



Brain asymmetry of tactile processing in children with autism.


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Hwo are we?





Autisme Center
Vestsjælland
Denmark

350 personal, 104 people with diagnose "autism" permanently living in the Centre and 73 children studying at the special school, 13 buildings.



Larissa Breusch
Research scientist, Ph. D



Lotte Starup
psychologist

Hwo are we?




Arne Wittling
Ingeneer



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Hwo are we?



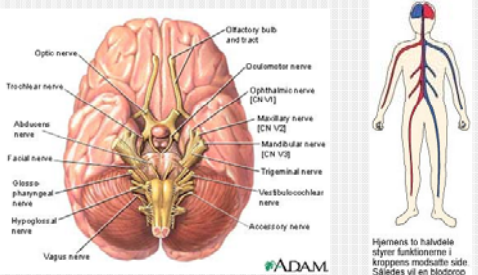
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Brain asymmetry in regulation of body functions and senses.



Optic nerve
Trochlear nerve
Abducens nerve
Facial nerve
Glossopharyngeal nerve
Vagus nerve
Olfactory bulb and tract
Oculomotor nerve (CN III)
Mandibular nerve (CN V2)
Mandibular nerve (CN V3)
Trigeminal nerve
Vestibuloocchlear nerve
Accessory nerve

Hjernens to halvdele styrer funktionerne i kroppens modsatte side. Således vil en blodprop i venstre side (DSD) lammes musklerne i højre arm og ben.

Specialization of brain hemispheres



Writing	12345 12345 Calculation	Functions of the left hemisphere	Functions of the right hemisphere	Intuition	Control of the space
Logic	Auditory speech			Creative abilities	Imagination
Scientific analyses	Right-hand management			Left-hand management	Music abilities

Brain asymmetry in autistic subjects

(1)

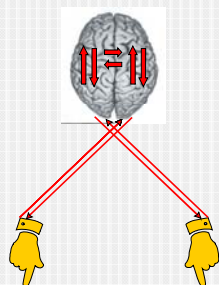
- Ventricular enlargement was found in the left brain hemisphere in a group of autistic children which resulted in brain matter deficiency on this side of the brain (Hauser et al, 1975).
- Glucose metabolism was reduced in different areas of the left hemisphere compared to the right side of the brain in autistic subjects (Siegel et al., 1992)
- EEG activity was reduced in the left hemisphere in autistic individuals (Dawson, et al., 1982, 1983).

Brain asymmetry in autistic subjects

(2)

- Cerebral blood flow was reduced in the entire left hemisphere, and regionally (sensorimotor, parieto-temporal cortices and prefrontal cortex) compared to the right hemisphere (Chiron et al., 1995; Ohnishi et al., 2000; Wilcox et al., 2002; Boddaert et al., 2003; Burroni et al., 2008; Pinkham et al., 2008)
- The majority of studies indicate dysfunction in the left temporoparietal and temporooccipital areas involved in speech processing in autistic subjects (Boddaert et al., 2004; Herbert et al., 2002; Meresse et al., 2005).
- Right hemisphere is involved in speech processing in autistic subjects significantly more than in controls (Prior M. R. og Bradshaw J. L. (1979).

Sensopress - a device for measuring brain asymmetry



The aim of our study was

- to measure brain asymmetry in autistic children with Sensopress.
- verify whether this device is suitable for the experiments with autistic children, how they can react to the procedur
- whether the method is sensitive enough to measure brain asymmetry in these children
- will the results be comparable with studies where other methods were used to investigate brain asymmetry in people with autism.

Participants.

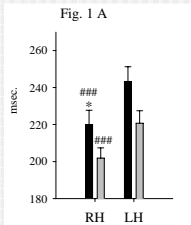
Two groups of participants were tested.

- The autistic group consisted of boys aged 7-18 years (N=34) who have been diagnosed by Danish child psychiatrists and who attend a special Danish school for autistic children.
- The control group (N=34) consisted of normal boys matched to the autistic subjects in age, who attend normal public schools.

Experimental protocol.

- at the beginning of the test, each subject was given brief oral information about the device
- exercise using the buttons for a few minutes
- the testing started with the FT test, followed by the TRT test. The whole procedure took about 30 minutes.

Finger tapping test (1)

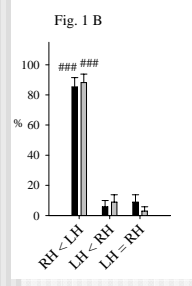


Shows manual motor speed of the right (RH) and left (LH) index finger

- - autistic children
- - control children

* - $p < 0.05$ when compared to motor speed of the right finger in control children;
 ### - $p < 0.001$ compared to motor speed of the left finger inside the group.

Finger tapping test (2)

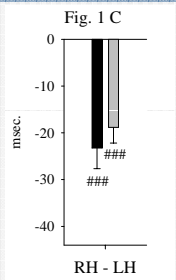


Shows the number of children (in %) with right finger faster (RH<LH), left finger faster (LH<RH) and equal dexterity (LH=RH)

- - autistic children
- - control children

- $p < 0.001$ when compared to the children with the left finger faster in the same group.

Finger tapping test (3)

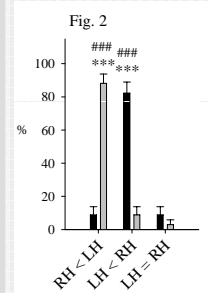


Shows the mean of difference in manual motor speed of the right and left finger.

- - autistic children
- - control children

- $p < 0.001$ when compared to 0.

Tactile reaction time (1)

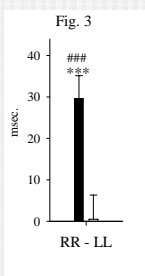


Shows the number of children with the reaction time shorter on the right (R/R<L/L) or left (L/L<R/R) side and equal performance on both sides (L/L=R/R).

- - autistic children
- - control children

*** - $p < 0.001$ when autistic and control children were compared
 ### - $p < 0.001$ when compared to reaction time on the other side of the body in the same group of children.

Tactile reaction time (2)

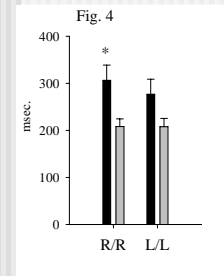


Shows the mean of difference in the reaction time on the right and left side.

- - autistic children
- - control children

*** - $p < 0.001$ when compared to the control
 ### - $p < 0.001$ when compared to 0.

Tactile reaction time (3)

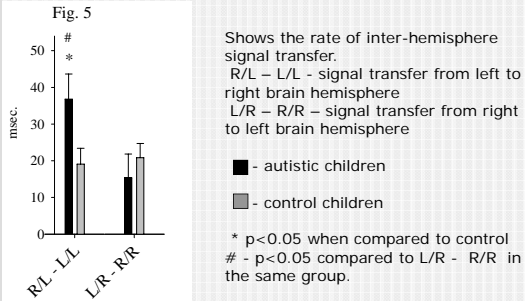


Shows the reaction time on the right and left side

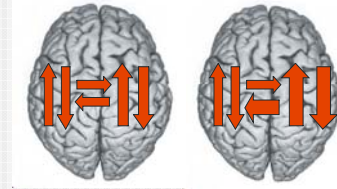
- - autistic children
- - control children

* $p < 0.05$ when compared to the control.

Tactile reaction time (4)

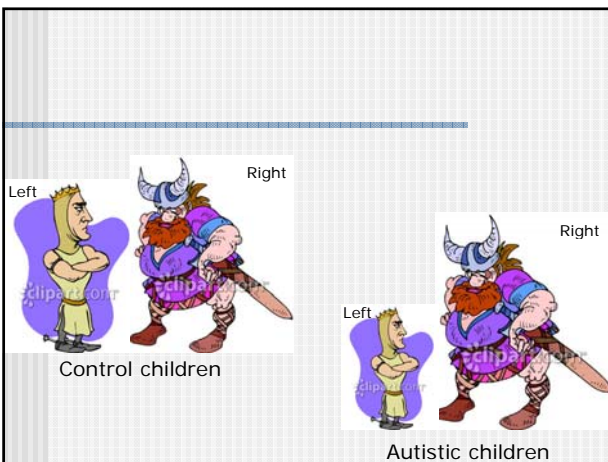


Conclusion: Asymmetry of tactile processing in the brain of autistic children

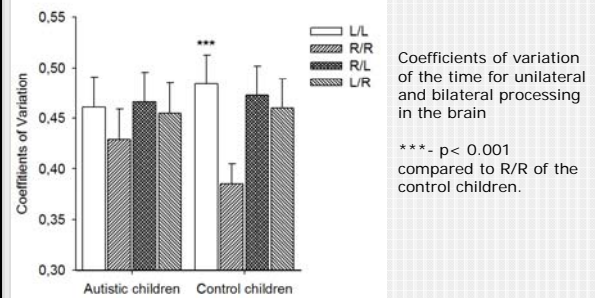


Control children

Autistic children



Variability of rate of tactile processing in the right and left hemisphere



Tank you for your attention!

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