

INSTRUCTIONS FOR GRATING ACUITY CARDS

INFANTS ASSESSMENT SET CHILDRENS ASSESSMENT SET

INTRODUCTION

These acuity cards provide a rapid method of determining the visual acuity of infants and young children within a variety of clinical settings. The apparatus forms part of the “acuity card procedure”, a technique pioneered in the United States and subsequently used in clinical practice in Europe. The standard procedure is based on infants’ known “preference” for patterned stimuli as indicated by their looking behaviour.

THE APPARATUS

The Infant Assessment Set consists of eight acuity cards. In seven of the cards there is a grating patch of known spatial frequency (i.e. the number of black and white stripes per degree of visual angle). The eighth card does not contain a grating- this is marked the “blank”. A small round peephole is located at the centre of each card through which the patient is observed during the test. This peephole is optional as some users prefer no distraction at all on the card.

A further set of 10 cards can be purchased separately and are called The Children’s Additional Set. This set includes 4 cards in the nominal acuity range 14.5 to 35.4 c/deg, and six cards within the range of 0.29 to 9.6 c/deg (see table). The additional cards extend the use of the Infant Assessment Set beyond about the first year of life and provide greater sensitivity when testing acuities below 12.5 c/deg.

Most users prefer the combined version of 18 cards.

PROCEDURE

A ONE-MONTH-OLD BABY

The infant is held by the seated parent (or if possible, by an assistant) at 38cm from the centre of the card. The tester presents the acuity cards whilst observing the infant’s looking behaviour through the peephole. The test is begun with a coarse grating (less than the infant’s expected acuity) to establish their looking pattern. Further cards of increasing spatial frequency are presented and the looking responses are observed. In this manner the finest grating that elicits a looking response is determined and recorded as the visual acuity in cycles per degree (c/deg), or Snellen equivalent if preferred.

It is advisable that the examiner be unaware of the location of the grating patch: the left-right position of the grating should be randomised before carrying out the test. N.B. no indication of the grating’s position is given on the reverse of the card. Each card can be presented once, then rotated through 180 degrees and the observed responses compared with the position of the grating patch. Intermittent use of the “blank” can be used to confirm responses, as can small movements of the cards at the acuity limit. Three presentations are recommended.

The term “looking response” refers to any consistent behaviour observed upon presentation of the cards. For example, eye movements, fixation, head turning or pointing. The nature of the response varies according to the age of the patient and the proximity to the acuity limit. For guidance, the following responses are associated with particular age groups.

NEONATES: often slow to respond and the grating patch may be positioned more centrally and then moved sideways to confirm fixation.

AROUND 6 MONTHS OLD: the easiest age to test at, looking responses are pronounced and therefore readily interpreted.

AROUND 9 MONTHS AND OVER: the older the infant, the quicker the response. The grating may not hold attention, and the infant may only glance at the grating and then look quickly to the other side of the card. The tester should be aware that after a few trials, the infant may anticipate which side the grating will appear (usually where it was last shown).

Several techniques can be used to assist in the smooth running of the procedure, and these will already be appreciated by those with previous experience in measuring vision in infants and children. For example, toys can be presented within the examination area to gain the infants attention, and for monocular testing, co-operation can be achieved by playing “pirate”.

The standard procedure can be adapted for use with a variety of patient populations. In all cases, distracting influences should be minimised. For toddlers, additional behaviours can be elicited, for example, the cards may be presented with the child lying on the floor.

Age norms have yet to be established for these acuity cards, although as a rule of thumb, visual acuity expressed in cycles per degree is approximately equal to the age in months up to about 1 year. However, it should be remembered that the range of acuities obtained using preferential looking tests of acuity in normal infants may span 2 octaves, an octave being a doubling of spatial frequency. For age norms obtained with similarly designed acuity cards, see the references.

HINTS ON USE

1. Every attempt should be made to standardise the test distance which is nominally 38 cms. If a greater test distance is considered appropriate, then it is necessary to recalculate the acuities using the tabulated information to follow.
2. Ensure that if a parent is holding a child, no cues are given to the infant as to the position of the grating.
3. Perform the test in good room illumination (the luminance of the cards should not be less than 10cd/m²), avoid reflections and shadows, and ensure an even illumination of the cards.
4. The acuity card procedure is undoubtedly a powerful tool for the clinical assessment of visual acuity. However certain matters pertaining to the interpretation of test results have yet to be resolved, for example the

significance of inter-ocular differences and the possibility that grating acuity may overestimate recognition acuity in amblyopia.

5. Always consider the likely constraints that a particular patient's diagnosis may have on the test, for example in the case of field defects. Testing of patients with nystagmus is possible although difficulty may be encountered in identifying the end-point acuity limit.

CARD RESOLUTION AND ACUITY EQUIVALENTS

| Acuity Card No | Cycles per cm | Cycles per degree at 38cm | Approx. Snellen equivalents | |
|----------------|---------------|---------------------------|-----------------------------|---------|
| 1 | 49.2 | 35.4 | 6/5 | 20/17 |
| 2 | 35.4 | 25.5 | 6/7 | 20/25 |
| 3 | 30 | 21.6 | 6/9 | 20/30 |
| 4 | 20.1 | 14.5 | 6/12 | 20/40 |
| 5 | 17.3 | 12.5 | 6/14 | 20/50 |
| 6 | 13.3 | 9.6 | 6/18 | 20/60 |
| 7 | 10.7 | 7.7 | 6/24 | 20/80 |
| 8 | 9 | 6.5 | 6/30 | 20/90 |
| 9 | 5.3 | 3.8 | 6/50 | 20/160 |
| 10 | 4 | 2.9 | 6/60 | 20/200 |
| 11 | 2.9 | 2.1 | 6/90 | 20/300 |
| 12 | 2 | 1.4 | 6/130 | 20/400 |
| 13 | 1.33 | 0.96 | 6/190 | 20/600 |
| 14 | 1 | 0.72 | 6/250 | 20/800 |
| 15 | 0.5 | 0.36 | 6/500 | 20/1700 |
| 16 | 0.4 | 0.29 | 6/620 | 20/2100 |
| 17 | 0.25 | 0.18 | 6/1000 | 20/3400 |
| 18 | blank | | | |

Infant's Assessment Set consists of 5,8,10,12,14,15,17,18.

Children's Additional Set consists of 1,2,3,4,6,7,9,11,13,16.

Conversions from cycles per cm to cycles per degree are based on an "eye-to-grating".

distance which will be approximately 3cm greater than from the eye to the peephole.

N.B. Grating no 2 subtends 30.1 cycles per degree (6/6) at a test distance of 46cm.

REVIEWS

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