



Striped Circle Visual Acuity Chart; A Novel Visual Acuity Chart Based on the Landolt-C Chart

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ABSTRACT

Measurement of Visual Acuity (VA) has been used for eye examinations under various clinical conditions. In addition, because of changes in VA with a range of eye diseases, its measurement is used to screen, diagnose, and evaluate response to treatment in numerous eye diseases and predict the patient's visual function. VA and the likelihood of astigmatism could be evaluated simultaneously using a newly designed Stripped Circle (SC) VA chart. This chart has been developed based on the standard VA measurement scale chart, and the Landolt-C (LC) VA chart and all the standards for a VA chart design were implemented during its development. However, to publicize the clinical application of this VA measurement chart, further studies are required to evaluate its sensitivity, specificity, and repeatability compared with a similar standard VA chart.

KEY WORDS

Visual Acuity; Landolt-C visual acuity chart; Stripped Circle visual acuity chart

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INTRODUCTION

Visual Acuity (VA) measurement is the most common method for assessing visual function in clinical practice and research [1]. Measuring VA is an important part of routine eye examinations as it plays an important role in determining the prognosis of eye disorders, as well as assessing response to treatment. Furthermore, based on valid published studies, high prevalence of astigmatism has been found in several racial groups of school-aged children in the United States. This can highlight the importance of simultaneous assessment of VA and astigmatism among children [2-7]. The Landolt-C (LC) VA chart is commonly used for the assessment of childhood VA in the screening process, while also making possible

the assessment of VA of illiterate maples and non-English speakers [8].

Although this test has been used for more than a century and is widely accepted as the gold standard, it also has its own inherent problems, probably due to the higher brain function where the gap of its optotype appears closed due to close proximity to the limit of resolution, particularly when the gap of optotype is at 6 o'clock. This limitation of LC VA chart is not due to the structure of the cornea or lens or an existing astigmatism [9, 10].

The adjusted Stripped Circle (SC) VA chart presented in the current report is based on the LC chart, and allows simultaneous assessment of VA and the likelihood of astigmatism. However, we propose to compare this novel assessment tool with a standard VA chart, such as an LC



VA chart, to determine its sensitivity, specificity, and repeatability.

HYPOTHESIS

The chart was designed based on well-established standards for designing a VA measurement chart. Furthermore, a chart was then designed for the optotype with the same dimensions and standards as the LC VA chart. According to this method, 2 VA charts were constructed in a similar manner with different optotypes for subsequent evaluation.

In most LC charts, the gap of the optotype is located in 4 directions, on the top, bottom, right, or left [11]. The chart of the current report contained stripy circles with 4 orientations, including horizontal, vertical, left (the angle of stripes being 135 degree) or right (the angle of stripes being 45 degree). The chart was designed in high contrast black on white optotypes, as shown in Figure 1. It consists of 13 rows, with 2 rows spaced equal to the height of 1 lower row of optotypes, and the number of optotypes in each row from top to bottom is proportional to the increase in VA. In this chart, logarithmic increments for the size of the optotypes were considered, and for different levels of VA, optotypes equivalent to that of a standard VA chart are used. Also, the spacing of each optotype to the next optotype in a row was considered equivalent to an equivalent optotype. The VA measurements are commonly made with the VA chart at moderate photopic luminance, while the room lighting is typically subdued. The standardized chart luminance range in this protocol was from 85 to 400 lux.

DISCUSSION

For a test to gain recognition as a routine clinical screening tool, several criteria must be met. One of the most important is the reliability of the test. Therefore, evaluating similarities between the newly designed test and a standard test is necessary [12]

This report focused solely on the idea and design of a new VA chart, thus further studies are required to evaluate this novel VA examination toll. The authors propose to design a computer model of this chart with an identical optotype on the Liquid Crystal Display (LCD) monitor to facilitate the assessment of VA of individuals. Design of a handheld model is also suggested with the same optotype to examine near VA in the working distance. The present invention, as described earlier, aimed at designing an upgraded chart for VA assessment that evaluates the ability of the visual system to identify

the new optotype. However, the described invention may be required to undergo further evaluations.

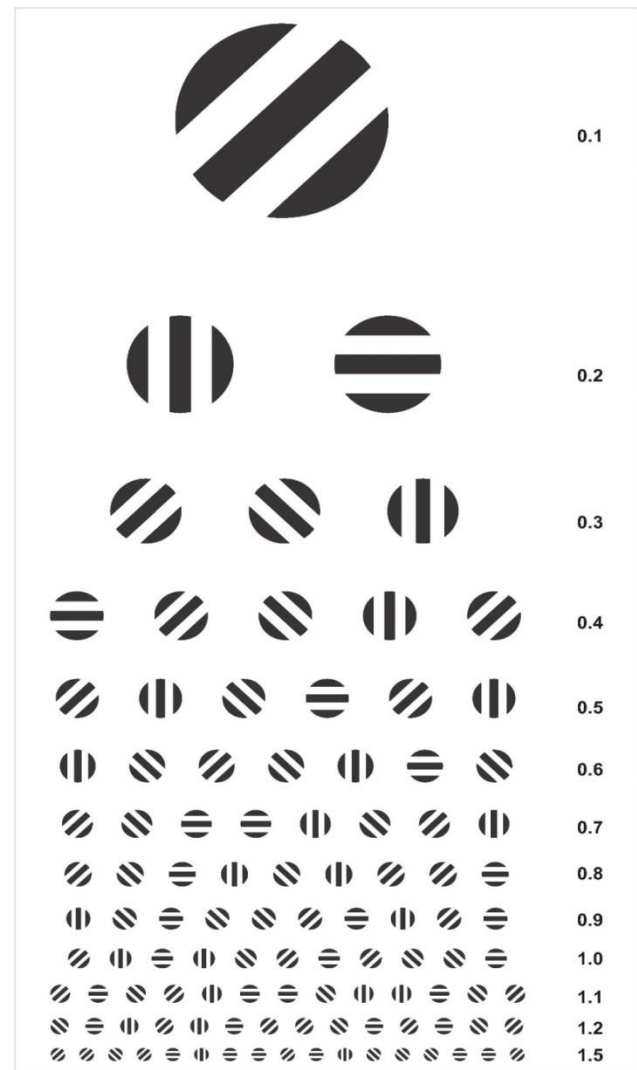


Figure 1. The Striped Circle (SC) Chart
The basic optotype consists of striped circles in 4 main directions of astigmatism (horizontal, vertical, left at 135 degree, and right at 45 degree). The objects are arranged in 13 rows.



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DISCLOSURE

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