Regardless of its cause, eye misalignment that is present between the time of birth and the seventh or eighth year of life (the plastic age) elicits adaptive sensorial and sensorimotor responses to the problem. These phenomena are considered to be adaptive for several reasons. If, in fact, the angle of strabismus is changed by means of surgery or corrective lenses during this period, the phenomena mentioned above also change to reflect the new type of misalignment. Misalignment that develops in older patients rarely provokes any of the adaptive responses seen in the young child, and the patient consequently experiences diplopia.

BINOCULAR SENSORIAL ANOMALIES (Suppression and anomalous retinal correspondence)

In the past, patients with overt strabismus have been considered almost monocular. It was believed that an important part of the central visual field of the deviated eye was excluded through the phenomenon of suppression in an attempt to avoid diplopia and confusion of images.

The phenomenon of anomalous retinal correspondence (ARC) was and is still, by some, considered to be an abortive attempt to achieve some degree of binocular vision in spite of the deviated eye. Figure 1 illustrates the phenomenon of ARC. On the left side of the drawing (A), the image received by the fixing left eye falls on the fovea (F) while that received by the deviated eye falls on an extrafoveal, nasal area of the retina (X). In children, this second image is not perceived because excitation of the visual field of the deviated eye is suppressed through synaptic inhibition that occurs at some point along the optical pathways.
In some cases, the second image is, at a certain point in time, no longer suppressed but is perceived superimposed on the image that falls on the fovea of the fixing eye. This occurs because there has been a change in the directional location of the retinal elements of the deviated eye. The extrafoveal, nasal area (X) of the retina shown in Figure 1 now corresponds to the fovea of the non-deviated eye, and the object fixed by the two eyes is thus perceived as a single image. This phenomenon is referred to as anomalous retinal correspondence (ARC). It occurs, however, only during binocular vision. If the fixing eye is closed, the image falling on the area X of the deviated eye is, once again, spatially perceived as peripheral.

Anomalous retinal correspondence was first observed in the 19th century. It is a functional condition that is related to the original ocular misalignment. However, most investigators found that binocular vision was impossible with ARC because the phenomenon of suppression always prevailed. Still, there have been reports of patients in whom ARC was not completely excluded by suppression, and an anomalous type of binocular vision was found to exist. Bielschowsky, for example, reported in 1899 that, when a colored filter was placed in front of the deviated eye, a small number of strabismus patients perceived the light as colored. He even found exceptional cases in which some degree of stereopsis was observed in the Hearing drop test. Burian (1947) later confirmed the possibility of color mixing reported by Bielschowsky and claimed to have also observed fusional movements in these patients.

Nevertheless, our concepts of the possibility of attaining some degree of binocularity through ARC began to change only after the introduction of non-dissociating