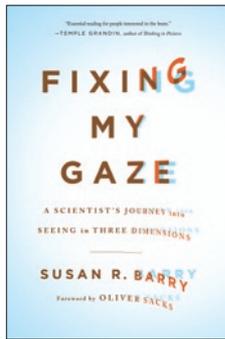


## Learning to see in stereo



### Fixing My Gaze: A Scientist's Journey Into Seeing in Three Dimensions

by Susan R Barry

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Single case studies documenting striking deficits after brain damage, such as the well-known case of Phineas P. Gage, have captured the imagination of scholars and society alike. Less common are tales of rejoicing following recovery, reports describing extraordinary benefits after successful new or unconventional targeted therapy. Sue Barry's enticing book *Fixing My Gaze* is a highly personalized account of both sides of this clinical coin. It describes her transformative journey from the many visual, social and psychological challenges of a turned eye (a squint or strabismus) early in life, to the sudden enrichment of her perceptions of the world following successful unconventional visual therapy begun at 48 years of age. Readers may be familiar with her visual recovery from the fascinating article in *The New Yorker*, "Stereo Sue" by Oliver Sacks. In her book, Sue Barry has expanded on key aspects of her case by combining a vivid and poetic account of her recovery with a detailed description of her treatment and the underlying science. Her narrative includes a reappraisal of methods of treatment and the time in life (critical periods) when they are effective. Scientific references to back up the material, as well as other anecdotes, are provided in over 50 pages of notes that follow the text.

As a professor of neurobiology at Mount Holyoke College, Sue Barry is able to describe her transformation in ways that grab the attention of lay readers (for whom the book is written), patients with strabismus and/or amblyopia, and eye-care professionals and scientists alike. She vividly recounts how acquiring stereoscopic vision led to a dramatic improvement of her perception of depth or the appreciation of "the space between" objects. A particularly valuable insight is her argument for the inability of people with normal vision to appreciate the visual experience of being stereoblind. Naively, one might think that this experience would be duplicated simply by closing one eye so all information about depth was conveyed by monocular cues. Not so, however, as Barry argues that the monocular experience of a typically reared person who closes one eye

has been informed by a lifetime of experience with stereoscopic vision and is therefore far different than that of a person who is stereoblind. As a result, her new stereoscopic vision brought much more to her life than just depth perception; objects became clearer, motion perception became more veridical and her ability to move around the world became more confident. Even more poignant is her vivid description of the enhanced sense of touch she had developed over the years and its key role in informing her newly acquired sense of stereovision. Barry did not simply recover stereopsis, but rather had to relearn to see with stereoscopic vision. As blind or deaf individuals often describe, individuals deprived of a sense are not just missing a sense. Instead, they have developed an entirely different way of sensing the world. On sensory restitution, a fascinating, but rather disturbing, experience unfolds as the brain has to adapt to a new way of functioning.

Beside the important insights Barry provides into the transformation from the separate perceptual worlds of two eyes to stereoscopic vision ("when two eyes see as one"), this book makes two other extremely important contributions. First, she uses her experience to put the last nails into the coffin of the dogma that interventions for early strabismus or lazy eye are ineffective after 7 years of age. Throughout the book, quotes are provided from other patients with a variety of visual conditions who, as adults, also recovered in a similar manner. Clearly, the author's experiences were not unique. In addition, as Barry points out, a growing body of work establishes that the visual system retains considerable capacity for change in adulthood. Second, she highlights the value of amazingly simple visual training strategies, variants of conventional orthoptic procedures, that enable patients to become aware of where they look with each eye as a first step in redirecting the two eyes to aim at the same point in space. These somewhat unexploited techniques have been the domain of a group of developmental optometrists for well over half a century. Sue Barry discusses some of the important questions that are raised by her rehabilitation, including whether her recovery was a result of the development of new connections or the unmasking of neural connections that were never entirely broken by her early strabismus. Many other questions remain, including the location in the brain of the neural changes that mediated her recovery and the extent to which her early surgery contributed to the success of her later treatment. It will also be interesting to see if her stereopsis will continue to improve, as it is still not normal.

Sue Barry's book will undoubtedly kindle renewed interest in the treatment of strabismus and amblyopia. However, it may also raise unrealistic expectations for successful treatment among some patients, as we don't yet know what proportion of patients are similar to Barry; she did not have amblyopia, had early surgery and, in other ways, may have been an ideal candidate for the therapy that she received. Moreover, much of the literature on visual training therapy is anecdotal; clinical trials with control groups are required. Nonetheless, Barry's account, along with recent scientific reports, makes it clear that it is time to overthrow the century-old dogma concerning the age limitations at which functional treatment is effective. Hopefully, the attention that Barry has placed on the importance of visual training therapy will promote randomized clinical trials to establish what proportion of patients with various visual developmental anomalies will respond and which specific therapies are important for success. ■

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