When one side does not know about the other one

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Whenever we are doing something, one of our brain hemispheres is more active than the other one. However, some tasks are only solvable with both sides working together. PD Dr. Martina Manns and Juliane Römling of the Ruhr-Universität Bochum (Germany) are investigating, how such specializations and co-operations arise. Based on a pigeon-model, they are proving for the first time in an experimental way, that the ability to combine complex impressions from both hemispheres, depends on environmental factors in the embryonic stage.

The results of the study are published online in *Nature Communications*.

Within the egg bird embryos always turn their head in such a way that one eye is turned close to the eggshell, and the other one is covered by the body. This causes an asymmetrical light stimulation, which influences developmental processes in both brain halves.

PD Dr. Manns uses this mechanism for her experiment. One group of embryos hatch in a lighted incubator, another one in complete darkness. Afterwards the scientists analyze the degree of interhemispheric communication in both groups. The results show that information exchange is impaired without light-stimulation. This research sheds light on the origin of communication processes in the brain. Developmental disorders like ADHD or autism are characterized by a deviating pattern between the two brain halves. Therefore, there is a possibility that the results may help to understand those disorders and give hints for new therapeutic approaches.

To determine how efficient the animals are able to handle incoming information, Manns and Römling confront the animals with a task that can only be solved with both brain hemispheres working together. For that purpose, the two psychologists use colour-pairs of a transitive line (A>B>C>D>E) at which one of the elements is rewarded with food. First the pigeons have to learn to discriminate the combinations A/B and B/C with one eye, and C/D and D/E with the other one. Afterwards, they can use both eyes to decide between, for example, the colours B/D. However, only birds with embryonic light experience are able to solve this problem.

More information: M. Manns, J. Römling (2012): The impact of asymmetrical light input on cerebral hemispheric specialization and interhemispheric cooperation, Nature Communications, doi: 10.1038/ncomms1699

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