A Comparison Of Rehabilitation Strategies Used To Ameliorate
The Impact Of Centre Field Loss: Preliminary Results.

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Abstract
The impact of sight loss due to macula disease can be reduced using eccentric viewing
strategy. The aim of the study was to compare the efficacy of two forms of rehabilitation used
to ameliorate the impact of centre field loss. Traditionally magnification is the most common
form of vision rehabilitation. Eccentric viewing is a technique being increasingly used in the
presence of centre field loss. Whilst there is some evidence to support the use of either
method little has been done to compare the two. This report provides initial data from a
random controlled study comparing the two rehabilitation techniques.

Keywords
Age-related macular degeneration, eccentric viewing, vision rehabilitation.

Introduction
Age-related Macular Degeneration (AMD) is the leading cause of blindness for people aged
over 50 and affects the central field of vision which is used for fine detailed tasks such as
reading, seeing faces and driving (Weih, van Newkirk, McCarty, & Taylor, 2000). The impact
of loss of the central field of vision upon visual function is devastating for those affected by
the disease as they may no longer be able to perform daily living tasks. The impact of central
vision loss can be ameliorated with the appropriate rehabilitation (Keefe, Lam, Cheung, Dinh,
& McCarty, 1998). A commonly used form of rehabilitation is magnification. Although this is
beneficial, there are some limitations with the use of magnification (Rubin, 2001). The
peripheral vision in patients with AMD is usually preserved and individuals can learn to use
their remaining vision for reading and activities of daily living. Eccentric viewing is a strategy
that has been shown to ameliorate the impact of loss of the central field of vision
(Fitzmaurice, 1994; Nilsson, Frennesson, & Nilsson, 2003). The technique has been shown to
be effective in decreasing the size of print a person is able to read although no studies to date
have incorporated a control group for comparison.

Methods
Patients attending ophthalmology clinics in Melbourne who met the inclusion criteria were
invited to participate in this study. Inclusion criteria were healthy persons aged 50 years and
over who are legally blind due to ocular pathology causing central field loss. Potential
participants were excluded in the presence of a second ocular pathology or diagnosed
dementia. Participants were randomly assigned to one of four age-matched groups. Group 1
use of magnification aids, group 2 use of eccentric viewing training, group 3 use of
magnification aids and eccentric viewing training (combination group) and group 4 non
intervention control group. Dependent variables were performance of activities of daily living (ADL), near print size and reading speed. ADL were tested using the 'Melbourne Low Vision ADL Index' (Haymes, Johnston, & Heyes, 2001), near print size was measured using the 'Bailey-Lovie Reading Card' (Bailey & Lovie-Kitchin, 1980), reading speed was assessed using extracts from the 'PAT-R' test ('Progressive Achievement Tests in Reading: Comprehension and Vocabulary (PAT-R)', 2001) and eccentric viewing training was provided using the 'ECCVUE' computer program (Fitzmaurice, Kinnear, & Chen, 1994). The study is a multivariate design using repeated measures.

Results
Data are reported for 28 participants, 7 (25 percent) male and 21 (75 percent) female. The age range of the participants according to the type of training they received was as follows: eccentric viewing = 82 years (SD=5.2); combination = 83.5 years (SD=4.6); magnification = 82.1 years (SD=6.3) and control = 83.5 years (SD=4.6). The mean near print size for the four groups' pre and post intervention are illustrated in Fig. 1.

Fig. 1 Near Print Size

![Near Print Size Graph](image)

Participants in all groups except for the control group demonstrated an improvement in near print size following intervention. One-way repeated measures analysis of variance (ANOVA) indicated there was no significant difference in near print size between groups pre training. Post training all groups except the control group demonstrated a significant improvement in near print size [eccentric F = 21.77 p = 0.003; combination F = 28.49 p = 0.002; magnification F = 18.3 p = 0.005]. Post-hoc tests indicated that the mean near print size of the control group was significantly different to the means of the intervention groups p<0.05 level [F = 18.6, p = 0.000] supporting the use of intervention to improve near print size.

Fig. 2 and 3 illustrate the mean ADL scores of the four groups' pre and post intervention. 'Part A' of the ADL Index comprises observed activities whilst 'Part B' is a questionnaire.
A one-way between groups ANOVA indicated that the four groups were homogenous on ADL measures before intervention. Participants in the eccentric viewing group and combination group demonstrated a significant improvement in ADL (part A) following intervention at the p<0.01 level \( [F = 19.9, p = 0.04] \) \( [F = 38.2, p = 0.01] \). The mean scores of the eccentric viewing group and combination group were significantly different to the other two groups on post-hoc testing.

Fig. 3 illustrates that participants in the eccentric viewing group showed the greatest improvement in part B of the ADL score. A one-way ANOVA confirms a significant improvement for the participants in the eccentric viewing group but not for the other groups \( [F = 3.036, p = 0.049] \). Figure 3 indicates the combination group performed better pre intervention on the ADL part b score however a between groups ANOVA did not demonstrate a difference between the four groups.

Improvement in reading speed pre and post intervention is shown in Fig. 4. Participants in the magnification group and combination group have the greatest increase in
reading speed. Although the increase in speed appears smaller for participants in the eccentric viewing group, one-way ANOVA indicates a significant difference in reading speed after intervention for all groups other than the control group. Between groups ANOVA confirms that there is a difference between the eccentric viewing group compared with the combination and magnification groups, indicating that the improvement is greatest in these two groups.

Discussion
Prior to any intervention, a between groups ANOVA indicated all four groups were homogenous for mean near print size, ADL and reading speed scores. The lack of improvement in near print size of the participants in the control group may indicate that without instruction, patients with macular scotoma may not learn to use their residual vision effectively by themselves. Improvement in near print size for all intervention groups indicates that all interventions have a positive effect on reducing the size of print of a person with AMD can see.

In this study, eccentric viewing training appeared to make a significant difference to participants’ ability to perform ADL. This may be due to the difficulty of using a magnification aid when performing daily living tasks such as grooming, bathing, housework etc. More importantly, participants who did not receive any intervention throughout the study period did not improve their ability to perform ADL, suggesting that patients with AMD do not develop eccentric viewing strategy or other means of maximizing their residual vision without formal training. Although eccentric viewing improved participants near print size and ability to perform ADL the results in this study indicate that magnification either independently or in conjunction with eccentric viewing was more effective in decreasing print size and increasing the reading speed of participants.

The results of this study to date indicate that both eccentric viewing and the use of magnification are useful strategies to improve near print size, performance of ADL and reading speed. Whilst magnification significantly improved participants’ ability to read faster and to read a smaller print size, eccentric viewing strategy facilitates better performance on ADL tasks.

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References