

## The social organization in constraint-induced movement therapy

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**Abstract**—Ethnographic data were collected at two rehabilitation facilities conducting ongoing research to evaluate functional and neurological outcomes of constraint-induced movement therapy (CIMT). Our findings indicate that several patterns of behavior occur during participant/therapist interaction in therapy sessions: coaching, cheerleading, reminding, changing, and contemplating. These interaction patterns indicate that learned non-use of an affected limb does not exist in social isolation and that people who participate in CIMT routinely consider the balance of any improvement against the costs of using an affected limb that is still not fully functional. These patterns of social interaction that occur during therapy—which often influence a participant’s hope for future physical progress—are an important part of CIMT that may not be fully acknowledged in the clinical training of therapists.

**Key words:** exercise movement techniques, induced movement, learned nonuse, musculoskeletal manipulations, physical therapy (specialty), physical therapy techniques, recovery of function, rehabilitation, therapy, upper limb.

### INTRODUCTION

In this paper we present findings from an ethnographic study performed at two rehabilitation facilities conducting ongoing research to evaluate functional and neurological outcomes of constraint-induced movement therapy (CIMT). The data reported on in this study are specific to the therapy sessions we observed. Conclusions drawn from the observations should not be generalized beyond these

specific contexts. This paper is not an evaluation of the physiological outcomes of CIMT, but rather a qualitative analysis of the everyday reality of CIMT as participants went through a specific rehabilitative program. The focus of this paper is the process of participant/therapist interaction that occurred during sessions of a specific version of CIMT, not the process, or value, of CIMT in general.

CIMT is a newly emerging rehabilitation treatment based on the paradigm of neural plasticity. Rooted primarily within the principles of operant conditioning, CIMT suggests that a portion of the motor disability caused by

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**Abbreviations:** ADL = activity of daily living, CIMT = constraint-induced movement therapy, HIV = human immunodeficiency virus, MAL = Motor Activity Log, OT = occupational therapist, SEAL = sea, air, land (team member).

**This material was based on work from a feasibility study (Principal Investigator, Maude R. Rittman, PhD, RN) supported by the Department of Veteran Affairs (VA), Rehabilitation Research and Development (grant B2937P), and partially supported by the Rehabilitation Outcomes Research Center (RORC), North Florida/South Georgia VA Medical Center, Gainesville, FL.**

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DOI: 10.1682/JRRD.2004.02.0021

certain types of injuries involves a learned suppression of movement, referred to as learned nonuse [1]. Current CIMT procedures are largely based on research performed by Edward Taub and colleagues [2–8]. CIMT for participants poststroke has traditionally involved restraining the unaffected upper limb, leaving the affected arm free. The therapy team draws up a behavioral contract for each patient in which the patient agrees to wear the restraint during waking hours except when performing certain activities such as toileting. The restraint is to be worn for 14 days. On the 10 weekdays in this timeframe, patients spend between 5 and 6 hours at the rehabilitation center each day, performing tasks with the affected limb. The therapists do not combine any specific training technique with the restraint procedure [9].

Because CIMT is relatively new, research has understandably focused on functional outcomes, generating findings that show CIMT's effectiveness in producing neurological changes and functional gains in affected limbs. A recent report indicates that up to one in four patients with chronic stroke could benefit from CIMT [10]. Neurological issues such as cortical reorganization, central nervous system repair, increased limb use, and language functioning are all fundamental to CIMT. From these preliminary findings, researchers in rehabilitation are evaluating results of CIMT with larger samples of stroke survivors.

Although physiological results from CIMT have been promising, 68 percent of prospective CIMT patients have reported being unlikely to participate in the program because of the perceived demands of wearing the restraining device and the amount of time spent in the treatment setting [11]. Prospective participants seemingly weigh the potential benefits the therapy can produce against the perceived costs of restraining their less affected arm for 2 weeks and participating in such an intense program.

During the sessions observed for this study, CIMT was traditionally delivered following protocol in prior publications [1,9,12]. Similarly, CIMT included behavioral contracts, a Motor Activity Log (MAL), and a daily diary. The MAL is a semistructured interview that enables researchers to measure how much and how well patients use their affected arm for activities of daily living (ADLs) in the home over a specified period of time. Fourteen specific ADL tasks are evaluated with a 6-point amount-of-use scale. Quality of motion was not addressed. Specifically, before the initial CIMT session, the therapist presents the contract to the participant and caregiver and has

the participant sign it, agreeing to its conditions. The contract includes the expectation that participants will comply with wearing a restraining device (a mitt) 90 percent of the time they are awake, except during activities involving water and safety. Thus, by signing the behavioral contract, the participant agrees not only to wear the constraint during therapy but also to follow a home training schedule, with evening and weekend tasks, to try to use the impaired limb as much as possible in ADLs. CIMT covered 2 weeks for 5 to 6 hours a day including lunch times and a short break only if requested. The participant kept a daily diary of all performed activities and all times the mitt was off, discussing it with the therapist to identify specific activities needing task practice. The MAL was used as a daily reminder for functionally increasing the use of the involved limb from the prior day.

The CIMT involved some activities that were unique to this protocol. The CIMT activities for each participant were identified through an Interest Inventory and Role Identification survey. Tasks included activities such as buttoning a shirt, brushing teeth, and using a key. The CIMT activities were gradually progressed as tolerated, with repetitions of task practice requiring power, endurance, coordination, and range of motion. From the therapists' perspective, CIMT was provided in a supportive and positive therapeutic environment with verbal acknowledgments of daily achievements. Celebrations ended the 2 weeks of intensive CIMT for each participant, and the participant was encouraged to continue the progress attained. No follow-up communications were made except for posttesting. The outcomes of the CIMT are not the focus of this paper, and we did not compare outcomes with qualitative data reported.

The value of qualitative studies in physical rehabilitation has been recognized for some time now [13–18]. Qualitative approaches using ethnographic methods have been used to study medical management of illness [19], life in assisted-living facilities [20], life in nursing homes [21], emotion therapy [22], and HIV (human immunodeficiency virus) counseling [23]. Findings from these studies indicate that qualitative methods are effective in defining patient-centered practices in healthcare. Various qualitative studies have noted the need for a patient-centered approach to physical rehabilitation [24–27]. One of the most comprehensive qualitative studies in physical rehabilitation examined clinical expertise among 12 physical therapists [28]. This study used a variety of qualitative data-collection strategies, including field observations,

interviews, and content analysis of professional documents. A conceptual model highlighting four specific dimensions of expert practice in physical rehabilitation included the following:

- patient-centered knowledge structures,
- a clinical reasoning process based on collaborative problem-solving techniques between therapist and patient,
- an assessment of physical function that usually relies on tactile engagement with the patient, and
- clinical practice based on the caring of and commitment to patient needs and concerns.

All these dimensions illustrate the importance of understanding the treatment process of rehabilitation therapy in which therapist and patient actively engage each other.

## METHODS

Ethnographic fieldwork was used to collect data on CIMT participants during therapy. This data-collection strategy enabled the research team to observe and assess the CIMT treatment as it naturally occurred between therapist and participant.

### Settings

We conducted observations at two different sites in the same southeastern city. At both sites, research programs tested the effectiveness of CIMT with or without adjunct therapies. CIMT sessions at both sites lasted 5 to 6 hours a day for 10 workdays. On weekends, homework was assigned, with participants reporting the completion and quality of homework activities to the therapist on the following Monday.

A variety of physical and occupational therapists (OTs) conducted the therapy. At site 1, one primary physical therapist worked directly with participants the majority of the time. Two other physical therapists, who assisted on the study, would sometimes take over the rehabilitation training. These three physical therapists were all professionals with years of experience; all three were female. Sometimes these therapists would train physical therapy students who would observe and, at times, conduct the therapy. Like the therapists we observed, all student therapists who interacted with the participants at site 1 were female.

Participants at site 2 either were assigned to daylong treatment at the facility or received a daily schedule of therapy tasks to perform in their home or temporary place

of residence. Of the seven people we observed at site 2, four participated in therapy 5 hours a day at the site for 10 days, whereas three participated in 4 hours of therapy each day off-site, spending an hour each morning at the rehabilitation facility interacting with a CIMT therapist. We observed these three participants throughout the entire time they spent at the facility. At site 2, all physical therapists were graduate students in physical therapy. Four main student therapists worked with the participants we observed: one was male, and three were female. Participants doing the therapy away from the rehabilitation facility would come to the facility for about 1 hour each day to report what and how well they did the day before and to receive their new schedule of assigned tasks, performing each of the tasks under the supervision of the therapist.

### Subjects

In total, 15 subjects participating in CIMT were enrolled and provided with consent forms, which they signed. Of these, three withdrew from CIMT shortly after consenting and were not included in our findings. **Table 1** and **Table 2** provide descriptive demographic and physical information on the participants, respectively.

### Data Collection and Analysis

Data collection for this project included in-depth field observations conducted across 16 months (from January 2002 to May 2003) and qualitative interviews with 12 participants and 10 caregivers at two rehabilitation sites.

**Table 1.**

Participant demographic data.

Participant (Pseudonym)	Gender	Age	Education (yr)
Annie	F	74	12
Sam	M	64	18
Mark	M	57	17
Jim	M	59	20
Tammy	F	37	12
Bill	M	49	13
Monty	M	66	16
Lisa	F	65	12
Mary	F	47	14
George	M	53	12
Ed	M	59	12
Max	M	49	14

Note: All participants were Caucasian. M = male, F = female.

**Table 2.**  
Participant physical data.

Participant (Pseudonym)	Handedness	Hemiplegia	Stroke Type	Poststroke (yr)
Annie	R	R	Clot (putamen)	23
Sam	R	L	Hemorrhage (putamen)	8
Mark	L	R	Hemorrhage (thalamic)	6
Jim	R	L	Hemorrhage (parietal)	2
Tammy	R	L	Hemorrhage (putamen)	2
Bill	R	R	NP	7
Monty	R	L	NP	6
Lisa	L	L	NP	2
Mary	R	R	NP	10 months
George	R	R	NP	6
Ed	R	L	NP	2
Max	R	R	NP	1

Note: NP = not provided, R = right, L = left.

At site 1, two researchers alternately observed therapy sessions, both developing a good rapport with therapists and participants. During these observations, the researchers wrote detailed field notes of what participants did during their therapy and the communication between participants and therapists. The use of field notes enabled the researchers to establish a "note-taker role," in which the note taking became an expected activity for the field researcher to perform [29]. Because of the research-laden nature of these rehabilitation therapies, note-taking activities seemed to blend in with the other action occurring in the environment. Although noted by therapists and participants, the researchers' presence was frequently regarded as a natural occurrence in the research-oriented facility. This interpretation of the fieldwork allowed the researcher to conduct the ethnography without overtly affecting what was being done during therapy sessions. Although both therapists and participants questioned the reason for the fieldwork, the researchers seemed to satisfactorily answer their inquiries with a short response that it was important to observe therapy sessions to more fully understand how rehabilitation is done.

Once the field research ended for the day, the handwritten field notes were transcribed into formal field notes on the computer, creating a wordprocessing file. Field notes were given a heading that marked the date and time, with notes numbered according to specific events occurring during the observed timeframe. Theoretical notes detailing impressions or thoughts of the researcher during observations were differentiated from

empirical observations of the therapy setting and entered into the computer as separate data. In the file, conversational data were marked with quotes if the talk jotted down was exactly what was said. If the field notes were a close approximation of the actual dialogue, quotes were not included. Field notes that were a summary of lengthier discussions were indicated as such by the use of brackets. Typing the field notes close to the time of observations assured that the content included in the notes could be completed as accurately as possible. The handwritten notes were quite detailed since the researchers were able to sit comfortably in a corner of the room where the therapy was being conducted. The detailed notes and quick importation of field notes into a computer database increased the validity of the data.

All transcribed field-note data were imported into the qualitative software package QSR N6 for detailed analysis. This software enables qualitative researchers to enter their data as separate text files into one large database. Researchers can then create coding structures and analyze data line by line within the database [30]. The research team developed a coding framework by initially coding six observations. All field notes were then subjected to coding with this framework, with new concepts added or existing concepts refined as observations continued. This method of data analysis follows the conventions of the constant comparative method [31], in which the constant comparative method is compatible with the inductive, concept-building orientation of all qualitative research [32].

The focus of the ethnographic analysis was the production of meaningful experience by participants and therapists during CIMT [33–35]. On the basis of the principles of ethnomethodology, our topic of study became the practical procedures that participants and therapists used for “creating, sustaining, and managing a sense of objective reality” related to CIMT activities [35]. Our emphasis was on how the social world of CIMT was accomplished through face-to-face interaction between therapists and participants. The researchers developed theoretical concepts from the patterns of behavior and dialogue observed during CIMT.

The reliability of the observations and subsequent coding was established by triangulation of more than one observer and multiple coders working independently and then validating their observations and interpretations with other members of the research team. The observations were found to be quite similar independent of the observer. Likewise, weekly coding meetings helped establish a systematic method to the data analysis. Any differences in data interpretation among members of the research team were discussed during weekly meetings until consensus was reached. Further, we presented our findings to leading physical therapists at a local conference, with therapists validating the consistency of many of our key findings with their clinical experiences.

## RESULTS

During therapy sessions, participants and therapists commonly discussed many aspects of CIMT not frequently captured by the results of formal testing procedures [36–38]. The object of these discussions frequently centered on an increased awareness of the impaired limb; pain reduction; slight motor improvements, such as the ability to bend one’s index finger at the first knuckle joint; and qualitative shifts in motor technique, such as better posture when reaching for an object. The patterns of social interaction that we found most prominent in our observations of these two settings consisted of the following:

- teaching the participant proper technique (coaching),
- praising and encouraging the participant (cheerleading),
- reminding the participant not to violate the signed behavioral contract by using the nonimpaired hand while performing a task (reminding),

- modifying a task because it is too easy or too difficult for the participant to perform (changing), and
- personally assessing the progress they were making during the rehabilitation treatment (contemplating).

The examples of participant/therapist interaction during CIMT presented in this paper were selected to illustrate the general patterns we observed. Although the patterns of interaction we list represent all the observations we made, the data we present for each pattern are limited to the selection of only one or two observations that we feel adequately capture the interaction pattern under discussion. The data used as illustrations are drawn from many observations made during the course of the study. Patterns were similar across all participants we observed, and saturation of data was achieved, with no new interaction patterns evolving. Note, however, that we observed only a select sample of participants at each site and other patterns may have emerged for other participants.

The principal investigators of each perspective CIMT project are still investigating the general range of sensory recovery; however, for the people we observed, our 1-month follow-up telephone interviews indicate minimal retention of new activities performed with the affected limb in and outside of the home. The participants we were able to reach 1 month after therapy informed us that the most beneficial aspects of the program were the interaction with therapy staff and a renewed hope for functional recovery with additional therapy. Many participants acknowledged that they would do the program again if given the opportunity.

### Coaching

Coaching is a pattern of therapist instruction in which the therapist directs the participant on how to perform an activity. Coaching strategies and directives most commonly involve discussing the proper technique the participant should use in performing a specific task. The term “proper” here refers to the technique the physical therapist actively defines and, at times, physically illustrates. Therapists frequently discussed with participants the notions of learned nonuse and neural plasticity (making new connections between the brain and the impaired limb). The belief is that changing the way an activity is performed (a change in technique) will eventually lead to a change in the body (improved functioning in the impaired limb by establishing new neural pathways between the limb and brain), which will ultimately result in changing one’s life

(improved quality of life). Therefore, the first step in this process is coaching the participant in the proper technique.

For example, one participant, Annie,\* was being timed while flipping playing cards. The therapist counted and recorded the total number of flips performed within 20 seconds. The following dialogue immediately ensued after the 20 seconds were up:

Annie: I did better yesterday.

Therapist: Let's talk about technique. It's not that your hand is any worse or anything. It's technique. Try to open as many fingers as you can.

Annie: That's the problem. If they'd open, I'd do better.

Therapist: Let's remember to talk about the technique tomorrow before we do this one.

Coaching the participant by stressing technique over physical failure appeared to be a crucial aspect of CIMT discourse. Annie begins to define her task performance as a failure because she did better on the same task the day before. The therapist discusses Annie's clenched fingers as a result of poor technique. The exchange ends with the therapist telling Annie that they should remember to talk about technique before she performs the task again. Interestingly, therapists often glossed over upper-limb impairments as being of secondary importance to the technique used by the participant in performing the task. In this way, hope for improvement always existed, because better technique would presumably result in better task performance.

### Cheerleading

Praising the participant is not simply a comment made by the therapist for a job well done; it also provides a motivational stimulus. Praise is a verbal reward for successfully completing a therapeutic activity that the therapist hopes will increase the participants' self-confidence in using their impaired limb in and out of the CIMT setting. This conclusion is illustrated by the following example:

The participant, Bill, begins buttoning a blue collared shirt. The shirt is flat on the worktable, facing Bill. Bill is using only his right, impaired, hand. Bill finishes one of the buttons on the shirt. The student therapist, Jane, responds, "I knew you had it in you." Bill completes

another button. Jane then replies, "That's two. What's going on?" Bill, remaining focused on the task at hand, does another button. Jane then tells Bill, "You got three. Are you impressing yourself?" Upon hearing this inquiry, Bill looks at Jane and chuckles. Jane tells Bill that the top button is harder. Bill replies that "Once you get it goin'". Once you get it in there..." Bill then focuses his attention to the task of finishing the top button. Jane says, "You got it. You just made my Friday." Bill then begins unbuttoning the shirt. As Bill does this, Jane tells him that he is doing "real good." She adds, "This is the most I've seen you do. I think I've only seen you do one button before. You should go home and tell your wife that you can button an entire shirt." Bill responds, "Yeah, I will."

Working 5 to 6 hours a day using an impaired limb often became very tiring for participants. Fatigue, coupled with coming face-to-face with what they were not able to do, was sometimes stressful and depressing. At site 1, if participants became depressed, they could be referred to a trained clinical psychologist who worked at the center. This occurred with two of the five participants we observed there. All 12 participants, however, would express sadness and frustration about their limitations. When participants expressed these feelings, therapists would try to offer words of encouragement, noting the progress they had seen the participants make during the short time they had been involved in CIMT. For example, it was quite common to hear therapists tell participants something like, "When you first came in here you couldn't even pick a checker up with your right hand. Now look at you. You've got three of 'em stacked there. You're doing great. You might not see it, but I do."

Therapist encouragement was also used to keep participants performing the therapy tasks. For example, as one participant, Ed, sits at the worktable putting pieces of a puzzle together, he stops trying to perform the task. Ed sits at the table and stares blankly at the wall in front of him. The therapist sees this and offers Ed some encouragement and praise to refocus him on completing the task.

Therapist: Come on, sir. You were doing good earlier.

Ed: I was?

Therapist: Yeah. You got the blocks out in no time. Now you are starting to drift.

If the participant is failing to perform a task, like Ed in this example, the therapist tries to offer encouragement, noting that the participant can do the task because the therapist saw him do it before. Praise and encouragement

\*All participant names are pseudonyms.

were two of the most prevalent forms of dialogue throughout CIMT. Sometimes participants would refocus and continue the task at hand, and at other times they would simply say that they were too tired and needed a break, or that they needed to use the restroom, exiting the room and returning about 10 to 15 minutes later. Sometimes, while taking breaks in between activities, participants would inform us of their frustration with CIMT. They would tell us that using a hand and arm that they had not used in years was very difficult physically and seeing how difficult it was to do something like putting one checker on top of another was emotionally draining because it provided them with a vivid example of the lasting effects of the stroke. For these reasons, therapist encouragement was an ongoing necessity to keep the participant focused and active in completing the tasks involved in CIMT.

### Reminding

At times, the therapist would remind participants of what they were supposed to be doing, often noting the participants' expressed agreement in the behavioral contract. While instances of mock resistance occurred, in which participants verbally refused to do something and then immediately proceeded to attempt the assigned task, at other times participants would not comply with therapeutic directives. The most common example of this noncompliance occurred when participants used the non-impaired hand to perform the task. Both therapists and participants used the term "cheating" to describe the participant's use of the restrained limb. Some therapists would tell the participant to allow the therapist to be the participant's other hand if necessary. This monitoring of the restrained hand is illustrated in the following example:

While George tries to put items back onto the post that is on the floor, the (student) therapist asks him if he is cheating. George says no. At another point, George puts his restrained hand between his knees and closes his legs together. The therapist sees this activity and asks George if he is doing that so he won't cheat. George says yeah. At another point, a twine ring falls from George's right hand onto his lap. George uses his mitt to stabilize the ring in a vertical position in order to grip the ring with his impaired hand. Once this occurs, the therapist says that George cheated. George looks at the therapist and states, "Yeah, but it wasn't intentional. It just happened that way."

In the CIMT sessions we observed, in which the restrained limb is a functional hand placed inside a large mitt, cheating seems "natural." Participants often pointed

out that many daily activities require the use of two hands. Therapists would respond that someone else could serve as the second hand or that participants should try to do the best they could by using only the nonrestrained limb. In the next example, the participant, Sam, begins cutting pieces of Play-Doh with a plastic butter knife. A conversation about the need to keep the mitt on the non-impaired hand ensues:

Sam begins to take his mitt off, but his therapist tells him not to. Sam tells her that he needs his right hand to stabilize the Play-Doh. His therapist instructs Sam to "stabilize the Play-Doh with the mitt on." She tells all who are present that Sam and she speak French: "Mitt on, mitt on." The visiting OT adds, "Mitt on. Mitt off." Sam's therapist and one of the visiting physical therapists exit the room. Sam looks at the visiting OT and states, "I don't know how she [his therapist] expects me to stabilize with my mitt on." Sam is having difficulty opening up the container of Play-Doh. He turns to the OT and says, "Just for kicks," and takes off the mitt, using his now bare right hand to open the container. The visiting OT jumps up from her seat reaching for Sam's right hand, quickly uttering, "Uh, uh, uh." Sam puts the mitt back on. He asks the OT, "Are you in collusion with my teacher?" She replies, "I may have to be."

The restraining device, or mitt, is a major source for discussion during CIMT. As mentioned previously, the "contract" participants sign before beginning therapy states that they are to wear the restraining device at least 90 percent of the time they are awake. However, when participants report what they do outside of the therapy setting, this percentage of restraint is difficult to quantify. For example, in the following extract, the participant, Mark, and his therapist discuss the contract, the times when the mitt is allowed to be off, and the importance of using the impaired hand in all activities Mark performs outside of therapy:

Therapist: You're going to be in it [mitt] 90 percent of the time, even at home. The only time you take it off is if there's some safety problem.

Mark: Let me ask a question. I just bought a computer and I like playing with it. How am I gonna do that with that mitt on? Do I have to wear that mitt?

[The therapist then explains the 90 percent waking time rule for wearing the mitt and how Mark would have to make sure that he is playing on the

computer during the allowable 10 percent of his waking time.]

The dialogue between Mark and his therapist illustrates that there are practical ways to “trump” restraint. The rule that participants are to wear the restraint 90 percent of their waking time, in effect, permits them to properly do CIMT at home during the time that they allocate to 90 percent; however, in actual practice, that amount is ambiguous. This point is clarified in the following example, when a week later, Mark and the therapist again exchange dialogue regarding the wearing and not wearing of the restraint when he is away from the clinical setting:

Mark and his therapist talk a bit about the weekend and the homework assignments. The therapist asks Mark what sorts of things he had to take the mitt off to do. Mark mentions that he did not wear the mitt when he was working on his computer, which amounted to “several hours” of not being restrained. Mark notes that there are several tasks where he simply cannot wear the mitt because he could not do them with the mitt on. The therapist agrees with this and responds that other than these “necessary” times, Mark needs to wear the mitt if he is to fulfill his end of their agreement. Mark then says that he could hardly wear the mitt when he was walking the dog and certainly not when he went out for prime rib (“for the first time in a long time”). He had to cut his meat, after all, and did not want anyone to do it for him, definitely not his girlfriend (which would make him look like a child). Mark then describes other times he had to go without the mitt. For example, when he describes opening a bottle, Mark says that a person needs both hands to unscrew a bottle, unless he steadies the bottle between his knees.”

Although wearing the mitt 90 percent of the time one is awake seems to be an objective and measurable practice, determining a participant’s compliance as specified in the behavioral contract often remains quite ambiguous during CIMT. In some instances, the use of two hands to perform an activity is expressed as a positive change by the therapist (overcoming learned nonuse), whereas in other instances using both hands for the same activity, like opening a bottle, is seen as noncompliance with CIMT protocol. Therapists must determine how much can be expected from participants and how adhering to the restraint device could possibly further limit stroke survivors’ participation in everyday activities by making them acutely aware of their disability. One student therapist discussed this difficulty with us:

George exits the room. The (student) therapist talks about her job. She informs the researcher that the toughest part

is gauging how hard to push someone. The researcher states that that is interesting and asks her how she gauges this. The therapist responds that she measures it. The researcher asks her how she measures. She replies that every therapist is different. Each participant is different. Some want the therapist close by; others want the therapist to back off. She just assesses the participant’s attitude. The researcher asks her how she does this. The therapist answers, “By, like with George, looking at their gestures. Nonverbal communication, I guess you call it.”

### Changing

Participants would sometimes talk with therapists about how close the objects should be or how a particular task should be set up for them to be able to complete the task. The result of these discussions often influenced the “progress” participants were making in that task. If the task was simplified, or objects moved closer to the participants’ impaired hand so that they would not have to reach out as far, successful task completion—the practical benchmark of progress for participants during therapy sessions—would be more likely.

Several therapists expressed the notion that “each participant is different.” Therapists frequently noted participant fatigue and would often assess the participants’ mood by engaging in conversation about the participants’ current feelings of the therapy, what family members and friends thought about their taking part in the rehabilitation program, and their plans for the immediate future. Through this system of “measurement,” therapists were then able to change the task schedule in a manner that best fit the current mental and physical capacity of the participant. For example, one participant, Jim, a former Navy SEAL (sea, air, land team member), frequently told therapists not to move the objects too close to him. For Jim, knowing that he was being challenged and pushing his ability to the limit made CIMT meaningful and worthwhile. Another participant, Mark, an attorney, did not obtain the same satisfaction from testing the limits of his functional ability. Mark frequently mentioned the pain in his shoulder and often requested break periods. For example, after playing two rounds of a card game, Mark and his therapist talk about continuing the game or taking a break:

Therapist: Okay. Keep playin’. [She holds the remaining cards in the deck up to Mark so that he can pull out cards for another round.]

Mark: Keep playin’?

Therapist: Hm-hm.

Mark: I need a little bit of a rest.

Therapist: Does it hurt in the shoulder?

Mark: Yeah.

Therapist: Place your elbow on the table when you flip the cards. That will place less stress on your shoulder.

Mark's actions of requesting breaks and verbalizing his pain are the opposite of Jim, who often refused to take a break when offered, denied any existence of pain, and directed the therapists on how to make a particular therapy activity more challenging for him rather than less. Most of the other participants acted in ways that were closer to Mark's behavior than to Jim's. Participants commonly remarked how they could not figure out why they could not complete a task they had completed only the day before. The assumption of consistency in physical ability and a linear understanding of progress can be quite misleading for participants. Although a linear trajectory of progress did not seem to occur with any of the participants, all participants appeared to believe that such a linear experience should exist. Whenever participants verbalized their disappointment in not experiencing this linear physical progression, they were given a great deal of encouragement, and they would often stop the task they were doing to specifically ask therapists to assess the progress they were making in CIMT. Although therapists could inform participants of the likelihood of plateaus in motor performance, the intimate experience of working hard every day at therapy only to see small improvements in the affected limb decline during a given task was not an easy concept for participants to accept. Changing a task by placing the object closer to participants partially alleviated negative personal assessments regarding their performance in CIMT.

### Contemplating

Contemplating occurred when participants stopped what they were doing because of fatigue, frustration, or simple curiosity and asked the therapist to assess the progress being made in CIMT. The therapist and participant would converse about functional limitations and what kind of improvements could be expected once the therapy was completed. As Sam informed us, the notion of improving, regardless of how much or in what physiological area, is the most important aspect to rehabilitation: Taking a break from a push-pin exercise, Sam says, "You know what? Sociologically speaking, success is needed to keep going. Chimpanzees can learn new tricks. If stroke

clients don't have any successes, they give up. It takes tiny pebbles to build a dam. Not rocks."

Rather than a miracle of rehabilitation science, the CIMT program was virtually always described as a "start" as the therapy sessions moved into the second week. That is, while perhaps expecting a miracle when they entered CIMT, by the end of the first week, participants seemed to realize that the therapy helped in overcoming learned nonuse and made them more aware of the impaired limb when performing daily activities; they seemed to realize that the therapy most likely would not result in functional recovery that would bring the impaired hand close to the functional level of the nonimpaired hand. However, even after the first week, a few participants continued to hope for a miracle, although they began to realize it was unlikely to happen. As they told us, "All you can do is hope." Some of the participants were eager to participate in additional therapies soon after CIMT ended, whereas others reported that they planned to return home and continue their normal routine, making few if any changes in how they went about their daily lives. Perhaps as a way to motivate participants to continue using their impaired hand beyond the 2 weeks of CIMT, therapists tended to emphasize the importance of any kind of improvement, often implying that continuing use of the impaired hand could lead to increased functional gain in the future:

Therapist: You're going to be surprised because, by the end of the week, you'll be able to reach out with your right hand.

Mark: [Laughs] Well, I don't know.

Therapist: Really. It'll just become natural for you to reach with your right hand.

All participants in CIMT discussed how their lives were drastically changed by their stroke. As previously mentioned, for those who were able to once again see themselves as independent, CIMT could bring back awareness that they were still physically limited, despite the activities they were able to perform at home and in the community. This realization could then lead to feelings of depression. Therapists frequently stressed the importance of slight functional changes, whether to help participants realize that they could become more independent through hard work or to alleviate feelings of depression over functional limitations that had been hidden through learned nonuse.

Student therapists, however, seemed to provide less verbal feedback regarding slight physical changes than

did senior therapists. For example, in the following extract, a student therapist asks George if he has seen any improvement since beginning CIMT. George mentions a new thumb movement and the ability to open drawers:

Therapist: Do you see any improvement?

George: I can get my thumb out like this.

Therapist: Anything else?

George: No. Well, I can open drawers and a few other things like that. That's about it.

[Therapist slowly nods her head up and down.]

George did not receive strong positive responses for the slight physical improvements the way Mark did from his more seasoned therapist. This may partly explain George's eagerness for CIMT to end, allowing him to return home and continue his life the same way he had been living it. George had also seemed to give up the idea of ever working again and was more socially isolated than Mark. These factors could have also influenced George's experience in CIMT.

## DISCUSSION

The CIMT participants we observed expressed a desire for information that tracked their physiological progress before and after treatment, but as social beings, these participants continually evaluated their own performance throughout the lengthy therapy sessions without the aid of any quantifiable data. This "microprocess" of evaluation that participants performed often involved verbally interacting with their therapists to reach a common understanding of the situation. Although the therapists continually focused the participants on the task at hand, participants would often continue the discussion until they were verbally engaged by the therapist. For example, in our initial observations of CIMT we often heard participants ask their therapist, "How am I doing?" It was a question to which participants expected an answer. We then wondered how varied these participant/therapist exchanges would be over time and if different therapists would provide different responses to the same therapy participant throughout the 2-week program.

These questions became important for our study in part because of the observational data indicating that regardless of how controlled the therapy environment is when the therapist uses an experimental protocol, human interaction between therapists and participants is a major

component of CIMT. Although we can hope to control the therapist's response to participants' questions, we cannot control how different people receiving treatment interpret CIMT. People bring their personal histories to all social encounters, including physical rehabilitation. Studying the process of social interaction between therapists and participants is important in its own right, apart from the measurable outcomes from that treatment. Ethnographic data help us understand the experience of participating in a particular therapy and the patterns of social behavior that make up that particular experience from the participant's perspective.

Our observations of participant reactions and therapist responses over the course of CIMT address issues that have been generally ignored in clinical literature. A recent review of CIMT articles states that very little attention has been given to the reactions of patients and therapists to this therapy [39]. Siegert et al. note that because participants are being restrained and investing a significant amount of time [39], it is important for researchers to consider participants' reactions regarding CIMT and their personal accounts of how the amount of functioning gained affects their daily lives. Siegert et al. add that participant response to CIMT while the restraint is being worn has not been considered in-depth. Another report notes that the clinical effects of CIMT fail to translate to participants' home environments, suggesting that the results stem from the intensity of treatment rather than the procedure that is used [40].

The social interaction between participant and therapist regarding the physical progress being made day to day plays a large role in the participant's attitude about CIMT. When therapists stated that the participant was doing much better than yesterday, it was not uncommon for participants to ask, "I am?" Or if a specific body part was singled out for positive progressive assessment, participants may have stated, "It is?" Yet participants also stopped during therapy to present an example of an improvement they had seen, such as opening a door, pushing an elevator button, or slicing a piece of meat. They sometimes even presented a narrative of the actual event (e.g., yesterday we went to Shoney's and I was able to . . . I haven't done that for years). When physical improvement is not contemplated to any great extent, functional improvement is left undefined; thus, the hope for recovery is minimized. Through the therapist's praising participants regarding their task performance and participants presenting illustrations of improvement to the therapist, the therapist/participant relationship is

strengthened and the personal understanding of CIMT becomes more positive. These social contours of the treatment experience seem to be very important in a setting in which the therapist works consecutive hours with functionally limited stroke survivors, having the participants perform tasks with their severely impaired limb.

Some limitations exist in our study. In reporting on the participant/therapist interaction in these settings, we find it difficult to know whether these interaction patterns are consistent with other therapy environments. The best way of testing if the results in an ethnographic study such as ours can be generalized is to compare results across settings. We did observe two different settings that resulted in a similar pattern of interaction. We also compared these results to an independent ethnography of a locomotor training program. Although all three of these settings consisted of different therapists, they were in the same overall academic community. Further ethnographic studies need to be conducted in environments outside the area in which these results took place. Particularly, differences in treatment protocol may result in differences in interaction patterns during the treatment. However, this question of generalizability cannot be answered until further ethnographic research is conducted in other places where CIMT occurs.

Another important limitation is that although we could compare our interview data with our observations, we could not link clinical measures conducted by the CIMT research team with our data. Since our project was separate from the CIMT treatment projects, we did not have clearance from the institutional review board to analyze participants' clinical results. Future studies should combine clinical results with ethnographic and qualitative interview data. Doing so would provide a more complete assessment of the rehabilitation experience from both a physiological and phenomenological perspective. However, combining clinical results with ethnographic and qualitative interview data may require an overall clinical trial that incorporates qualitative research strategies into its own methodological design.

## CONCLUSIONS

For participants in CIMT, the costs and benefits of using an impaired limb are considered in the context of overall gains achieved during the therapy. For example, if the cost is soreness, the participant might question risking it when the unaffected limb now works efficiently for

all practical purposes. If the cost of using an affected limb is slowness in the company of others, the participant might question risking their impatience when the unaffected limb works efficiently and may pose fewer problems in the presence of others. This is the kind of everyday thinking participants undertake outside of CIMT, which is far more complicated than the simple idea of maximizing the functioning of an affected limb.

Learned nonuse does not exist in social isolation. Stroke survivors are not purely "behavioral" entities, whose conduct is presumably shaped by the contingencies of usage. They also balance any improvement against what it costs to use an affected limb that is still not fully improved. In the participants' everyday lives, the question comes down to whether learning to use the impaired limb is worth the "costs" of use when the limb is still not fully functional. How much regain in function, then, would be needed to overcome the cost of the learned use of a still impaired limb?

From the interviews we conducted with CIMT participants posttherapy, the everyday use of the impaired limb gained through CIMT was described as minimal. However, what CIMT produced was a renewed hope to regain functioning in the future through additional practice or therapy. This future possibility of progress that our participants expressed is shaped largely through the participant/therapist interaction that occurs during CIMT. That is, a participant's hope for future physical progress is influenced by the patterns of social interaction that occur during the therapy. These social interaction patterns are an important part of CIMT that may not be fully acknowledged in the clinical training of therapists.

## ACKNOWLEDGMENTS

We would like to thank Charles Ellis for his assistance during the research process.

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