

EVALUATING SUNLENSES FOR
SPORTING ACTIVITIES
OR
"HOW TO ELIMINATE THE CHET
LEMON EFFECT"

BY

DAVID C. GABRIEL, SENIOR
FERRIS COLLEGE OF OPTOMETRY

APRIL 1985

ABSTRACT

This paper will look at the effect that three sunlenses have on a fielders ability to seperate the suns rays from an inflight baseball. Teseted lenses include polaroid, green 15, and CPF 550 sunlenses against no lenses. These lenses were tested under three sky conditions with each person catching flyballs projected from a pithing machine.

KEY WORDS: Polaroid, Corning Photochromic Filter, scotopic, photopic.

INTRODUCTION

For many years baseball fielders as well as many other outdoor athletes have been bothered by sunlight. Throughtout the years these athletes have used many methods to shield their eyes from the sun. They have used visored hats, over-the-counter sunglasses, special flip-down sunglasses, and specifically designed lenses prescribed by practioners. However, most amateur athletes use the cheapest route of all, no lenses.

The question which this paper addresses is whether or not there is another better solution available which is not being used at this time. In this paper we will look at the common polaroid and green 15 lenses mostly used in flip-down baseball sunglasses. To these lenses we will compare the Corning Photochromic Filter lenses also known as CPF 550's.

Although this paper addresses a specific athletic problem the results may be usable by many other athletes in other sports and hobbies such as tennis, golf, hunting, and fishing.

METHODS

Inorder to test this thesis, sunny to overcast conditions were necessary. Also a consistent means of placing the fly ball was necessary. For this latter purpose a pitching machine was used to simulate flyballs hit at a distance of approximately 150 feet.

Fielders were graded on their ability to catch the ball while wearing the four different lenses. In each case no hats were used and the players were given a chance to warm-up with the pitching machine prior to being graded. The order which the lenses were used was variable so as to negate any improvement in catching ability as they caught more balls. The fielders were graded according to whether they caught the ball (2 points), they touched the ball yet dropped it (1 point), or they missed the ball completely (0 points).

A total of 12 players were tested, one-third under sunny skies, one-third with overcast skies, and one-third under partly cloudy skies. In all conditions the fielders were given ten chances with each lens in a random order.

RESULTS

Scores are broken down by cloud conditions and reported as points received out of a possible forty points. These scores are cumulative totals for the fielders tested.

The first results were gathered under overcast skies. Using no sunlenses the fielders scored thirty six points. The loss of points were due to two complete misses. The use of flip-down green lenses registered thirty two points. The loss of points were due to four complete misses. The use of polaroid lenses gave a total point score of thirty six. The loss of points a result of four near misses. Finally with the use of the CPF 550 lenses a point total of thirty two was obtained. The loss of points were due to four near misses and two complete misses.

The following results were gathered under sunny skies. Using no sunglasses twenty points. Loss of points due to eight near misses and six complete misses. With the flip-down lenses thirty six points gained, losses due to two complete misses. With the polaroid lenses thirty one points losses due to three near misses and three complete misses. Lastly with the CPF 550 thirty seven points, losses due to three near misses.

Results under partly cloudy skies are as follows. Using no sunlenses thirty three points, losses coming as a result of four near and two complete misses. Secondly with the flip-down lenses thirty three points, losses due to three near and two complete misses. Thirdly with the polaroid lenses thirty seven points gained, losses a result of three near misses. Finally with the CPF 550 lenses thirty eight points gained, two points lost on near misses.

Totalling all results gives the following figures. No sunlenses 88/120, and CPF 550 lenses 107/120, with the flip-down lenses totalling 101/120, and polaroids 106/120.

Two-thirds of the participants indicated that the CPF lenses would be their lens of choice. One-fourth liked the green lenses best and the remaining individual preferred the polaroid lenses.

Sixty-six percent of the fielders felt that it was easier to pick up the ball following its release with the CPF's. Eighty seven percent felt that the CPF's provided better clarity and sharpness on hazy days. Ninety four percent reported that the CPF lenses provided greater comfort. All players tested in sunny conditions wearing CPF lenses were able to follow the ball throughout its flight, even when moving through the sun.

The cumulative results would indicate that sunlenses are definitely better than no lenses at all. Of course this would not be a surprise to anyone. Of the three sunlenses, two appear to be equal in providing protection against the sun, those being the polaroid and CPF lenses.

Breaking the results down based on sky conditions shows slightly different findings. In overcast conditions no lenses or polaroids appear to be equally good. Under sunny skies the CPF 550's barely outshined the green flip-down lenses, and under partly sunny skies the CPF 550's were slightly better than the polaroids.

DISCUSSION

Polaroid lenses produce polarized light from unpolarized light. Polarization is the process of producing light or similar radiation which exhibit different properties in different directions. The optical effect that this process has is to reduce the glare from horizontal surfaces when positioned in glasses in the normal fashion. In catching flyballs there are not many horizontal surfaces which interact with the task, however the lenses do reduce the direct glare which is produced by the sun's rays. They also protect the eyes by reducing the total amount of light entering them. These lenses do not block the more harmful ultraviolet light. According to some fielders they hardly blocked out the sun.

Second are the green 15 flip-down lenses. These lenses reduce glare slightly via the reduction in light entering the eye. They do not reduce the reflections as do the polaroids. The green lenses allow less of the blue wavelength light to pass through as they change the spectral transmittance.

Third are the CPF 550's which according to Corning reduce the amount of blue visible light scattered. Corning developed the CPF lenses to be used by people requiring protection from ultraviolet and short wavelength visible radiation.¹ The Corning Photochromic Filter 550 lens attenuates wavelengths up to about 550 nm to reduce brightness and to provide protection while retaining sufficient luminous transmittance to permit its use in most everyday situations.² One problem with its everyday use or its possible use in baseball or sporting events is its reddish-amber color. This color results in a needed period of adaptation and therefore would be poorly used as a flip-down lens. The benefits that the CPF lenses provide are hindered by this reddish affect which occurs when first putting the lenses on. This red affect was compared to what a holocaust would look like. Another problem with this lens is the color change which it causes by making the blue end of the spectrum bluer and the green portion also seems bluish. It is because of this problem that Corning issues a warning to drivers to become used to the lenses and to make sure that they do not affect their ability to identify³ traffic signals, prior to attempting to drive with the lenses.

A major problem in attempting to catch a flyball is identifying the ball against a blue sky. Corning researchers identified blue light, which dominates the daylight spectrum, as the kind of visible light most likely to scatter.⁴ Adding these two situations, one can clearly see how difficult it is for the eye to function at its peak efficiency. The design of the CPF 550 allows for a spectral transmittance to reduce scotopic (rods) transmittance while allowing a higher level of photopic (cones) transmittance.⁵ Out of doors, in sunlight, over 99 percent of the scotopic stimulus is suppressed.⁶ In the fully darkened state the CPF 550 lens transmits a mere .5 percent of the scotopic spectrum, while allowing 21 percent of the photopic spectrum.⁷ Looking at these percentages it is easy to see how visibility is increased via the greater stimulation of cone receptors while the rod receptors are left unstimulated.

According to Corning literature, when considering the use of the CPF lenses for pathology patients, symptoms to consider include the following:

- (1) Sensitivity to bright light and glare from sunlight and/or artificial light.
- (2) Reduced vision due to loss of contrast.
- (3) Reduced vision due to light scattering.
- (4) Prolonged adaptation time in adjusting to abrupt changes in illumination intensities. 8

These are the same symptoms which plague a fielder of flyballs. Their eyes are sensitive to the sun's rays, they lose the ball due to decreased contrast as it blends with the sky, and they must adapt to the immediate change in light intensities as the ball goes from bright sunlight into the shadows caused by the stands.

During Corning's initial testing about 90 percent of the patients reported one or more of the following benefits:

- (1) Greater comfort from less light-induced eye strain.
- (2) Improved contrast of outdoor colors.
- (3) Greater acuity thru improved contrast and reduced glare.
- (4) Faster adaptation time to sudden changes in light intensities. 9

Via this fielding research it was found that 94 percent enjoyed greater comfort and 87 percent experienced increased clarity on hazy days with the CPF lenses.

It is thus conceivable that fielders would also benefit from these findings if the adaptation problems could be eliminated. There are of course other lenses which achieve some of these benefits and reduce the problems. These other lenses may include other Corning products such as the photogray series and the Serengetti Driver's. Other companies also produce lenses which block the ultraviolet rays which are the rays which tend to scatter in the atmosphere the most.

There are also many health aspects to tinted lenses. A person engaged in outdoor activities is more susceptible to the effects of ultraviolet and infra-red light. It is the belief of some Optometrists that a growing child needs the full-spectrum of light to stimulate pituitary growth. Thus the use of sunlenses on a continued basis would interfere with this process. For this reason it is unadvisable for children to use sunlenses except on a short-term basis such as for sports activities. On the other hand, adults beyond the growth stage are in need of protection against the harmful ultraviolet rays. An athlete who gazes skyward is inviting health hazards to many areas of the eye such as the cornea, lens, and retina. It would thus be advisable not only to use sunlenses for sporting activities such as fielding balls, but also on a full-time outdoor basis.

CONCLUSION

Research has definitely shown that sunlenses for outdoor sporting activities can be very beneficial. The question which arises is what kind of protection is the best. Of course there is no single solution because just as people are different so are their needs and expectations. This is a partial explanation as to why Corning developed a series of three CPF lenses, different pathologies benefit from different lenses. It is necessary for all adults should wear some type of ultraviolet protection.

For those people who will wear the sunlenses full-time or specifically for continuous baseball fielding, the CPF lenses may be their lens of choice. Because of the adaptation period necessary when first wearing the CPF lens, baseball players could only use them full-time in the field and not as flip-down lenses. For those fielders who find it necessary to use flip-down lenses, a well made polaroid or green lens would be the lens of choice. These latter people must realize that some of the benefits of the CPF lens will be lost such as clarity, contrast increases and sharpness on hazy days.

Another factor which plays a large part in choice of sun protection is cost. For the amateur athlete the CPF lens costing over 80 dollars would be out of their financial range. The average high school or college athlete would find a polaroid lens more cost efficient, whereas the more serious or professional athlete may find it worth the price.

With any sunlens it is an individuals needs which must determine which lens is best for their specific athletic activity. Many enthusiasts and professionals could benefit from the CPF 550 lens, as do the many ocular pathology patients using them now. With the increased involvement in recreational sports and the general need to protect the eyes from the sun's affects, it is this type of research which merits follow-up.

REFERENCES

1. Corning's CPF 550 Spectacles, Information About A New Eye-care Product For Ocular Disorders Resulting in Light Sensitivity. OPM-2 Page 1.
2. Corning's Photochromic Filter Lenses with 550nm Spectral Cut-off. OPM-1, Page 3.
3. Ibid (1), page 8.
4. Ibid (2), page 3.
5. Ibid (2), page 3.
6. Ibid (5)
7. Ibid (5)
8. CPF Products Manual for Corning's CPF Filter Lens Series: CPF 511, 527, 550. Page 9.
9. Ibid (1), page 4.