objects and involve the recruitment of individual and groups of digits into patterns. This classification was developed as a means of identifying and systematically describing deficits in hand function, but provides a basis for higher level rehabilitation of the hand in therapy. People who lack dexterity and manipulative ability due to stroke could benefit from specific training of these movements. This should be in the context of repetition and with different sizes / shapes of objects. The following hand manipulative activities are based on work by Elliot and Connelly⁶ and Aiello and Dean.⁵

Table 4.1. Hand manipulative activities used in Functional Strength Training

Class	Movement	Example	Activity	Comments
Simple synergies	Dynamic tripod	Typically seen when writing with a pen	Simultaneous flexion or extension of digits at the interphalangeal (IP) and metacarpophalangeal (MCP) joints, and flexion/extension of wrist for larger shapes; results in the movement of the pen in a proximal-distal axis.	Progress by drawing lines in different directions and orientations e.g. horizontally, vertically, www, zigzag
	Squeeze	Squeezing a ball, or syringe, or foam blocks	Simultaneous flexion of all digits and palm	Progress by using different sizes of syringe and amounts of liquid. Progress with 3 blocks of different resistance
Reciprocal synergies	Twiddle	A pattern used to roll small objects to and fro between the thumb and index finger such as when tightening nuts and bolts	Abduction and opposition of thumb; flexion / extension of index and middle fingers	Progress by using different sizes of bolt or nut
	Rock	Similar to twiddle but using more digits, for example when moving a screw-top lid; rocking object in hand	Abduction/adduction of all digits with some flexion / extension of digits and abduction and opposition of thumb	Progress with different sizes of object e.g. jar and lid size, pencil, cup
	Radial roll	The thumb is rolled against the distal phalanx of the index finger, for example when winding a watch or re-shaping a ball of putty into a pellet / sausage	Abduction/adduction of thumb at MCP joint; flexion/extension of index finger at MCP and IP joints	Progress with putty of different resistance
	Index roll	Rolling, for example, a small pellet of putty into a ball using the thumb and index finger	Rotation of thumb pad around distal pad of index finger ; opposition, abduction and flexion of thumb; flexion and extension of index finger	Progress with different stiffness of putty
	Full roll	Make larger ball with plasticine (all digits)	As for index roll but using up to all 5 digits	Progress with different stiffness of putty

Sequential patterns	Digital step	A complex movement such as turning a pen end over end using only one hand	Complex combination of flexion / extension of digits with occasional abduction / adduction; opposition and abduction of thumb with flexion and extension of MCP and IP joints	Progress using different weights and lengths of cylindrical objects
	Linear step	Deviation of the little fingers to reposition by sliding along a pen; squeezing icing from tube	Complex sequence of flexion and extension of all digits and thumb, but particularly digits 3, 4 and 5	Use different sizes of nozzle on icing bag
	Palmar slide	Immobilisation of an object using digits 3, 4 and 5 combined with a manipulative movement of other digits, such as the index finger and thumb when taking the lid off a pen, or clicking a biro on and off, taking pen lid off and back on, using one hand	Flexion of digits 3, 4, and 5 to stabilise object / shaft; flexion and extension of thumb and index finger to remove pen lid	Use different pens e.g. differences in size / diameter, and with different lids that may be easier / harder to remove

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