Impairment of motion perception in chronic low back pain patients

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Disclosure

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Background + Purpose of the Study

– Pain matrix: cortical brain network involved in chronic pain

– Mirror neuron system: brain network involved in:

1) execution of a person's action

2) during the visual recognition of the same motor action performed by others

– Anatomic overlap between both networks => Both systems functionally linked ???

– Does chronic pain affect the perception of visually presented actions that would be painful for the observer to perform ?

example of chronic low back pain (CLBP)

– Is this effect specific for the painful body region ?

=> Patients with chronic shoulder pain (CSP) added as comparison group

Methods

– Experimentally controlled study

- 16 CLBP patients (without shoulder pain)
- 9 CSP patients (without back pain)
- 14 healthy controls

– Videos of 2 different movements were recorded with 2 healthy actors.

– Based on these videos, computer-animated point-light animations were constructed that were presented to the subjects.

Methods

1) Trunk rotation movement (TRM)

- typical stress for CLBP patients

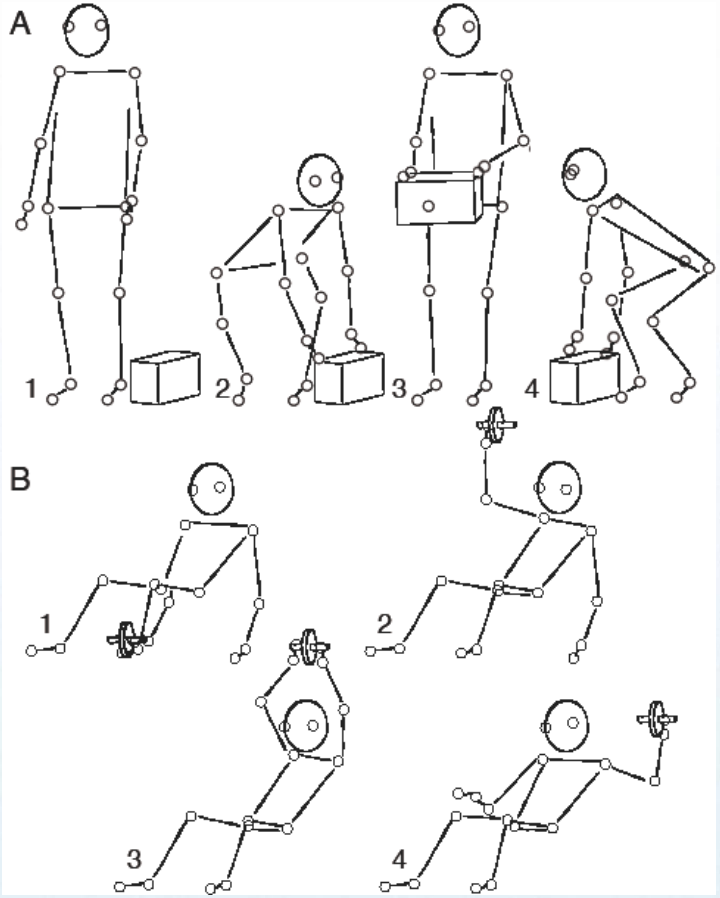
- box with 3 different weights (5, 10, 15 kg)

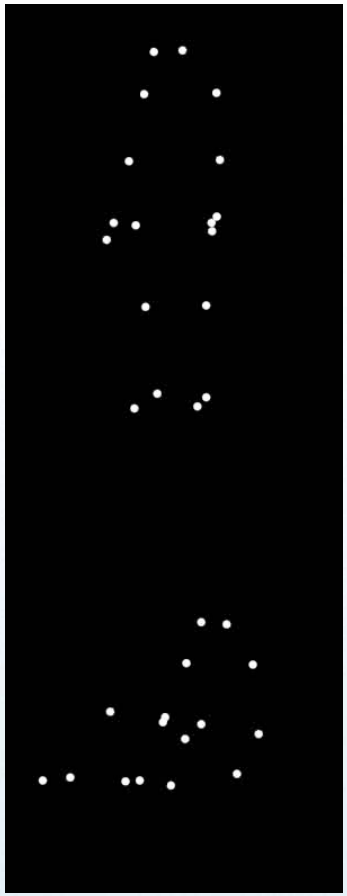
- lifting from the floor on his left side, twisting his trunk and placing it down on the floor on his right side

2) Manual transfer movement (MTM)

- typical stress for CSP patients

- actor sitting on a bench with his back supported, taking a dumbbell (0, 3.5 or 7 kg) from the floor on his right side, moving it over his head, passing it to his left hand and placing it on the floor to his left side.

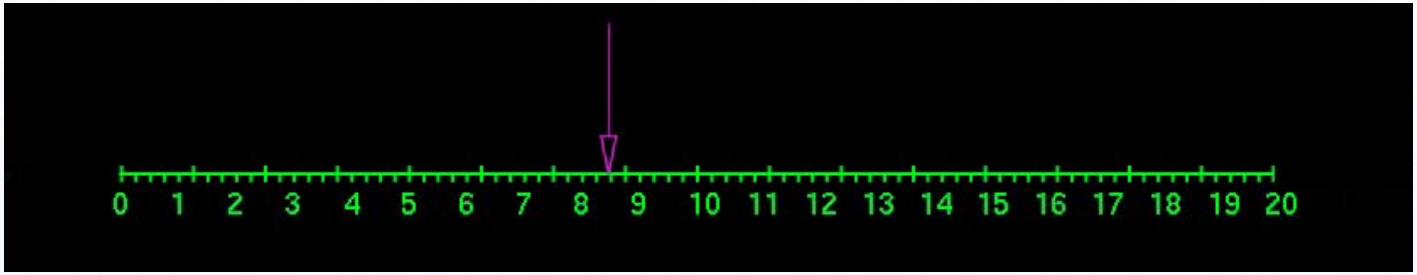




Methods

– Each subject had to estimate the lifted weight on a 0 to 20 kg scale in a total of 120 randomized sequences: 60xTRM + 60xMTM

20 sequences per weight (3 different weights)



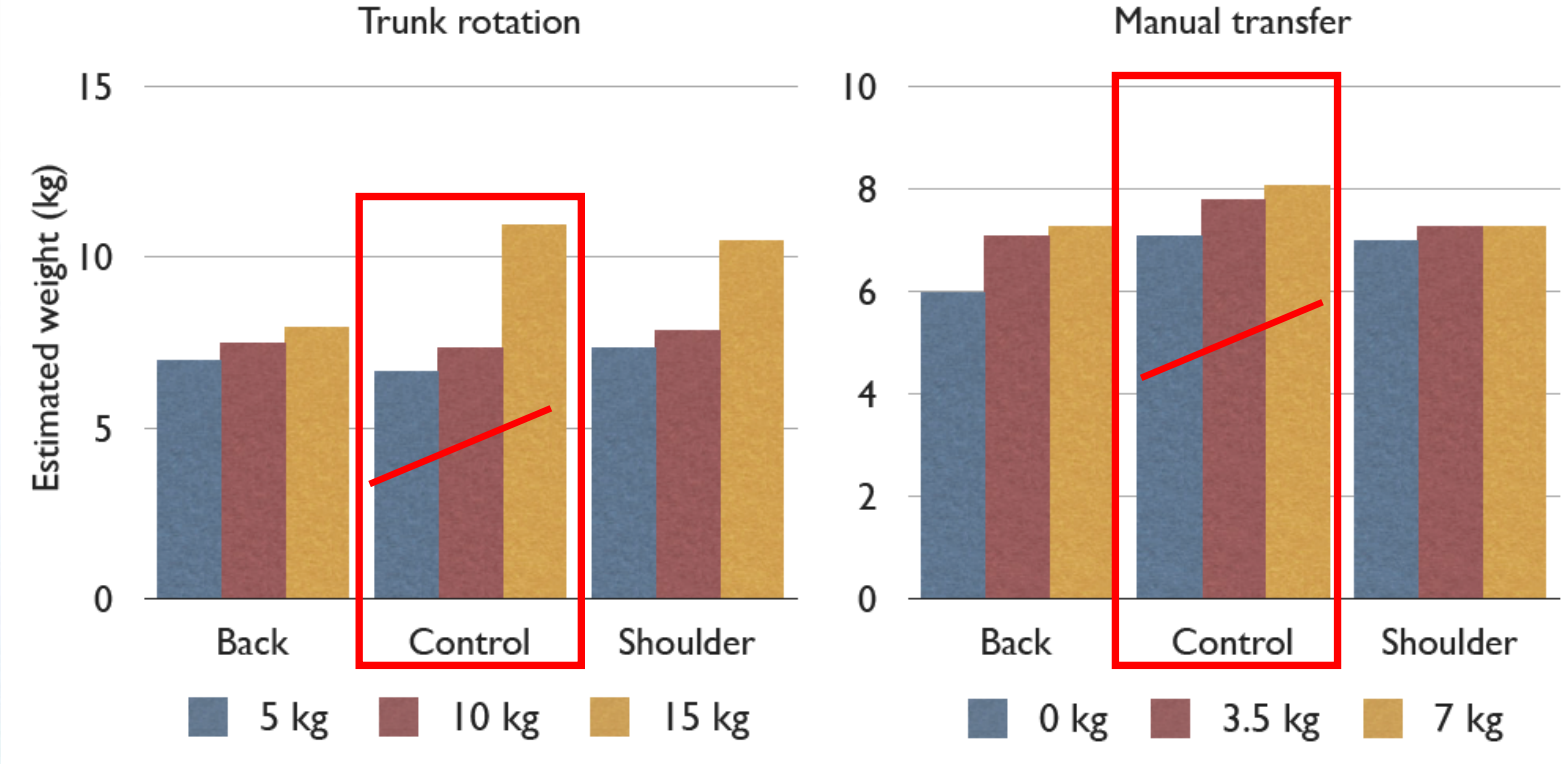
– No information about the weights

– No information about the number of different presented weights

– No feedback

– Linear regression analyses + ANOVA (to compare presented + estimated weights)

Results



– Healthy controls: able to clearly differentiate between the presented weights for TRM and MTM

Results

– CLBP patients were impaired to differentiate the weights for TRM

– CLBP patients could well differentiate weights during MTM

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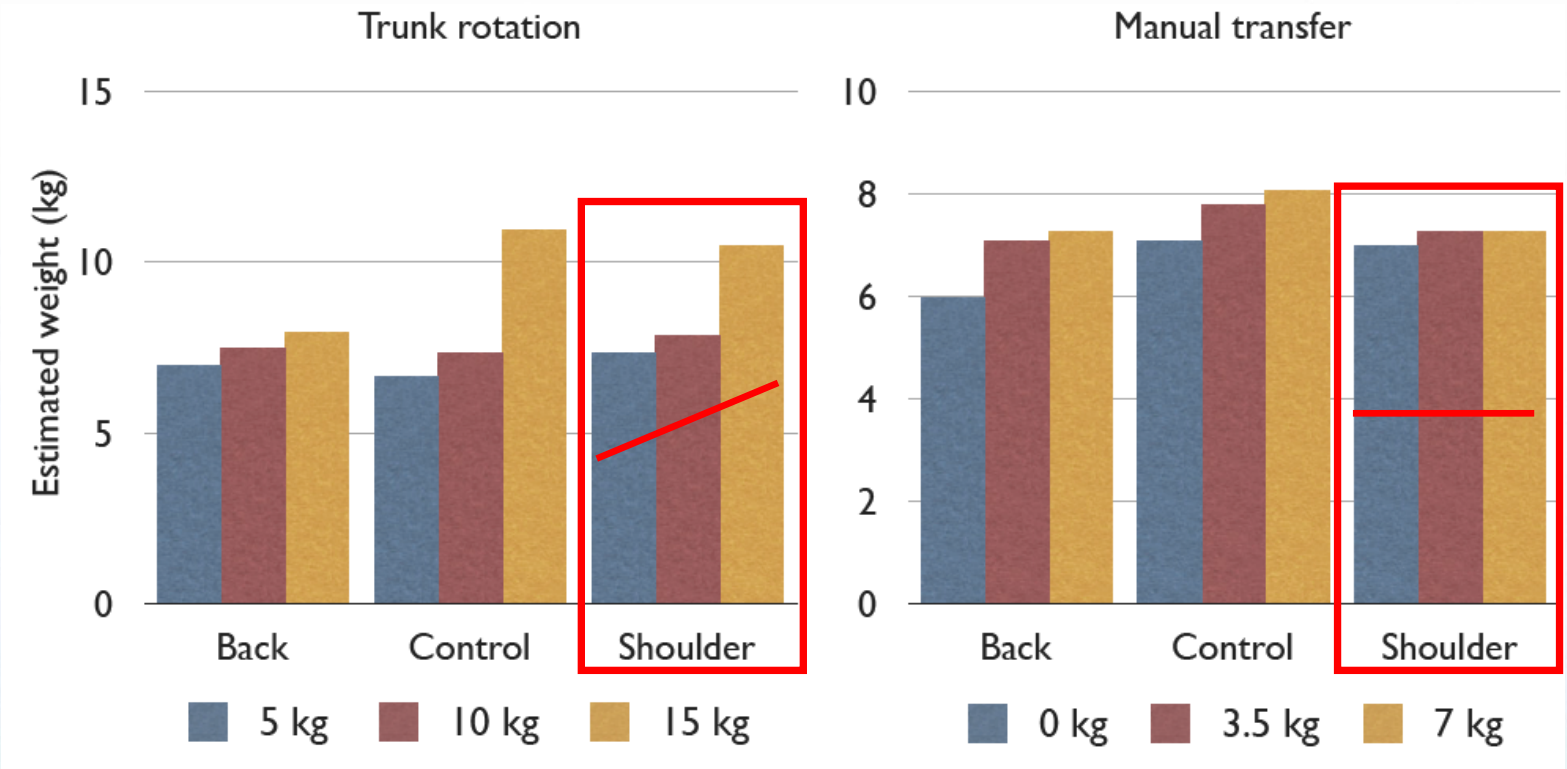
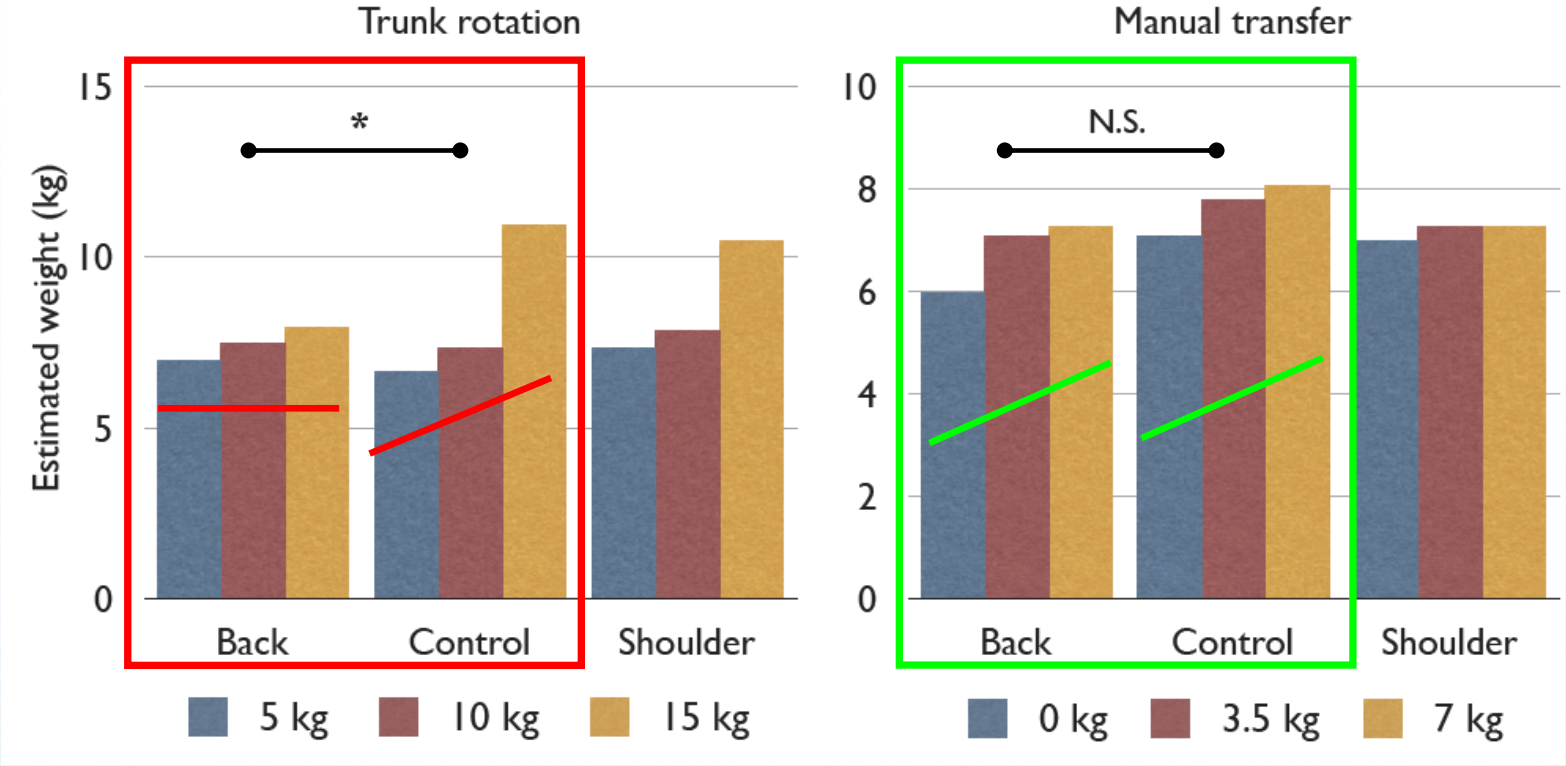


– CSP patients were impaired to differentiate weights for MTM

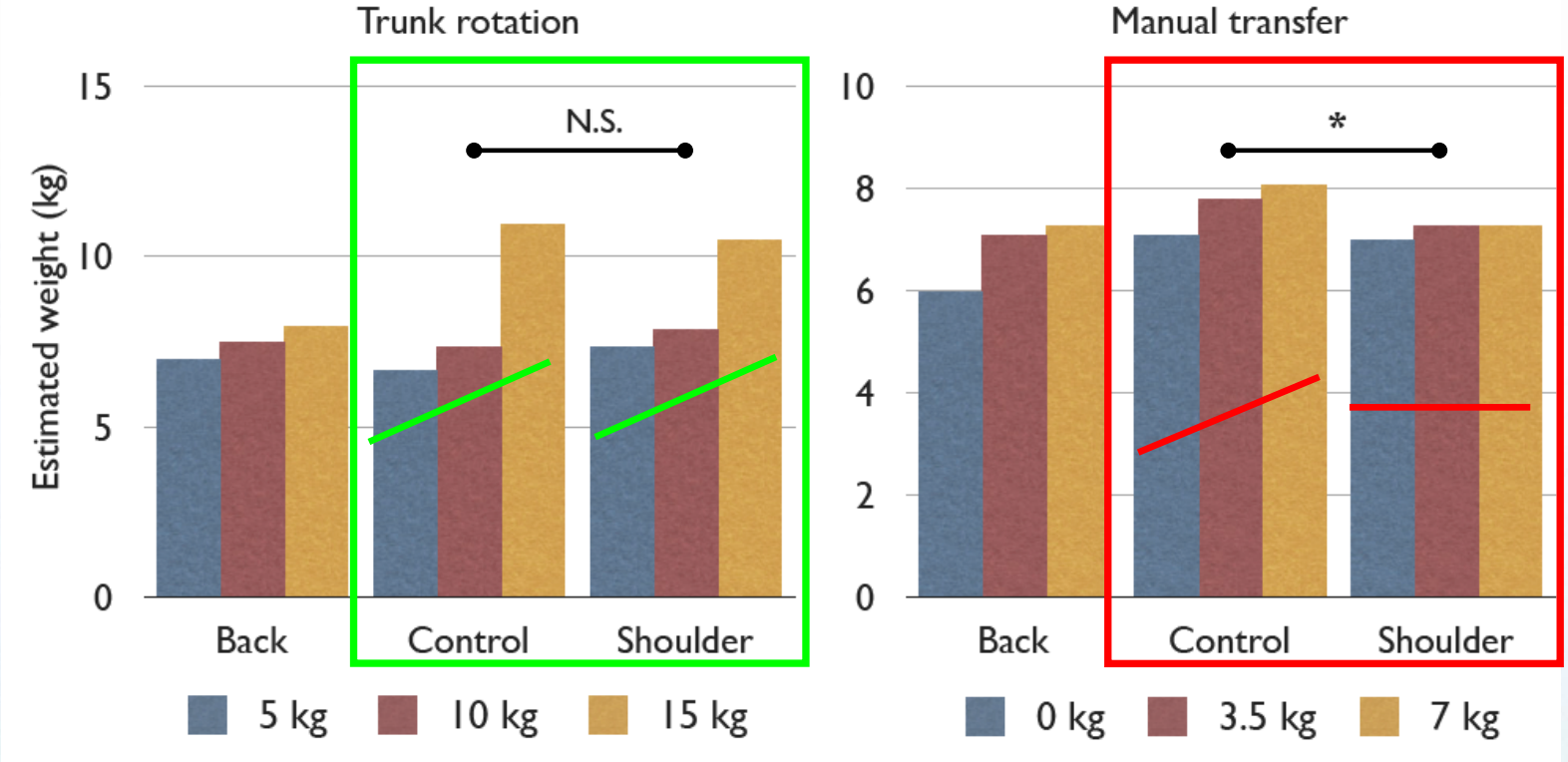
– CSP patients could well differentiate weights during TRM

Results



– The ability to differentiate weights differed significantly between CLBP patients and healthy controls for TRM, not for MTM.

Results



– The ability to differentiate weights differed significantly between CSP patients and healthy controls for MTM, not for TRM.

Conclusions

– CLBP leads to limitations not only of the patient's own back movements, but also of the patient's perception of back movements of other persons, not of shoulder movements !

– This effect seems to be specific for the painful region

– This may lead to: misjudgements / misinterpretations / fear avoidance

– Chronic pain functionally changes cortical networks, that are involved in action recognition !

– New results may be used to develop new therapeutic strategies focusing on relearning to correctly assess one's environment and on reactivation of these cortical networks !

– Judgement of weight is of potential diagnostic value (cortical involvement in different kinds of pain syndromes may be measured) !