

Vision Rehabilitation and the Development of Eccentric Viewing Training: A Historical Overview

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ABSTRACT

The concept of vision rehabilitation is a comparatively new concept given the long-standing history of medical practice and medical research. This paper provides a historical

overview of vision rehabilitation, with an emphasis on the development of eccentric viewing training, from antiquity to the present day.

Keywords: vision rehabilitation; eccentric viewing training.

INTRODUCTION

Healing, caring for the ill and disabled, medical practice and medical research have an extensive history and long standing tradition. However, the concept of rehabilitation and specifically rehabilitation for the vision impaired is a comparatively new concept and has only been adopted within the past fifty years. Rehabilitation is the process whereby a person's function is restored when he or she has been affected by physical disability. Vision rehabilitation therefore enables a person to improve his or her ability to read and perform daily tasks when this has been affected as a result of vision impairment.

The aim of this paper is to outline early healing methods and provide a historical overview of the evolution of vision rehabilitation in addition to identifying some of the influences that may have lead to the development of this form of therapy. In this paper, specific emphasis is placed upon vision rehabilitation for people with macular vision loss. Whilst it is not possible to document every historical event, it is hoped that this paper will provide an interesting and informative insight into this topic area.

HEALING IN ANCIENT CIVILISATION

Vision rehabilitation, as it exists today, was not practiced in prehistoric civilisations. The treatment of illnesses in ancient times was carried out by magicians and medicine men and most healing skills were enveloped in spiritual tradition and cults. As knowledge of human anatomy increased, early

civilisations such as the ancient Egyptians, Greeks and Romans advanced the practice of medicine and treatment of illnesses. The ancient Egyptians gained knowledge into human body functions including function of the heart and blood and understanding of the importance of air. As a result of their religious-based embalming techniques, they described various organs of the body, particularly the brain. The ancient Greeks were also influenced by religion and although their lives were dominated by the Gods, evidence exists that Greek physicians like Hippocrates actively treated people that were ill. Another ancient Greek scholar, Alcamaeon of Croton, was one of the first to operate on the eye and discover that there were links between the organs and the brain. The ancient Romans further progressed the study of medicine and disease and whilst they learned from the ideas of the Greeks, their main focus was on public health schemes, improving hygiene and disease control¹⁻³.

THE MIDDLE AGES TO THE EIGHTEENTH CENTURY

Medical knowledge in Middle Ages Europe (500-1500 AD) stagnated as scholars concentrated their thoughts on theological issues rather than scientific issues and the Catholic Church dominated medical practice. Diseases were attributed to supernatural causes and common medical illnesses were thought to be punishments from God. In relation to the visual system, anatomists of the time thought that light rays diverged from the eye and the 'nervus opticus' transmitted 'visual spirits' through the lens. One of the only documented practical solutions to vision problems of the time was provided by the explorer Marco Polo who, upon his return from China in 1270, reported that convex lenses were being used by the elderly Chinese, in order to read fine print⁴.

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During the Renaissance (1400-1700 AD) performing surgical techniques became more popular and universities were established to provide a scientific basis for teaching medicine. However, due to the delicate nature of the eye it was difficult for surgeons and anatomists to make advances and great discoveries with regards to the structure and optics of the eye. In 1637 French philosopher, scientist and mathematician, Rene Descartes described the use of a magnifying aid that could assist people with vision impairment⁵. This description may possibly be the only documented attempt at vision rehabilitation during this period in history, apart from Marco Polo's documentation of convex lenses^{1,6}. There is very little evidence that there was any attempt to provide treatment or education to people who were blind or vision impaired during antiquity, the middle ages or even as late as the seventeenth century.

By the end of the eighteenth century, enlightened humanitarians were convinced that people with disabilities could be assisted and taught new skills, rather than isolated from the rest of society in specially dedicated "asylums". The protection of peoples rights and the rights of the disabled were acknowledged. The prevailing thought was that people who were blind could be taught to adapt to their surroundings and perform normal tasks of daily living. In 1784 Benjamin Franklin invented bifocals and in this same year the first institution for the blind was founded in Paris by Valentin Huay where blind children were taught to read by touch using raised letters embossed on paper. Similar institutions were later founded in England, Germany and various other European countries^{2,6}.

ADVANCES IN THE NINETEENTH CENTURY

The nineteenth century heralded major advances in general medicine with the study of bacteria and subsequent development of vaccines. It was at this time that a blind teacher by the name of Louis Braille invented the Braille system of raised coded dots that enabled blind people to read. It was also in the late nineteenth century that Helen Keller, a deaf and blind American woman, advocated on behalf of blind people⁷. In Australia, at about this same period in history, Reverend James Miriam founded the 'Victorian Asylum and Schoole for the Blind'. In 1870 the asylum established a vocational training centre for people with vision impairment. This organisation later became known as the Royal Victorian Institute for the Blind. A student of the institute by the name of Tilly Aston formed the Victorian Association of Braille Writers and in 1895 founded the Association for the Advancement of the Blind. This association was an important lobby group for blind people and was able to bring about voting rights for the blind in 1902, established nursing homes and a library (1909 and 1919) and invented blind cricket in 1922^{8,9}. Awareness

that rehabilitation and special care could be used to benefit people with vision impairment was increasing, although it was still underdeveloped.

Significant progress in terms of recognising the benefits of teaching blind people was made in the early 20th century. Several schools specifically focused on the tuition of blind students and institutions for the blind were founded at this time. Some included the Myope School and the Blind Social Aid and Literary Union in the United Kingdom; the National Society to Prevent Blindness and the Perkins Institute in the United States and the Colne Society in Germany. In addition, the Clear Type Publishing Company published some text books printed in large font⁵. It was also in the early 20th century that Parsons documented various diseases of the eye and described appropriate therapeutic and surgical treatment¹⁰. However, there was no mention of any forms of rehabilitation for those with poor visual acuity. Most of these schools concentrated on people with total blindness and recognition of those with functional vision impairment was yet to occur.

Over a decade after Parsons, Duke-Elder devoted a small section in his book to "special glasses for optical purposes"¹¹. It was at this time that vision impairment, as opposed to total blindness, became more recognised and Duke-Elder describes a new found use for telescopic or Galilean spectacles commonly used by jewellers or those involved with industrial work such as linen grading. The telescopes and Galilean spectacles were reported to be beneficial to patients with a variety of retinal diseases and the American Foundation for the Blind had begun supplying these aids to the vision impaired as early as 1924. The development of vision rehabilitation was now in its infancy and continued to revolve around the use of telescopic lenses.

Although some methods of vision rehabilitation had been described as early as the 1920s, it is difficult to state exactly when modern vision rehabilitation techniques arose. Goodrich reports that vision rehabilitation began in the 1950s with a paper published by New York's Industrial Home for the Blind¹². The author maintains that this paper defines rehabilitation as a distinctive discipline within a multi-disciplinary vision rehabilitation service and his statements are supported by the fact that this is the first publication outlining vision rehabilitation principles incorporating multi-disciplinary teams. These principles, in addition to the involvement of multi-disciplinary teams in vision rehabilitation, are still considered best practice¹³. In 1947 the United Nations Commission on Human Rights (UNCHR) began drafting a treaty on the principles of human rights. These focused upon respect for all human rights without discrimination¹⁴. This paper by the Industrial Home for the blind was published soon after the UNCHR draft and may have been directly influenced by the principles of inclusion of all people in society without discrimination based on race, gender or disability.

Telescopic aids increased in popularity during the 1950s and there are reports that people with low vision relied upon telescopic loupes to assist them with close work such as reading. These loupes, which were placed in a spectacle frame, involved mounting a Galilean telescope with a convex lens, enabling the user to focus upon a close object. After 1955, less expensive magnifiers were developed originating from those designed for normally sighted users for tasks such as looking at stamps, coins and fingerprints or used by jewellery makers, as described earlier¹¹. The American Foundation for the Blind was instrumental in making these aids commercially available to people with vision impairment. In subsequent decades Louise Sloan published several papers on topics such as using distance low vision aids, optimising illumination, using Closed Circuit Televisions and reading cards¹⁵⁻¹⁹. In 1970, Duke-Elder also described the use of magnifying devices in the form of aids such as hand magnifiers, stand magnifiers and telescopic spectacles for use in aiding the vision of those with disorders of the retina, optic nerve or visual pathway.

Whilst there were some publications regarding low vision available from the 1940s until the early 1970s, very little literature specific to vision rehabilitation is accessible. The reason for this is not that pioneering work was not being carried out in the field, but rather that most publications at that time were memorandums, internal publications and personal correspondences between low vision clinicians within and between organisations.

EVOLUTION OF VISION REHABILITATION IN THE 1970'S

The disability rights movement which emerged in the United States in the 1970s resulted from the civil rights movement of the 1960s. The civil rights movement intended to eliminate racial discrimination and was the foundation for many minority groups to demand an end to discrimination on the basis of several factors, including disability; hence the Rehabilitation Act 1973 was enacted in the United States.

According to Welch and Palames²⁰, three important concepts emerged during the 1970s in the United States, these were: "program accessibility, mainstreaming and independent living". These concepts influenced the evolution of vision rehabilitation and one of the first available books in the area of low vision entitled "The Low Vision Patient" was published in 1970²¹. This book evolved from work undertaken at the New York Lighthouse, a support agency for people with vision impairment, established in the early 1950s. This text also introduces a new concept in low vision patient care, that is, the consideration of psychological and social factors. Innovative rehabilitation methods and treatment including both the medical and optical approach to rehabilitation are described. In addition, significant emphasis is placed upon methods of accurate vision testing and prescription

of low vision aids. Emphasis was placed upon the use of low vision aids in the 1970s. The most likely reason for this emphasis is that magnifying glasses and telescopes had only become commercially available to patients with vision impairment a decade or two previously. Thus most of the publications of the time were concentrated towards the use and development of these aids, including work by authors such as Sloan¹⁸ and Gerstman and Levene²². The use of magnification as a strategy for vision rehabilitation has continued to be extremely popular and as a result, a plethora of information is available for the low vision practitioner. The literature includes an overview of useful magnifiers available to patients with low vision, optimum prescribing methods and complete optical management²³⁻³².

Despite the fact that the greater part of vision rehabilitation work concentrated on magnification devices, there were some innovative authors of the 1970s who focused on alternative forms of vision rehabilitation. This included perceptual vision rehabilitation based upon their clinical experiences with low vision patients³³⁻³⁷. Backman and Inde³³ published a manual describing exercises and vision training for people with a central scotoma, nystagmus, decreased peripheral vision and amblyopia. Based upon the authors' personal and clinical experience rather than through scientific testing, they conclude that the ability to use remaining vision is significantly improved by vision training. In addition the manual offers practical exercises and skills for the person with low vision on how to improve residual vision.

Movement towards alternative methods of vision rehabilitation continued to emerge in the 1970s. At this time, new ideas were developed about how to teach patients with macular vision loss to best utilise their remaining vision, without the use of an optical aid. A multi-disciplinary influence upon vision rehabilitation most likely contributed to the concept that people with low vision still had usable vision. As a consequence, a wider variety of health professionals such as occupational therapists, educators, orientation and mobility instructors, psychologists and other vision scientists became involved in developing the vision rehabilitation concept.

THE EMERGENCE OF ECCENTRIC VIEWING TRAINING

The 1970s and 1980s were a very crucial time in the development of vision rehabilitation with a movement towards other methods of utilising remaining vision, quite distinct from the conventional use of magnification or optical aids. The development of vision rehabilitation at this time was influenced by legislation introduced in the United States and Europe relating to anti-discrimination. In Australia similar laws were also being enacted, such as the Sex Discrimination Act 1975 (SA); Racial Discrimination Act 1976 (SA); Equal Opportunity Act 1977 (Vic) and the Equal

Opportunity Act 1984 (WA, SA, Vic). The Equal Opportunity Act and similar anti-discrimination acts allowed people with disability to be integrated into society and not be discriminated against when attending school or applying for employment. This was especially pertinent for those with vision impairment who required adaptations in educational institutions or the workplace.

As people who had central scotoma caused by macular disease were entering vocational training and the work force a new method of improving remaining sight was introduced and there were several pioneers of this "new method", laying an important foundation for further work in the field over the coming decades. Thus, vision rehabilitation in the form 'eccentric viewing' began. Eccentric viewing is a strategy that assists people with central field loss to utilise their remaining peripheral vision by relocating fixation. It is a skill that the person deliberately uses in order to project an image on to a functioning area of the retina, adjacent to or just beyond the macula scotoma³⁸⁻⁴⁰.

Several papers were published in the 1970s and 1980s describing optimum eccentric viewing training methods. Most of the early publications are based upon anecdotal evidence noted by low vision clinicians. Backman and Inde were among the first authors interested in vision rehabilitation to document and describe the principle of eccentric viewing training³⁵. This instruction manual is the foundation upon which many clinicians and researchers base their eccentric viewing methodology. Other clinicians further advanced eccentric viewing training methodology by incorporating various ideas and equipment to facilitate teaching a patient with central scotoma the principles of eccentric viewing training^{33,34,41}. Further development of eccentric viewing training methods were reported in the 1980s, including the use of large print materials such as playing cards, followed by the introduction of training materials in various sizes incorporating single letters, words and sentences, dependent upon the patient's progression⁴².

Early work in this field was not without some controversy. In 1982, Romayananda and colleagues reported that the use of prisms could be utilised to achieve eccentric viewing⁴³. This technique is quite different to that of the other authors at the time, was considered controversial and was soon after refuted by Bailey⁴⁴. More recently, another research team has investigated the effects of prismatic treatment for people with macular vision loss and concluded that using prisms alone is not sufficient for ameliorating macular vision loss⁴⁵.

Despite this debate, the groundwork was set for incorporating eccentric viewing as an accepted method of vision rehabilitation. The 1990s heralded further developments in eccentric viewing with many clinicians and researchers cultivating new methods of training. Following the initial reports outlining methods for eccentric viewing strategy, several papers were published that advocated the use of

these various strategies and built upon them in order to improve patient outcomes. Whilst, many eccentric viewing methods reported were quite simple, others were more comprehensive training programs. As a result of this early work and of increasing anecdotal and clinical data, eccentric viewing strategy was becoming more widely acknowledged as a vision rehabilitation technique appropriate for people with centre field loss.

Soon the personal computer became an extremely useful tool for both storage of resources and data, and for presenting training techniques. Collins was one of the first to describe the use of a personal computer as a method of teaching eccentric viewing⁴⁶ and this was soon followed by other computer generated training methods such as 'EccVUE'^{47,48}, video display^{49,50} and 'Vistra'⁵¹.

CONCLUSION

Now that eccentric viewing training techniques have been developed questions arise as to whether eccentric viewing is an effective rehabilitation method and how does it compare with the use of magnification aids? There has been some attempt at answering this question^{39,52-65} however, further questions need to be answered, such as how many training sessions of eccentric viewing are sufficient and does the degree and position of eccentricity influence the outcome of training? Thus, there is much work still left to be done in this emerging area of vision rehabilitation. We can look to the past to assist us with our future direction in terms of vision rehabilitation and ameliorating the impact of vision impairment for people with vision impairment.

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