from the two eyes to accurately reconstruct the three-dimensional world. They described how nerve axons from the thalamus — the brain's primary relay centre for visual information received from the retina — fan out into a broad band and terminate in the visual cortex in alternating eye-specific zones called cortical ocular dominance columns.

Hubel and Wiesel also performed a series of simple but elegant experiments in cats and primates in which they showed that stitching one eye closed during early visual development permanently altered the structure of the columns, shifting the ocular dominance of cortical cells to the non-deprived eye[2,3]. They hypothesized that visual experience guides the development of ocular dominance columns during a critical period shortly, but not immediately, after birth. As a result, the developing neuronal connectivity and function is susceptible to disruption by visual deprivation or abnormal visual experience during this period.

For the next three and a half decades, neuroscientists regarded this hypothesis as a fundamental principle of the mechanisms guiding the emergence of the complex and precise organization of functionally specialized neuronal circuits — in vision and in other neural pathways. In the past decade, however, this dogma has been challenged. We now know that ocular dominance columns form much earlier after birth, during the pre-critical period[4,5]. In fact, there is evidence that at least a protomap of ocular dominance columns develops prenatally[5]. Nonetheless, early formation of ocular dominance columns does not mean that their development is pre-programmed. There is evidence that, during the pre-critical period, genetically encoded cell-patterning mechanisms and visual experience can influence the formation of balanced ocular-dominance maps[6,7].

Investigations into the role of visual experience in refining ocular dominance columns during the pre-critical period have largely been limited to experiments in which the visual cortex is deprived of extrinsic stimulation during development. However, such experiments are ambiguous, because there is a high level of intrinsic neuronal activity in the visual cortex that can be altered by visual deprivation. Similarly, elimination of intrinsic stimulation might alter any interplay between intrinsic and extrinsic factors that contribute to the development of neuronal circuits. Jandó *et al.*[1] are the first to examine the effect of additional visual experience, rather than deprivation, on the development of binocular function.

To do this, the authors compared the age of onset of a binocular response from the visual cortex in human infants born either prematurely or at term. They reasoned that pre-programmed development of binocular cortical function would lead to the age of onset in preterm infants being the same as that in term infants when the preterm infants' ages were adjusted to reflect the age the child would be if the pregnancy had gone to term. Alternatively, a role for experience would be indicated by an equivalent age of onset when age is expressed in post-natal months — the number of months of visual experience (Fig. 1).

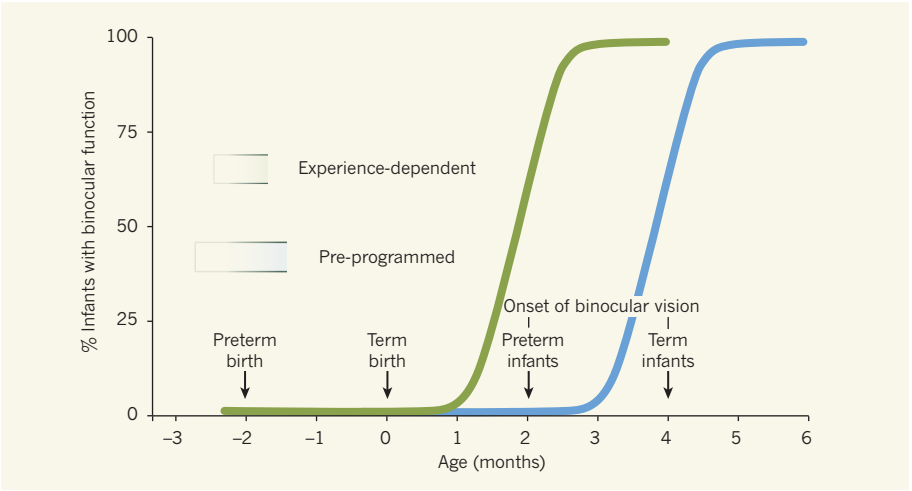

Figure 1 | Experience counts. Binocular vision is absent at birth and seems to switch on when a baby is about four months old. Jandó *et al.*[1] monitored the activity of the visual cortex region of the brains of babies who were born at term (nine months post-conception) and babies who were born two months prematurely, to determine when they first displayed a binocularly evoked response. Binocular vision developed at four months after birth in both cohorts. This suggests that four months of post-natal visual experience is the key determinant of the onset of binocular vision, even in premature babies (green curve). This is in contrast to the alternative scenario of a pre-programmed onset age that is guided by genetically encoded molecular and neuronal signals. In this case, additional visual experience should not alter the rate of maturation, and binocular onset would be expected to occur six months post-natally in the premature babies (blue curve).

To distinguish between these possibilities, Jandó and colleagues presented random dot patterns — either the same pattern to both eyes or a different pattern to each — to babies who were born at term (nine months post-conception) or two months early (seven months post-conception). The researchers monitored the babies' brain activity about once a month post-natally to determine when the infants first responded differently to patterns that were matched versus patterns that did not match. The answer was clear-cut — the onset of the binocular response occurred 4 months after birth for both term and preterm infants.

This finding indicates a strong role for visual experience in guiding the development of binocular organization of the visual cortex during the pre-critical period. The current literature supports a close association between the onset of binocular function and the onset of the critical period, but it remains to be determined whether the precocious onset of binocular function in preterm infants also heralds the transition from pre-critical period to critical period.

If the transition from the pre-critical to the critical period is advanced by preterm birth, we may need to rethink current approaches to the treatment of disorders that can disrupt the development of binocular vision during infancy, such as esotropia (crossed eyes) and anisometropia (different refractive errors in each eye). These two disorders are far more prevalent among preterm infants than among infants born at term[8]. The current therapeutic focus is on early surgery or optical treatment to minimize the duration of abnormal visual experience during the critical period. However, Jandó and colleagues' finding that the early visual experience afforded by preterm birth can accelerate the onset of binocular vision raises the possibility that preterm infants could require intervention timed to their post-natal age — not their adjusted age — to prevent permanent changes in the structural and functional organization of the visual cortex. ■

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CORRECTION

In the News & Views article 'The ancestral dinner table' by Margaret Schoeninger (*Nature* **487,** 42–43; 2012), reference 7 should have been cited in the fifth paragraph, rather than reference 4, in the sentence "This predominant C_4 signal led some researchers to suggest that...".