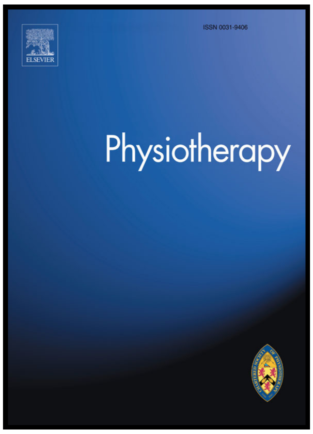

Principles into Practice: An Observational Study of Physiotherapists use of Motor Learning Principles in Stroke RehabilitationMotor Learning in Stroke

Louise Johnson, Jane Burridge, Sean Ewings, Ellie Westcott, Marianne Gayton, Sara Demain

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Principles into Practice: An Observational Study of Physiotherapists use of Motor Learning Principles in Stroke Rehabilitation

Short Title: Motor Learning in Stroke

Authors: Louise Johnson[ab], Jane Burridge[b], Sean Ewings[c], Ellie Westcott[a], Marianne Gayton[a], Sara Demain[b]

[a] University Hospitals Dorset NHS Foundation Trust, Castle Lane East, Bournemouth, Dorset, UK. Louise.Johnson@uhd.nhs.uk, +44 1202 300 194768 @PhysioLouiseJ [corresponding author]

[b] School of Health Sciences, Faculty of Environmental and Life Sciences, Building 45, University of Southampton, Southampton, SO17 1BJ.

[C] Southampton Clinical Trials Unit, University of Southampton, University Road, Southampton, SO17 1BJ

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Abstract

Objective(s): To describe a) how motor learning principles are applied during post stroke physiotherapy, with a focus on lower limb rehabilitation; and b) the context in which these principles are used, in relation to patient and/or task characteristics. ~~and explore which (if any) patient related factors influence therapist's choice of strategy.~~

Design: Direct non-participation observation of routine physiotherapy sessions, with data collected via video recording. A structured analysis matrix and pre-agreed definitions were used to identify, count and record: type of activity; repetitions; instructional and feedback statements (frequency and type); strategies such as observational learning and augmented feedback. Data was visualised using scatter plots, and analysed descriptively.

Setting: 6 UK Stroke Units

Participants: 89 therapy sessions were observed, involving 55 clinicians and 57 patients.

Results: Proportion of time spent active within each session ranged from 26 to 98% (mean 85, SD 19; ~~95% CI 81.1, 88.9~~). The frequency of task repetition varied widely, with a median of 3.7 repetitions per minute (IQR 2.1 - 8.6). Coaching statements were common (mean 6.46 per minute), with 52% categorised as instructions, 14% as feedback, and 34% as verbal cues/motivational statements. 13% of instructions and 6% of feedback statements were externally focussed. Examining the use of different coaching behaviours in relation to patient characteristics found no associations. Overall, practice varied widely across the dataset.

Conclusions:

To optimise the potential for motor skill learning, therapists must manipulate features of their coaching language (what they say, how much and when) and practice design (type, number, difficulty and variability of task). There is an opportunity to implement motor learning principles more consistently, to benefit motor skill recovery following stroke.

Keywords: Stroke; rehabilitation; Motor Learning; Coaching; intensity; Motor Performance
Trial Registration: Clinicaltrials.gov (NCT03792126).

Key Messages

What the article adds to the current literature:

The findings from this study highlight opportunities for therapists to consider how they use verbal instructions and feedback in a specific and precise way, in order to support the process of motor learning. There is scope within routine clinical practice to use the many and varied types of feedback more robustly.

What new knowledge is added by this study:

This study provides insight into how therapists apply motor learning principles stroke rehabilitation settings, and potential associations with a range of patient characteristics.

Introduction

Creating practice conditions that will optimise motor learning is an important consideration for stroke rehabilitation professionals [1]. Factors that are understood to have an effect on the performance and learning of motor skills include: intensity; task specificity; the frequency and focus of instructions, feedback and cues; autonomy; and motivation. Whilst much of the research in this field considers the independent contribution of these factors, there is growing evidence highlighting a cumulative effect when certain practice variables are applied together [2, 3].

It is widely accepted that intensity of practice has a direct influence on recovery, a concept well supported by the evidence base [4-8]. However, intensity is unlikely to be the only influencing factor – what is practiced, how it is practiced, and the broader practice conditions also contribute. For example, stroke rehabilitation is most effective when there is sufficient physical challenge [6], and when training is task specific [9].

In the context of motor learning, the term "coaching" refers to the process of instructing, motivating and guiding someone (the patient), to facilitate improved performance. As part of this process, the coach (the therapist) will use "coaching language" – instructions, feedback and/or short cues, that aim to influence the way a person moves [10], and subsequently their ability to learn a movement. The connection between coaching language and motor skill learning is well evidenced in the field of sport[10]; numerous studies have demonstrated the impact that coaching language has on performance and learning[11, 12]. Within stroke rehabilitation, a number of small studies have demonstrated performance benefits relating to specific coaching techniques, such as an external focus of attention [13-16], reduced quantity feedback [17, 18], and action-observation [19-21].

Observational studies have highlighted that therapist's may not optimally apply specific motor learning principles during stroke rehabilitation. Studies investigating intensity of practice report that around a third of time in therapy sessions is spent resting [22, 23], and that number of task repetitions is relatively low [24]. Furthermore, therapists typically use frequent instructions and favour an internal focus of attention [25, 26], and that feedback that is non-specific [27]. Studies that examine the use of principles relating to practice design or autonomy support in stroke rehabilitation are limited.

The purpose of this current study is twofold. Firstly, we report how motor learning principles are applied during standard physiotherapy care, with a focus on post stroke lower limb rehabilitation. This is part of a programme of work is investigating the use of implicit motor learning principles in stroke rehabilitation. We are therefore predominantly interested in how therapists use coaching strategies, such as instructions and feedback. Our findings will be used as a comparator in a pilot trial, the protocol for which is described elsewhere [28]. Secondly, we describe the context in which different learning principles are applied, in relation to patient and/or task characteristics. Findings are discussed in relation to current literature in this field, in order to better understand how and where practice could change, in order to optimise learning and recovery.

Methods:

Study Design:

This was a cross sectional study, using nonparticipant observation [29] to collect data relating to current therapy practice. The study was approved by the Berkshire B Research Ethics Committee (18SC0582).

Setting:

Therapists and patients at six Stroke Units (SU) in the UK.

Subjects:

Patients were invited to take part if they a) were receiving rehabilitation following stroke, b) had goals relating to lower limb recovery and c) were able to provide informed consent. To meet our objective of describing current routine practice, we did not impose any other inclusion criteria. Therapists were invited to take part if they were involved in the rehabilitation of a patient participant.

Both patient and therapist participants were provided with information about the study, and were asked to sign a consent form. To avoid changes in behaviour, therapists were given minimal details about the specific study objectives.

Materials:

Observational data were collected via video recording; using a video camera (Panasonic HC-V770), mounted on a tripod. Participating therapists were briefed by the researcher (LJ) regarding the overall purpose of the research, and were given guidance on how to use the camera.

Procedure:

Data collection took place between March 2019 and February 2020. For each patient participant, demographic details were obtained from the medical notes: age, gender, type of stroke, admission National Institutes of Health Stroke Scale (NIHSS) [30], current transfer ability and cognitive level (either Montreal Cognitive Assessment (MoCA)[31] or Oxford Cognitive Screen (OCS) [32], dependent on local practice). For therapist participants, profession and number of years working in stroke rehabilitation were recorded.

Once a patient-therapist pair was identified, they were asked to video record a therapy treatment session. As the study intended to capture routine care, there was no specific guidance for this, other than that the focus should be on lower limb rehabilitation. Therapy sessions took place in the usual setting for each site (typically a gym space). The duration and content were decided by the treating therapist, in line with usual practice. To reduce observer bias, the researcher was not present during the session. The treating therapist was asked to record the whole session, only pausing the video recorder if it was deemed necessary to do so (e.g. to maintain dignity).

Analysis:

Analysis consisted of two parts: a) content analysis of the video recordings to describe physiotherapy practice and b) analysis of the data generated, to identify any relationships between participant characteristics and the way in which learning strategies were used. Primary analysis of the data was conducted by a member of the research team (EW/MG), who received training from the research lead (LJ). Where there was uncertainty about how to categorise a statement or behaviour, a second researcher was consulted (LJ). Secondary analysis of the data was conducted by LJ and SE.

After familiarisation with the data set, a deductive approach was used to focus on the behaviours of interest. This analysis was broadly based on a previously validated method [25], using a structured matrix to count and record: type of activity being practiced; repetitions; instructional and feedback statements (frequency and type); strategies such as observational learning and augmented feedback. Definitions of the behaviours of interest, and guidance for counting activity repetitions, were agreed a priori (

Table and Table). Videos were watched and re-watched to extract these multiple aspects from the data. A sample matrix is provided in Appendix 1.

Analysis and reporting of video data was primarily descriptive. The occurrence of each target behaviour is reported using descriptive statistics, whilst accounting for the overall length of the treatment session. Normality of data distribution as assessed visually using histograms. Where data were normally distributed, we have provided values for mean and standard deviation (SD); otherwise, median and interquartile range (IQR) are given.

The study was not designed to formally test the possibly complex interactions between different characteristics; particularly with regards to a limited sample size within a complex data structure, involving sessions nested within participants, across potentially multiple physiotherapists. Therefore, data relating to participant characteristics and coaching behaviours were presented graphically and interpreted in a descriptive way. Scatter plots are presented for each pair of participant characteristic and coaching behaviour (supplementary file). A line of best fit is included to aid visual assessment.

[INSERT TABLE 1 HERE]

[INSERT TABLE 2 HERE]

Results:

Eighty nine treatment sessions were recorded, involving 31 physiotherapists, 10 occupational therapists, 12 rehabilitation assistants, 2 student physiotherapists and 57 patients. This number was deemed sufficient to describe current practice. In 75% (n=67) of the treatment sessions, two professionals were treating the patient (e.g. two therapists, or a therapist and a rehabilitation assistant/student). Where a rehabilitation assistant or a student was involved, the session was led by a registered therapist, with the majority of communication being from that therapist. We did not include sessions that were led by a student, or delivered solely by rehabilitation assistants. Experience working in stroke rehabilitation, of the lead therapist, ranged from 1 to 25 years (median 8; IQR 5 – 15). Characteristics of the patient participants is shown in Table .

[INSERT TABLE 3 HERE]

INTENSITY

Time Spent Active

A total of 1941 minutes of observational data were collected, with individual session length varying between 6 and 53 minutes (mean 21.8, SD 9.7) in total. Proportion of time spent active (engaging in any type of physical activity) within each session ranged from 26% to 98% (mean 85, SD 19). This included sitting tasks (35%), sit to stand (16%), transfers (2%), activities in standing (25%), walking (14%), and other (8%).

Task Repetition

The frequency of task repetition varied widely, with a median of 96 task repetitions per session (IQR 38 - 147). As each treatment session varied in length, the number of repetitions was also calculated as an average *per minute* (median 3.7; IQR 2.1 - 8.6).

Table shows the number of activity repetitions per minute, according to activity type. Although task repetition was highest for activities that fell into the category of walking, and lowest for activities in sitting, there was wide variability across all activity types. Overall, in 47/89 (53%) of the observed sessions, the mean number of repetitions per minute was fewer than 4. Conversely, in just 18/89 (20%) of the observed treatment sessions, the mean number of repetitions per minute was greater than 10. Of these 18 sessions, 8 (44%) were from a single site, which could indicate local practice trends in relation to intensive practice. All patients who practiced this higher rate of repetitions had a mRMI score for transfers of 2 or higher (able to transfer with assistance of 1). There were no other common characteristics of this group.

[INSERT TABLE 4 HERE]

AUGMENTED FEEDBACK

Aside from verbal feedback from a therapist, the use of auditory feedback was rare – being used on only two occasions. Visual feedback was more common, primarily in the form of visual modelling (demonstration) from a therapist, or use of a mirror. Visual feedback was used in 62% of the sessions (55/89), with 117 instances overall. Visual feedback was only used alongside concurrent verbal feedback.

Sensory/proprioceptive feedback provided manually by a therapist was not possible to accurately gauge from the video data, but no other episodes of specific sensory feedback were observed. To give an insight into the use of manual guidance, we recorded whether or not therapists were "hands on" during each 30 second block of video in which the patient was practicing a task. 87% (77/89) of the treatment sessions included some time where the therapist provided manual guidance during the practice of tasks. Overall, therapists were hands on for 31% of the time. We further evaluated the 18 treatment sessions where the therapist spent more than a half of the session providing manual guidance. Of these 18 sessions, 8 involved patients who required a hoist to safely transfer; and 4 included patients who required assistance of 2 people.

COACHING LANGUAGE

Frequency of Coaching Statements

Collectively, 12633 coaching statements were given across the recorded sessions. This includes instructions, feedback, verbal cues and motivational statements. It equates to an average of 6.46 coaching statements per minute, i.e. a new statement every 10 seconds. Of all coaching statements, 52% (n=6594) were instructions, and 14% (n=1749) as feedback. The remaining 34% (n=4358) were verbal cues or motivational statements. Therapists tended to use coaching statements less frequently in the earlier days post stroke, and in patients with more severe stroke (Figure 1), although there was notable variability in frequency suggesting any relationship may be weak. There were no observable differences relating specifically to physical or cognitive impairment.

Coaching statements were used before, during and after practice. All types of coaching statement were given either concurrently with practice, or immediately following a practice attempt. Verbal cues and motivational statements were repeated regularly; accounting for around a third of all coaching communication (34%). Feedback was often given following one or two attempts of a given task, and was rarely delayed or summarised after task practice.

Focus of Attention

Instructional and feedback statements were further categorised according to their focus of attention. Of all *instructional* statements, 36% were internally focussed, 13% externally focussed, and 51% unfocussed or mixed focussed. Of all *feedback* statements, 44% were internally focussed, 6% externally focussed, and 50% unfocussed or mixed focussed. Figure 3 shows the distribution of instructions according to focus of attention for each participant, and Figure 4 shows the same distribution for feedback statements. Unfocussed statements, which do not confer any specific focus of attention, were used most commonly.

[INSERT FIGURE 3 HERE]

[INSERT FIGURE 4 HERE]

To examine the general bias toward either an internal or an external focus, we identified sessions where an external focus was used *more often* than an internal one. There were only 6 (7%) treatment sessions where an external focus was used more commonly. Furthermore, whilst there was a mix of internal and external focussed *instructions* in the majority of sessions, 48 (53%) included no externally focussed *feedback*. There were trends toward external focus statements being used more commonly in patients who were physically independent (higher score on mRMI), or cognitively impaired (lower score on MOCA) (figure 2). It also appeared that therapists used an external focus more frequently in the early days of recovery.

We further considered the specificity of the feedback that patients received, and particularly whether the therapist used an objective or quantifiable measure to increase specificity. The use of quantified feedback was low; occurring on 13 separate occasions, and in 9 treatment sessions.

AUTONOMY AND MOTIVATION

Motivational statements were used frequently. In total, 34% of all coaching statements were categorised as motivational statements or verbal prompts. The use of specific or structured motivational coaching techniques was limited, for example, facilitating the patient to have more control within a session by offering choice or enabling self-monitoring of task performance. We recorded no instances of therapists using phrases that would specifically align to the concepts of autonomy support or enhanced expectations [33].

Discussion:

We investigated the implementation of motor learning principles in routine stroke rehabilitation, providing insight into how and when therapists apply different behavioural strategies. Our analysis of descriptive data sought to understand which patient factors, if any, might influence this implementation.

Facilitating high intensity task practice is critical for optimising clinical outcomes [34], but is a challenge for rehabilitation professionals [35]. In this study, we were able to quantify two aspects of intensity – time spent active and task repetition. Unlike previous studies [22, 23], we found that time spent actively engaging in physical activity during rehabilitation sessions was proportionally high, however, treatment sessions themselves where short in length. There was considerable variability in terms of task repetition. Although it was not always the case, those who practiced at lower intensity were typically those with greater levels of either physical or cognitive disability. While not surprising, this highlights the clinical challenge of implementing intensive practice with patients who have lower levels of function.

Verbal instructions and feedback were used commonly across all of the observed treatment sessions. Instructional statements were particularly frequent; and patients had minimal opportunity to practice tasks independent of verbal information. This approach may not always be optimal, as it increases attentional demand and requires concurrent cognitive processing to understand, interpret and act on the information provided. Tailoring the frequency and/or timing of instructions, based on factors such as the individual's preference and stage of learning, could enhance task performance and learning [16].

Of all of the ingredients inherent to deliberate practice, feedback is considered as one of the most essential [10]. Multiple studies in healthy populations have demonstrated that reduced quantity feedback [36, 37] and delayed feedback [38, 39] are beneficial for the retention and generalisation of motor skills. Whilst the evidence in stroke rehabilitation is less compelling, research has shown some benefits of reduced quantity feedback, primarily for upper limb tasks [17, 18, 40]. Verbal information from a therapist was the commonest form of feedback observed in this study, and therapists favoured statements that were either unfocussed, or internally focussed. Other forms of feedback were scarcely used. Following stroke, where intrinsic feedback may be diminished due to sensory and proprioceptive impairments, the role of careful augmented feedback may be even more important. In their systematic review, Molier and colleagues found augmented feedback to have most value when it combined auditory, sensory and visual elements [41]. Further research is required to understand the optimal combination of feedback frequency, timing and content, and how to apply this for different tasks and different stages of recovery, in stroke rehabilitation. Nonetheless, our findings suggest that there is potential to improve the way in which verbal feedback is targeted, and that augmented methods may be underutilised.

Motivation is also an important influencer in motor learning. Engagement is linked to the fulfilment of competence, autonomy and relatedness – which increase inner drive and motivation [42], in turn influencing the motor learning process. Throughout all of the observed sessions, therapists used motivational language, and provided regular encouragement to aid performance. However, this motivational language was often non-specific, and was not always related to successful performance. In some cases, potentially disempowering language was used by therapists, for example, "*I want you to* do 5 more", or "try standing up *for me*". Careful consideration of communication, and use of more targeted autonomy supportive techniques [33], may be one way to support performance and learning. Examples include providing choice about aspects of performance/practice [43], and allowing opportunities for the patient to initiate, respond and change their behaviour, with less overt direction from the therapist.

Strengths and Limitations

The implementation of motor learning principles in stroke rehabilitation is highly complex, and requires systematic description using observational techniques. Through a consensus exercise, Kleynen *et al* (2015) outline a number of factors impacting motor learning, using implicit and explicit models as a conceptual framework [44]. Whilst previous studies have typically examined single factors (e.g. elements of intensity or focus of attention), we have collectively examined a range of factors that are known to be important in post stroke motor learning; including the elements (organisation, feedback and instruction) and influencing factors (stage of learning, ability of learner, and type of task) that are described in this framework [44, 45].

Our use of observational methods has both limitations and benefits. As we have used only observation to collect data, our analysis is limited to a quantitative description of content. We cannot report more depth about the reasons why therapists have employed certain approaches for individual patients, or the impact of the learning style used. This reasoning process is known to be complex, with therapists drawing on a range of information to guide clinical decision making [46]. Further research is warranted to better understand the factors that impact implementation of motor learning principles in practice.

In any observational research, the presence of a researcher may stimulate modifications in behaviour or action - this is a particular issue in small or more private settings (as in this research) [47]. Whilst this cannot be eliminated, recording the session without presence of the researcher, and limiting the information that therapists received about the exact nature of the analysis, sought to minimise this effect. Furthermore, a relatively large sample involving a number of different settings, therapists and patients, provided a broad and representative data set, that is likely to be generalizable. Finally, as our primary objective was to describe standard care, the use of video recording enhanced credibility of the observation, through minimisation of selectivity and bias during analysis, and the opportunity to employ more rigorous strategies for ensuring reliability during the analysis phase. For example, where there was uncertainty with how to categorise a behaviour, two researchers were able to observe the primary data and discuss and agree codes.

To optimise task performance during rehabilitation, and subsequently learning, therapists can manipulate features of their coaching language (what they say, how much and when) and practice design (type, number, difficulty and variability of task). Whilst this must be tailored to the circumstances of an individual patient [48, 49], this current study highlights an opportunity to better adapt practice conditions, and to use coaching language more effectively and consistently, to benefit motor skill learning following stroke. Further research is required to understand the collective benefit of different motor learning principles, and to understand what works best and for whom, in order to support therapists reasoning and application within clinical practice.

Implications for Physiotherapy Practice

- Therapists should consider how they use verbal instructions and feedback in a specific and precise way, in order to support the process of motor learning.

- There is scope within routine clinical practice to use the many and varied types of feedback more precisely and robustly.
- Further work is required to understand how to support high repetitions of practice in people with greater levels of physical impairment

Tables

Table 1: Category Definitions

Category	**Description**	**Example**
Instruction	Communication directed at the patient regarding a desired action or how to perform a desired action/skill.	"Lean forward, and push up to stand"
Feedback	Communication that provides information based on previously observed movement attempts; intended to influence or modify further attempts. NB – feedback may be given as a further instruction, for example – "next time, bend your knee more". This should be marked as feedback.	"You are not leaning far enough forward when you try to stand"
Internal Focus	Instruction or feedback that directs attention towards the movement itself (i.e. relates to the biomechanical/kinematic features of the movement)	"**Move your hips** to the left and **straighten your knee** before stepping." "You didn't **bend your knee** enough"
External Focus	Instruction or feedback that directs attention towards the desired effects or outcome of the movement (i.e. related to the environment/goal driven).	"Look up at the **clock** on the **wall**." "You touched the **marker** 8 out of 10 times"
Mixed Focus	Where a single instruction or	"Lift your **toes up** and step onto

	feedback statement includes both information of internal and external foci, within the same sentence.	the **block**”
Unfocussed	A general instruction or feedback statement that doesn't elicit any particular focus of attention	“Stand up and sit down” “Walk across the room” “You're sitting really nicely, well done.”
Verbal Cue	Short, concise phrases that serve to prompt or encourage an action	“…. And again” “Keep going”
Motivational Statement	One or two word positive statement – without specifically referring to any aspect of the performance	“Well done” “Good, better”

Table 2: Definitions and examples used to count movement repetitions

Activity Category	**Measure**
Sitting	a) Time spent sitting (mins) b) Movement repetitions in sitting were counted as 1 repetition for each full movement, from a starting position and back to the starting position, e.g. • reach for an object and back to start position = 1 repetition. • extend knee and back to start position = 1 repetition.
Sit to Stand	a) Time spent practicing sit to stand to sit – from initiation of first stand to seated position on final sit (mins) b) Repetitions of sit to stand (we did not specifically count stand to sit), e.g. • Sit to stand from a plinth to a table, to then complete a task in standing = 1 repetition • 5 repetitions of sit to stand to sit = 5 repetitions
Standing	a) Time spent practicing standing or tasks in standing (mins) b) Movement repetitions in standing. A repetition was counted from the initiation of the movement and back to a start position e.g. • Squat and return to start position – 1 repetition • Reach out to a target and back to midline = 1 repetition • Transfer weight to one side, and back to midline = 1 repetition
Stepping	a) Time spent practicing stepping activities that were ≤ to 1 gait cycle

	(mins) b) Movement repetitions that involve a stepping movement, but were ≤1 full gait cycle. e.g. • Step 1 foot forward and backward = 1 repetition. • Step 1 foot onto a block and down again = 1 repetition
Walking	a) Time spent practicing walking (mins) b) Any activity in which the patient continuously performs > one full gait cycle (moving forwards only). • Each step = 1 repetition
Other	Any activity that does not fit into the categories above. For example, any activity in supine, prone, side lying, kneeling.

Table 3: Characteristics of patient participants

Characteristic	**Summary Statistics**
Age (years)	
Median (IQR); Range	73 (66 to 83); 32 – 95
Gender (male)	
n (%)	56 (63%)
Time since stroke (days)	
Median (IQR); Range	17 (8 to 30); 1 - 77
Stroke sub-type n (%)	
ICH	17 (19%)
TACS	10 (11%)
PACS	35 (39%
LACS	22 (25%)
POCS	5 (6%)
Lesion side (left)	
n (%)	37 (42%)
NIHSS score on admission (maximum score 42)	
Mean (SD)	7.48 (4.69)
MOCA (maximum score 30)	
Mean (SD)	19.47 (6.58)
mRMI score – transfer sub-section (maximum score 5)	
Median (IQR); Range	1 (0 to 2); 0 - 5

ICH – Intra cerebral haemorrhage; TACS – total anterior circulatory stroke; PACS – partial anterior circulatory stroke; LACS – lacunar stroke; POCS – posterior circulatory stroke

Table *4*: Number of repetitions per minute, according to activity type.

Type of Activity	**Repetitions per Minute Median (IQR)**	**Range (reps per session)**
Tasks in Sitting	1.2 (0.8, 2.3)	3 – 156
Sit to Stand	2.7 (1.2, 4.3)	1 – 56
Transfers	1.4 (1.0, 2.0)	1 – 6
Tasks in Standing	5.8 (2.1, 10.7)	3 – 283
Stepping/Walking	21.5 (10.5, 32.3)	8 – 1245

Figure legends

Figure 1: Frequency of coaching statements and patient characteristics.

The relationship between the frequency of coaching statement's (statements per minute) and a) time since stroke, b) stroke severity. A line of best fit is given to aid visualisation

Figure 2: Use of an external focus of attention and patient characteristics.

The relationship between the proportion of externally focussed coaching statements (%) and a) physical independence (mRMI Score), b) cognitive impairment (MoCA score). A line of best fit is given to aid visualisation

Figure 3: Focus of attention categories for instructional statements, for each individual treatment session.

Figure 4: Focus of attention categories for feedback statements, for each individual treatment session.

Appendices:

Appendix 1: Sample Analysis Matrix

Supplementary File 1: Graphs

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Conflict of Interest Statement

None to declare

Keywords

stroke rehabilitation, motor learning, coaching, intensity, motor performance.

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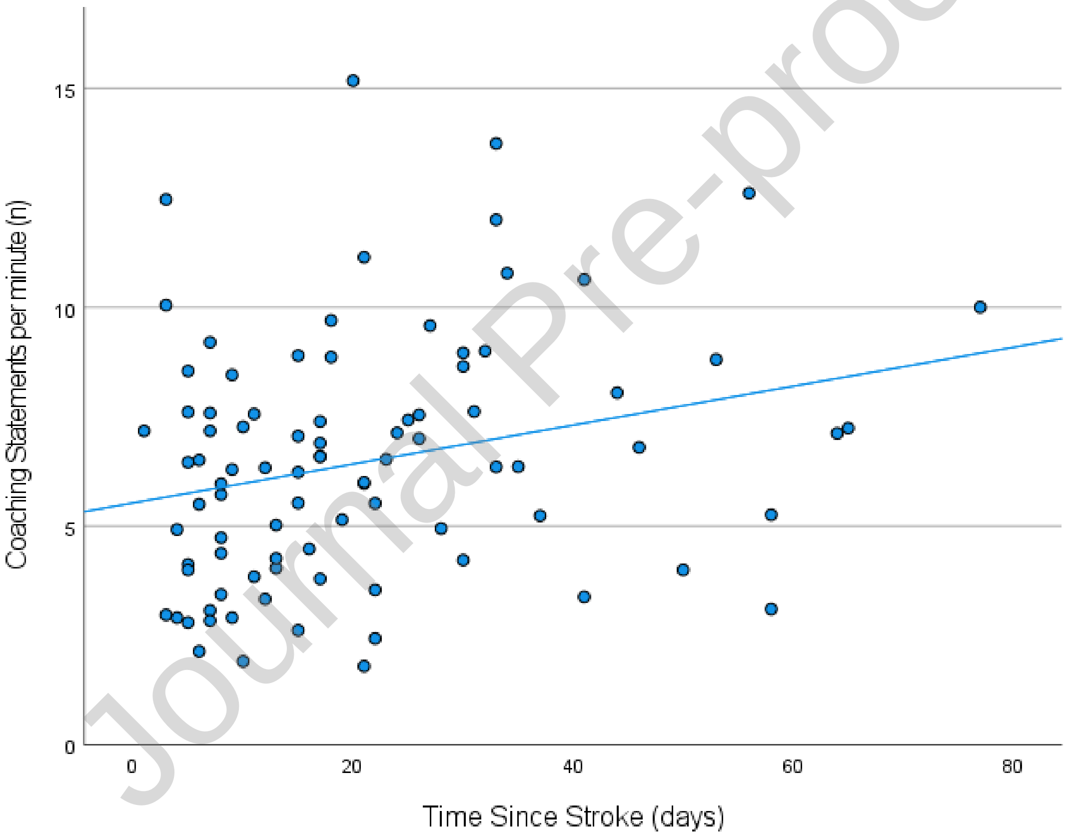
Fig 1



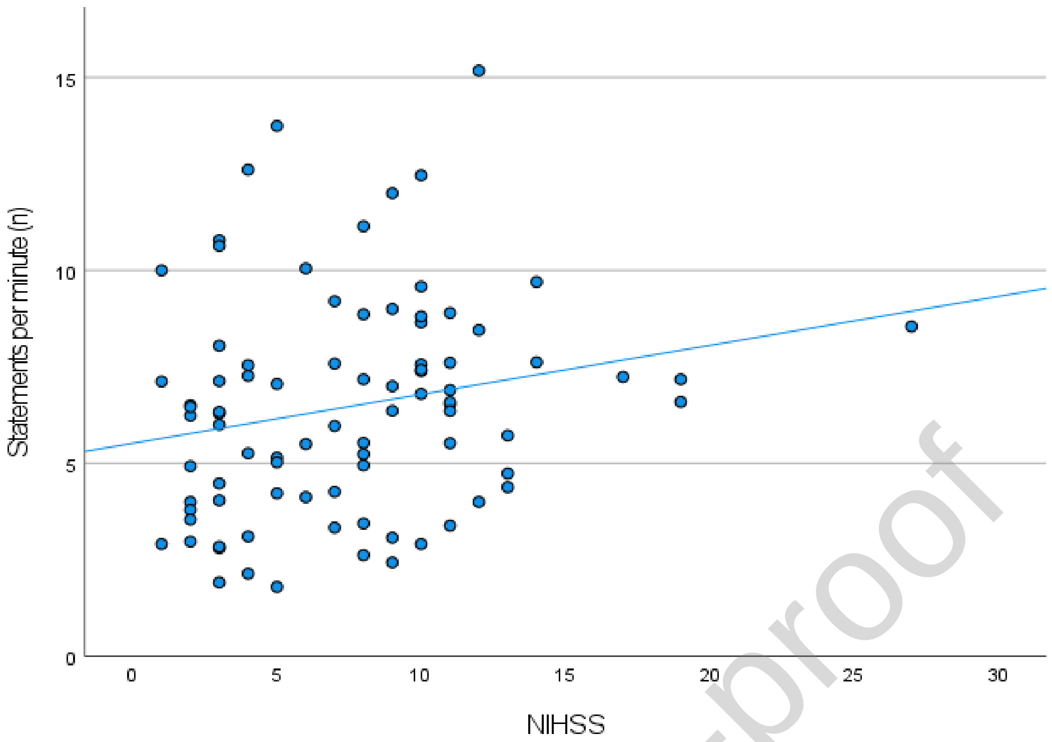
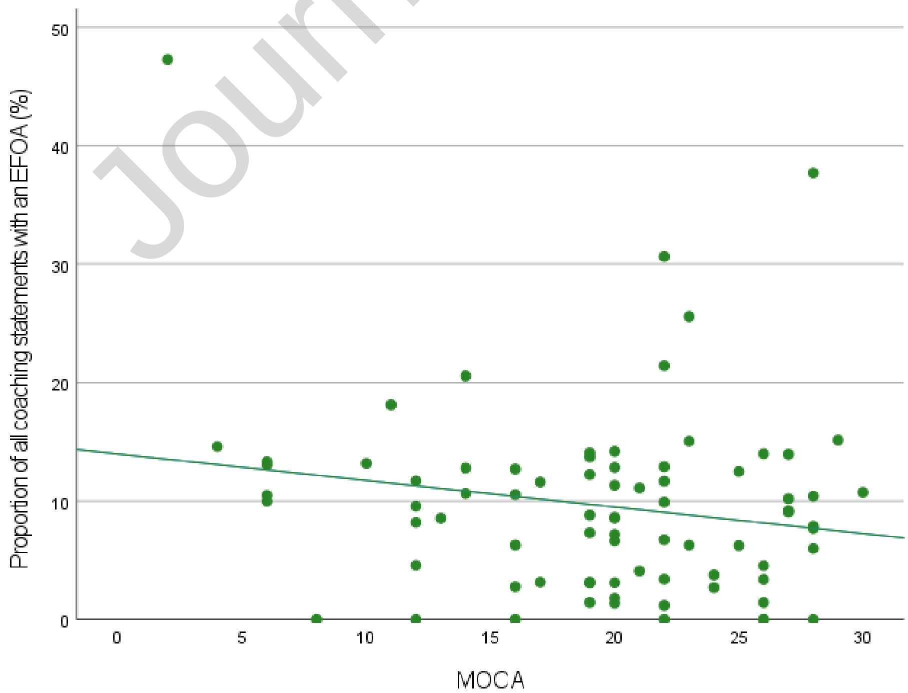

Statements per minute (n)
NIHSS
0
5
10
15
20
25
30

Fig 2


Proportion of all coaching statements with an EFOA (%)
MOCA
0
10
20
30
40
50
5
15
25

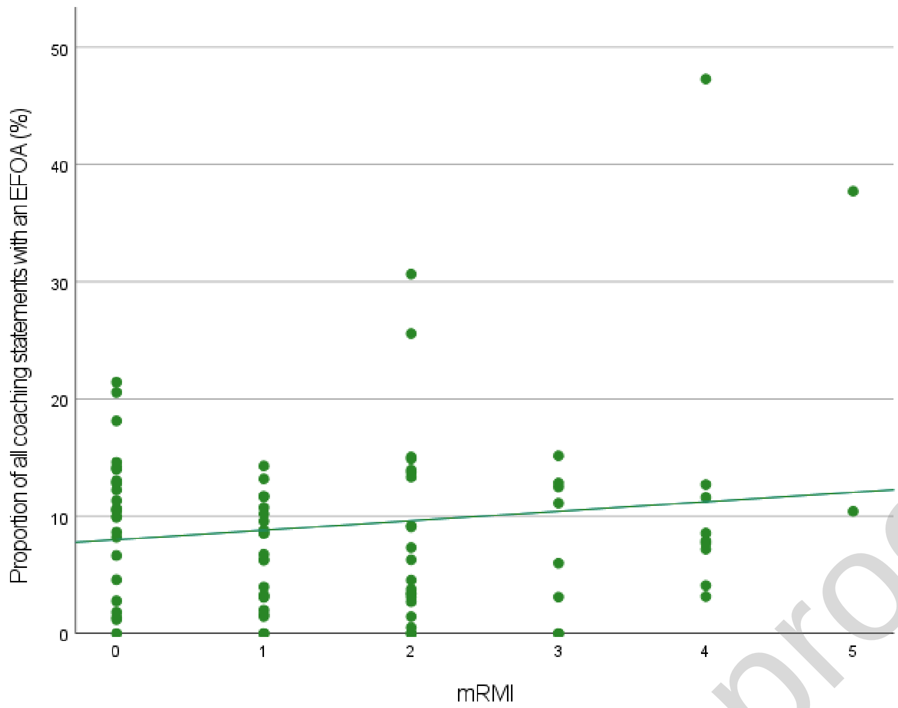

Proportion of all coaching statements with an EFOA (%)
50
40
30
20
10
0
0
1
2
3
4
5
mRMI

Fig 3

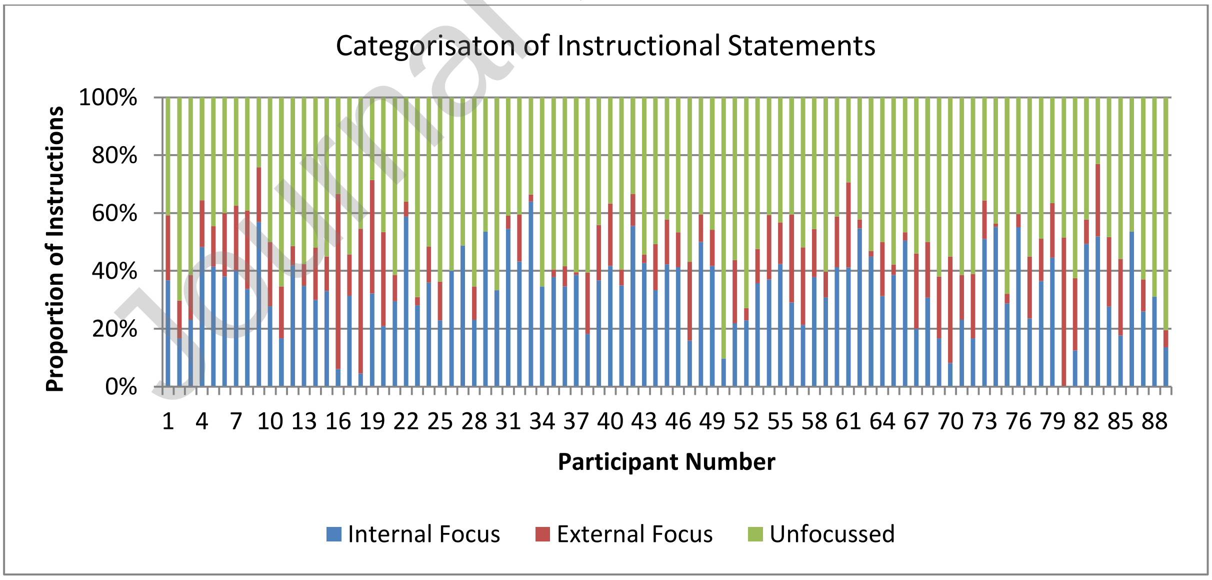
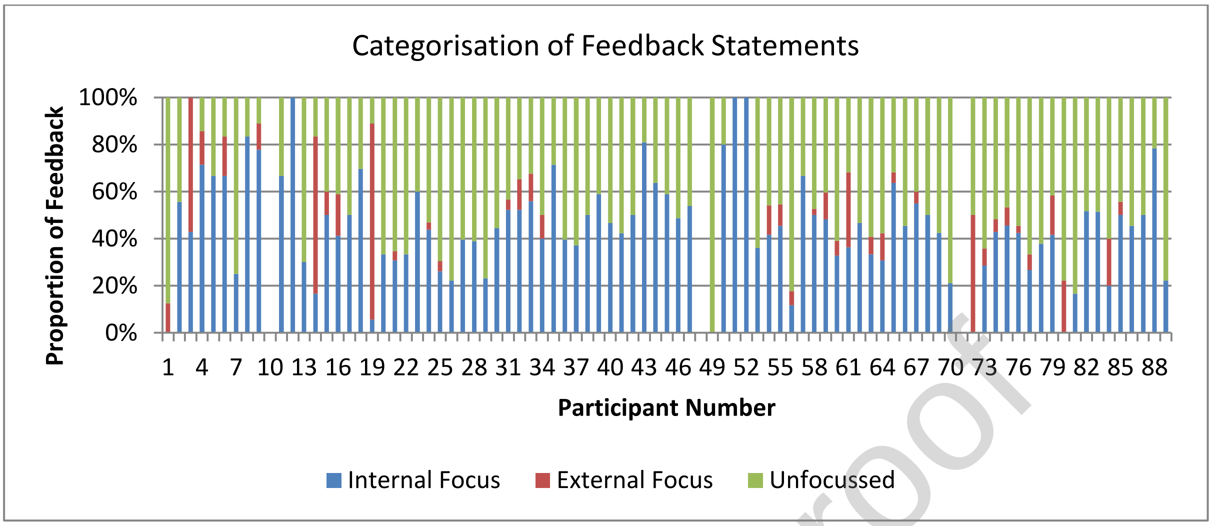

Categorisaton of Instructional Statements
Proportion of Instructions
100%
80%
60%
40%
20%
0%
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88
Participant Number
Internal Focus
External Focus
Unfocussed

Fig 4


Categorisation of Feedback Statements
Proportion of Feedback
100%
80%
60%
40%
20%
0%
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88
Participant Number
Internal Focus
External Focus
Unfocussed