

Transcript of the data collected during the user study.

P1 Sai Vignesh

stopping is like really, really important.

stopping is important in a sense, for example like the therapy should not be that much fast. for example, like they need to take break or something for example, then you should not speed up or slow down, you should definitely stop the therapy.

change direction is also kind of neutral for me because like that depends on the therapy what they are doing. undo it's neutral because, that depends on what therapy.

repeat is important

relevance stopping is very much relevant

slow down easy to do, as in like, I did not do anything for that to happen.

mental effort is very much low for all these crystals in the sense like I did not think too much like all these are physical distance I don't need to think so much

All were well blended actually, like, I didn't say much difference of doing it separately. For example, this, what do you call the gesture and intervention intervention like I didn't see much difference between both like it was very much seamless actually

Repetition is the best which seamlessly blended

Speed up and slow down not seamlessly blended

With the single motor you're like almost getting like around 6 gestures, which is very high and that makes a great task actually

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P2 Anwesha

Stop gives more control to the user, if the person wants to not continue with it and the exoskeleton keeps on moving, stop is used

user feels more in control are stop, slow down and undo are most important

seamlessly blending - stop, speedup, repeat are rated highly as 5, whereas change direction and undo are rated 4 and slow down as 3

additional gestures are like double tapping as people do a lot these days

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P3 Balaji

The stop thing was important because it is very instant and we know that when you have to stop when there is a comment or something, so it was very important in terms of the interventions and when I compare with the gestures, doing that as also was easy

Speed up intervention is also very important because in the context of rehabilitation, like when you need to speed up the muscles or something with some sort of help, it is very helpful

The same goes with the slowdown

When I was doing this experiment speeding up and slow down was very relevant changed direction, it was very neutral. Because it was not very much supportive with this motor property I think so. And doing with the cashews was also very relevant but for for the rehabilitation with this motor property. It was very neutral for me.

Repeat Motion was actually very important because most of the exercises also will have said these kinds of motions in rehabilitation

undo was very important. And it was also relevant, as I mentioned.

I think 90% It was more or less blinding other than this change direction which I did not feel much but everything else was good.

Additional gesture - anti clockwise rotation

think maybe we you can work around on this change direction alone, probably. Okay. Other than that the tissues were all fine and it was very relevant to the interventions as well.

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P4 Riyadh

I chose this very important because, like, in my practical experience, I have a labour problem on my leg. So my limbs distorted on my knee. So sometimes if I like a seat for longer time, I can't stand up immediately. So I need extra support. Okay, and if I stand so long time, then I cannot bend my knees. Oh, okay. Okay. So if this one is there, and it can help me Yeah, so I don't need to take the table or like support that. Even if it is also works for hand, it can go it's like God bending part of the body.

seamless blending is perfect

at the very beginning since it's an external body took some time so but after 3 to 4 or five that time actually, it feels for natural for me

I know the motion I get the rhythm when it goes up when it goes down, so gestures blended naturally

I didn't have lot of mental effort to make the gesture

Initially I need to concentrate, when it goes up and it goes down, but after sometime I felt good, I guess it's like with my muscle movement

Slow down and circular motion was little tough in blending compared with others

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P5 Ganavi

when you're working on your muscles, certain movements are important, the repetitions are also important. I mean, it's it's normal that we know this repetition even when normal exercising

Seamlessly blending gestures are repeat, speedup and slow down

Not seamlessly blending is undo gesture

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P6 Adman

if the exoskeleton is just involuntarily moving and I need to resist resisted for rather rather perform something that I don't need that case like stopping or speeding up or slowing down could be important.

repeat is also important with the same respect as stop

Although I'm still not sure like how changing the direction might be useful or okay actually while I was checking it as trying to think about it. . I'm not sure like I mean, how this changing direction and knowing it could help us

moving my arm towards the motion of exoskeleton was quite easy

I was my thinking I felt had some trouble was like during the Undo and change direction

The rest of the gestures were easy for me

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P7 Saleh

Not seamlessly blended are change direction. I need to put efforts to move in against the motion.

Mostly other gestures seamlessly blended. It was very light to do it, there were no trouble

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P8 Elizabeth

I need to use Stop when taking or drinking coffee

I need speed up and slow down if there is urgent need or emergency

At first , it is tough, and it became easy after getting used to it

Undo gesture is little bit tricky, change direction was tough, repeat circular motion was very easy

Stop, speed up, slow down easily blended

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P9 Tanya

Different people have different hands and may need more energy, mostly male because their hand is heavy. It's not lifting as easily.

It's a working model.

I like the thing that people are controlling it themselves.

After knowing the rhythm of the song, and it was pushed down nice and easy. was impressed with the rhythm.

Resistance

Push up is not that much felt

The first step is to understand how it is going to feel.

The we can do normal push-ups.

Slow down and slowly move the hand, restricting the motion so that the motor will run for the full range, even though it is restricting the motor.

How important is the concept of repeat?

Repeat is effortless, may be I can ask you to give dumbbells.

One small exercise, a very small range, and a repeat.

The concept of repeat and how important it is to do the same motion again, and what was happening during the previous intervention.

The relevance to the gesture is ok.

I think by making the thing rotatable, either make it rotatable or one of the hinges go here or go here and then you can move it.

The best part is making the whole thing rotatable from here. Instead of having a block, make it like a circle, it will be rotatable with the end clip.

Feedback.

Speed up by pushing it up and down in one direction and pushing it down in the other direction is normal.

How to control the push-down.

Additional interventions for safety.

There are no additional interventions needed apart from the six for the safety of using the exoskeleton. Emergency stop is really useful.

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P10 Kshema

Speeding up is not as important as slowing down and stop. Change direction and repeat is neutral. Undo is important in case we have done a mistake

I felt undo up and down gesture is not suitable for the undo intervention. usually we have circle symbol for undo, so maybe having half circle would be an appropriate gesture

Maybe we can split repeat and undo like, right rotation and left rotation

Once we get the rhythm of the exoskeleton motion, all the gestures are nicely blending

Seamlessly blended - stop, speed up, slow down

Not seamlessly blended - change direction, undo is fine

additional intervention - may be start motion after a pause or stop

Pause and resume, stop

pause for 2 seconds and then continue from that instance itself.

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P11 Anjali

person who is struggling with this hand movement, he or he or she obviously wants to work with the these interventions like stop, speed up and everything. So, all all the movements you have written here are important according to my opinion

Obviously we are moving up and down. So normally people will like to work up and down will not be repeated and do not want to move their hand circularly

seamlessly blending are speedup, speed down and also stop
Not seamlessly blending are repeat

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P12 Prem

Though Undo intervention is important, the action for that is somewhat neutral

so all these interventions is very important for the patient. So if the patient is undergoing any kind of like, for example, you say that doctor is recommending some exercise. So it's very important that patients should take control of it. And the same intervention is very important to take control of the machine. So I think the all the intervention is very

In case of change direction. So we are moving to the opposite direction of motion. So that's why it was little really some physical effect to oppose the direction.
Same for undo

according to me, if there is more physical effects, you need more intense mental effort. , so change direction, repeat needs more mental thinking than stop , speed up and slow down

Stop and change direction have seamless blending. Though change direction requires more physical effort, it is blending with the exoskeleton motion

Do not seamlessly blend - Undo, slow down
extra gestures - go left or right, half rotation in both direction, or full rotation in opposite direction

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P13

Intensity of intervention for rehabilitation.

going against the motion, repeat, and undo the last one up

The last one was a neutral to high

The concept of intervention and exoskeleton is useful for rehabilitation. The importance of intervention comes into play when someone's hand is not working well and they want to regain their strength.

The importance of speed up and slow down is important, but everyone has their own pace.

In that case, change direction would make sense, nice repeat.

The seamless blending of the gesture with the motion of the exoskeleton is a little bit mentally exhausting. It is hard to get used to in two hours of time.

Everything takes time, so speed up is a good way to speed things up. Speed up is quick, so the mind will remember.

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P14 Prashanth

stop is very important for the context of rehabilitation as they might be different emergency situations.

speed up and slow down are important in case the patients want to slow down or do according to their comfort but they might not be very important as to stop intervention

change direction is also important because in sometimes, like in the extreme cases, patients might want to change the directions

Repeat is neutral because like in rehabilitation, it's not that useful compared to the other cases

undo might be very important in case if you make some mistakes and if you want to undo it

Suitability stops, speed on speed up and speed all are very relevant because they will do the exact same thing the similarly with change direction also

repeat and undo also the kind of they do the similar thing. They are suitable gestures stop and speed down less physical effort

Change direction also require very low effort. Same with repeat and repeat was also very easy

but often slow down requires more effort as we have to concentrate and move slowly.

Stop, slow down and speed down were very intuitive, so not much to think requires less mental effort.

But undo was different, we need effort to do it

For seamless blending , as we do the gestures, the exoskeleton also moves along. I felt the gestures are seamless and good

everything was seamless but like speed up and slow down. And also stop have like good seamless blending

Maybe repeat was not seamlessly blending because we were moving some motions, and if we do repeat it takes time to go back to the same position. Also undo was not seamless to an extent

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