

Increasing task complexity



### Graded hand activity examples

- Looking at the hand
- Turning hand up and down (elbow movement, not hand movement)
- Flattening out the hand
- Flattening the hand and taking some weight through it
- Moving individual fingers
- Finger thumb opposing
- Tapping fingers
- Add increasing muscle activity to each movement
- Use tools (screwdriver, nail cutters, pen scissors etc - make appropriate to the left or right hand)
- Introduce clinician's hand
- Move hand inside the box as well
- Touch the face in the mirror

### Context variables to alter

- Place (safe to feared places)
- Emotions
- Time of day
- Try movements distracted (eg., while balancing on a chair)
- Music ('play' a song in your brain or play an external song)
- Sitting, standing, lying
- Use metaphors (eg., Open hand to 'free a bird', play 'spiders' with the fingers on the mirror)
- Add different smells and noises



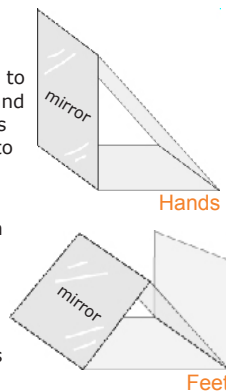
## NOTES FOR USERS

### Assembly

The NOI Mirror Box is designed to be simple to use, easily portable, and the corflute material is lightweight and easy to clean.

The package you receive should contain one corflute sheet with a perspex mirror attached.

To assemble: attach the two velcro patches to each other, folding the sheet into a triangular prism as the creases allow as seen on the diagram.



### Related reading

- Chan, BL et al. (2007). New England Journal of Medicine 357:2206-7
- McCabe, CS et al. (2004). Novartis Foundation Symposia 260: 154-174.
- Moseley, G. L. (2006). Neurology 67: 1-6.
- Moseley, G. L. (2005). Pain 114: 54-61.
- Rosen, B. and G. Lundborg (2005). Scandinavian Journal of Plastic and Reconstructive Surgery 39: 104-108.

You can direct your queries to any of the contact details on the front of this brochure.

NOI's Mirror Box may be used on its own, but is best used in conjunction with the *recognise*<sup>®</sup> limb laterality program. Find information on [www.noigroup.com](http://www.noigroup.com)

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## Introduction

Mirrors may be used for a variety of pain and disability states especially those involving the hands and feet. In particular, mirror therapy may be appropriate for problems such as complex regional pain syndrome, phantom limb pain, stroke and focal dystonia. Many people gain pain relief and better movement by using a mirror.

## Biological basis

We believe that some understanding of brain function is a requirement of successful mirror use. Here is a basic introduction.

Your brain consists of billions of neurones and trillions of connections. Those neurones are able to 'represent' things. For example you can see things because your brain can 'represent' the light coming into your eye. You feel things because your brain represents your body.

People who lose a limb, but who have phantom pains, provide us with evidence of a limb still represented in the brain. If you use your hands in a repetitive meaningful way such as playing a musical instrument, or if you are blind and use Braille, you will have more brain area devoted to these tasks than a person who doesn't play an instrument or a person who is sighted. Such a person would have a hand that looks exactly like everyone else's, but the hand and fingers in the brain will be larger than everyone else's.

The brain can change quickly. The brain representations of body parts and movements are altered in pain and disability states. They lose a bit of clarity, sometimes spread and take over surrounding areas, sometimes get smaller. This may sound a bit scary, but it happens all the time and is probably a defence (perhaps the brain tries to spread the pain or get rid of it), but the longer a problem persists, the greater the brain changes.

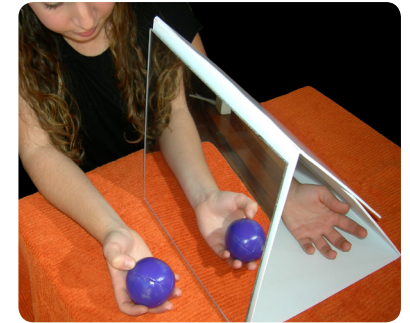
## Mirrors to trick the brain

By using a mirror, you can trick the brain into believing that an injured part is actually okay, thus providing a powerful synaptic exercise. For example, if the left hand was a problem, it could be hidden and by using the mirror image of the right hand, the brain would construct that the left hand was now somehow okay. It is a way of signalling the brain that 'the hand is fine, its now time to represent it properly and look after it'.

## Suggested use

Note the photograph of a person with a hand problem using a mirror box.

Sit comfortably with the injured/painful hand in the box, therefore hiding it from view. Place the other hand in front of the mirror. Lean forward and look at the image created in the mirror. Your brain is now 'seeing' the injured/painful hand. If you wriggle the non-painful hand it will feel a little bit odd. This is just your brain trying to decide what is going on.



While there has been some promising research on the effectiveness of using mirrors, we don't really know the best protocol. Therefore, ideal management will have to be individualised.

### Some general suggestions:

1. Be guided by a clinician who understands brain function.
2. Presuming there is no jewellery on the affected side, remove wrist watches and rings. Try to make a total illusion.
3. Depending on the pain and disability state, decide on an appropriate activity(ies) to perform with the good hand. This could range from just looking at the mirror image to finger movements, or taking weight through the hand. See suggestions in the table below.
4. In general, the more severe the problem (eg. Severe Complex Regional Pain Syndrome), small movements, performed often, may be more appropriate.
5. Feel comfortable with the selected movements(s)', ie. 'conquer the movement' before progressing to a more challenging movement
6. Once you feel comfortable with a movement, try and perform it in a different context. For example, do it with a song in your head, or with altered emotions by thinking of something good or bad. Overall, you will need to repeat movements, grade the movements and then context enriching the movements for best neurone health.
7. Take care. If the hand in the box hurts or sweats, you may have taken the brain exercises too far even though the hand has not been moved.
8. Move the painful hand in the box to the point where it starts to hurt a little and then move the good hand which is outside the box a little bit further. Do it simultaneously or reciprocally.
9. By placing a mirror between the feet, a similar therapy can be performed for the foot problems.