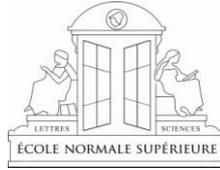




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Are babies endowed with consciousness?

Babies have long been considered as beings with limited skills and behaviors that are principally automatic and of a reflex type, and are not accompanied by a subjective conscious experience. Nevertheless, CNRS scientists in the Laboratoire de Sciences Cognitives et Psycholinguistiques (CNRS/Ecole Normale Supérieure, Paris/EHESS), working in collaboration with scientists from NeuroSpin (Inserm/CEA) have now shown that as from an age of 5 months, infants are endowed with form of consciousness similar to that seen in adults. These findings are published in *Science* on 19 April 2013.

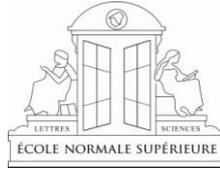
How can we determine whether babies are conscious of their environment even though they do not yet know how to talk and are incapable of communicating their thoughts? To solve this complex problem, the scientists used an alternative approach which consisted in determining whether the neural markers of consciousness seen in adults might also be present in babies. Indeed, recent research in adults has revealed a two-stage response by the brain to the perception of an external event. During the first 200 to 300 milliseconds, perceptual processing is wholly unconscious and accompanied by neural activity that increases in a linear manner; i.e. according to an amplitude which increases constantly depending on the length of time the objects are presented to them. A later, second stage (after 300 ms) is characterized by a non-linear response corresponding to the threshold of consciousness. Only periods of presentation that are sufficiently long to reach this threshold will give rise to a later response and be accompanied by conscious perception. This late and non-linear response by the brain is considered to be a neural marker of consciousness.

During this study, the presence of this marker of consciousness was tested in 80 infants aged 5, 12 and 15 months. To achieve this, they were asked to look at faces presented to them for varying periods of time (or in other words, for periods shorter or longer than their threshold of perception), while the electrical responses of their brains were recorded by electroencephalography. In all the age groups, the scientists saw the same late and non-linear response as in adults, thus confirming the presence of this “neural signature of consciousness” in the babies. However, although this response is recorded at around 300 ms in adults, it occurred much later in the babies, only being established after at least a second in the youngest infants. These findings reveal that the cerebral mechanisms underlying perceptive consciousness are already present at a very early stage in infants. But at that time they are relatively slow, before accelerating gradually during development.



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A 5-month old baby who participated in the study with his mother.

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Bibliography

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