

For example, in the last 35 years, only one case was reported where numbers were perceived and recognized with no difficulty, letters with some difficulty, and geometric forms and gratings were not perceived at all.⁵

When comparing both VA and GA values, patients with VA approximately 0.008 (20/2500) have had GA values in the range of 4 to 6 cpd, which better depicts their vision. If the useful area of vision is in the lower part of the visual field, a person with a VA of 0.004 (20/5000) and a GA of 4 cpd may move like a sighted person.⁶ However, GA values of 4 to 6 cpd can sometimes be recorded in persons with normal VAs. This is a sign of poor encoding of high-frequency gratings. Such individuals usually describe finer gratings as distorted lines and cannot perceive millimeter paper or cut materials along the thread.

Finally, visual functioning should also be assessed using low-contrast optotypes and gratings so that, in addition to the full-contrast level, the functionally more important intermediate- and low-contrast levels are assessed. Actually, to achieve a complete description of visual functioning, all nine domains recommended by the International Classification of Functioning, Disability and Health,⁷ the framework within which we should now work in rehabilitation and education, should be evaluated.

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Authors' Response

The Berkeley Rudimentary Vision Test (BRVT)¹ is a set of tests designed for the clinical measurement of visual acuity beyond the limits of the letter chart, which we suggest is at about $\log\text{MAR} = 1.6$. This is when the patient cannot read across a five-letter row of 40 M letters presented at 1 m and the angular width of the row is 32 degrees. The BRVT tests progressively simplify the test task and, when necessary, use a short viewing distance to achieve very large angular sizes. Beyond the letter chart, the first task simplification is to test with single optotypes—single tumbling Es (STEs) presented at 100 cm and, when necessary, at 25 cm. The limit of STE $\log\text{MAR} = 2.6$ is reached when the largest (100 M) STE cannot be recognized at 25 cm. The next simplification of the visual task is a grating acuity (GA) test. The BRVT test cards are 25 cm square, and the coarsest grating has only two black and two white stripes, whereas the finest grating has four times as many stripes. On the coarsest grating, each stripe subtends 800 arc-minutes at the close testing distance of 25 cm, and the limit of GA becomes $\text{GA } \log\text{MAR} = 2.9$. If the grating orientation cannot be recognized at this angular size, visual resolution tests are abandoned. The visual task is further simplified in the basic vision component of the BRVT that tests for white-field projection and black-white discrimination.

There were no assumptions that letter chart acuity, STE acuity, and GA measurements were all part of a continuous function or that scores on one of these functions can be converted to or replaced by each other. The converse is true. We stated that “The visual acuity score on one task is not necessarily a reliable predictor of the visual acuity scores that would be obtained on alternative test tasks,” and the issue was given considerable attention in the Discussion section. The ETDRS (Early Treatment Diabetic Retinopathy Study) chart acuity, STE acuity, and GA are three different measures of limits to spatial resolution, but the visual tasks are different. For some individual patients, there can be surprisingly large differences in the acuity scores from these different tests.² It is important that whenever visual acuity results are reported, the visual task should be identified.

Dr Hyvärinen suggests that different methods should be used to specify the resolution limits for optotype tests and grating tests. All visual acuity scores, directly or indirectly, express the angular size of critical detail within the test target. The minimum angle of resolution (MAR) specifies the angular size of the critical detail within the test target in units of minutes of arc. $\log\text{MAR}$ acuity scores quantify the MAR in log units. For optotypes, the critical detail is taken as the stroke width or the separation between strokes. It is not inappropriate to take the width of a single stripe as a meaningful measure of the size of the critical detail. Whereas cycles per degree is a common way of specifying GA limits, there are many alternative methods that are equally explicit and satisfactory, including degrees per cycle, arc-minutes per cycle, or arc minutes per stripe width. There are no advantages gained through using different units to express scores from different acuity tests.

Dr Hyvärinen also points out that the resolution of gratings depends on the number of stripes, or cycles, within the display, and she draws attention to the limited number of stripes the coarser grating targets within the BRVT. As a matter of practicality, the size of the BRVT test cards was made 25 cm square, and at a 25-cm viewing distance, the cards subtend 53 degrees. In the BRVT, the GA test does present a simpler task than the STE test. We considered that two black and

two white stripes to be the minimum for presenting a GA task. When the stripe width is 13 degrees, it is impractical to substantially increase the number of stripes in the display.

The BRVT is intended to provide a simple and convenient means of assessing form vision for high-contrast targets for beyond the usual clinical limits. In cases of very poor visual acuity, results from the BRVT test can contribute to the clinician's understanding of the patient's functional vision abilities.

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