

Instructions



The Frisby Stereotest

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HOW THE TEST WORKS

Testers should first familiarise themselves with how the test works by examining the thickest plate carefully, initially using both eyes normally and then with one eye covered. Using two eyes, an observer with normal stereoscopic binocular vision will easily be able to see in one of the four random-pattern squares a circle of pattern elements, similar to the one printed on the frontispiece, lying in depth relative to its surround. With one eye covered (a viewing condition which simulates a patient lacking binocular stereopsis), that depth effect no longer obtains. The depth effect is due to the circle and its surround being printed on opposite sides of the plate.

Testers with poor stereoscopic vision who have difficulty in discriminating the circle-in-depth themselves can nevertheless administer the test by discreetly feeling the corner studs on each presentation; the stud nearest the circle has a flat discriminable by touch. The flat is on the same side as the circle-in-depth.

A brief guide on how to administer the test is given opposite. Full details are given in the remainder of this booklet. **Note carefully** that, once the initial phase of explanation is over and the patient is being called upon to demonstrate stereoscopic ability, the **patient should view the plate squarely with head and plate held still**. It can be helpful to steady the head of the young and active patient with one outstretched hand, while holding the plate steady with the other.

STEREOPSIS SCREENING

For stereopsis screening the test objective is to discover whether the patient can reliably discriminate the circle-in-depth using the thickest plate. Present the plate several times with the position of the circle-in-depth varied randomly. *Patients with stereopsis* usually find the circle-in-depth quickly and confidently. *Patients with defective stereopsis* usually make slow hesitant responses with a high frequency of errors.

Understanding of the test by patients making hesitant responses can be checked by standing the plate on a corner and twisting it gently to and fro by about 10° either side of square to the patient's line of sight. Twisting the plate in this way introduces the monocular depth cue of motion parallax which makes the circle-in-depth readily visible, even for patients without stereopsis (testers can check this for themselves by viewing the moving plate with one eye only). Hence, if a patient can find the circle-in-depth when the plate is twisted to and fro but not when it is held still, a confident judgement of defective stereopsis can be recorded because the patient has demonstrated understanding of the test. *Be sure to use a new random position and to hold the plate and patient's head still when stereopsis is being tested.*

STEREOACUITY ASSESSMENT

For stereoacuity assessment the test objective is to find the finest depth discrimination which the patient can reliably manage, using the full range of plates held at various viewing distances (the thinner the plate and/or the greater the distance, the finer the depth discrimination: see details later).

SCREENING PATIENTS ABLE TO UNDERSTAND SIMPLE VERBAL INSTRUCTIONS

- Hold the thickest plate steadily in front of any convenient bright plain background (such as a piece of plain paper resting on a table, or the flap of the test box — see figure in lid). Avoid reflections and light sources behind or over the patient.
- Draw the attention of the patient to the circle-in-depth. Besides pointing to it, it can be helpful to say that the circle is “sticking out” in front of its surround. Alternatively, if the plate is held the other way round, one can say that the circle forms a “hole” in the pattern. The circle printed on the frontispiece can be helpful in explaining the nature of the circle-in-depth.
- If the patient claims to be able to see the circle-in-depth, take the plate away, turn it unobtrusively to some new random position, and then show it afresh, this time asking the patient to point to the square containing the circle. Give as many such presentations as you need to establish whether the patient can reliably discriminate the circle. The interest of the young patient can be held by challenges to “find the hidden circle”, or “find the hidden hole”. Usually 3 or 4 confident and speedy correct responses are sufficient. If in doubt, and particularly if the patient is slow and hesitant, try a few more. The practitioner should be aware that it has been reported that some subjects can perform some stereotests monocularly. It is therefore always wise, for this test as for others, to suspect very slow but correct responses. The

patient's understanding of what the depth effect looks like can be checked using the ‘twisting presentations’ technique described previously. Record **Stereopsis Present** if reliable discrimination is established.

- If the patient reports being unable to see a circle-in-depth even when it is pointed out, and/or the patient fails to pick out the square with the circle reliably and confidently over repeated presentations, record **Stereopsis Not Demonstrated**. Be sure to try the plate both ways round before recording this result, and consider checking the patient's understanding using the ‘twisting presentations’ technique described earlier.
- **It is important** that the patient should view the plate squarely with head and plate held still once the initial phase of explanation is over and the patient is being called upon to demonstrate stereoscopic ability. It can be helpful to steady the head of the young and active patient with one outstretched hand, while holding the plate steady with the other.

CAUTION

The corner studs help protect the plates when they are laid on table tops, etc. It is desirable, however, to replace the plates in the box when they are not in use.

SCREENING PATIENTS UNABLE TO GRASP VERBAL INSTRUCTIONS

- Present the thickest plate as previously but without comment. Infants will often spontaneously touch the circle-in-depth. If this does not happen, draw attention to the circle-in-depth by pointing one of the patient's fingers towards it.
- Take the plate away, turn it around unobtrusively to a new random position, and then present it afresh, again if necessary pointing one of the patient's fingers to the circle-in-depth. Repeat this procedure until you think the patient has grasped the idea that the plate contains a target-to-be-identified.
- Present the plate again in a new position, but this time encourage the patient to point a finger to the circle unaided. If this is done reliably over several presentations record **Stereopsis Present**.
- Should the patient not volunteer clear pointing responses, a positive result may still be recorded if **scanning eye movements** stop consistently at the correct square on repeated testing. The tester can concentrate on the patient's eyes and still know the position of the circle by discreetly feeling the corner studs: the stud nearest the circle has a flat surface discriminable by touch. The flat surface is on the same side of the plate as the circle-in-depth.
- If the observer consistently makes incorrect pointing responses despite every effort to direct attention to the correct square initially, record **Stereopsis Not Demonstrated**.

Note: While it is often easy to record a Stereopsis Present result even for very young pre-verbal children by virtue of their consistently correct pointing responses, it is not so easy to be as confident about a Stereopsis Deficient result for such young subjects. For example, a run of incorrect responses may be due to the patient not fully understanding what is required, rather than because of a lack of stereopsis. This is a problem common to all currently available stereopsis tests but the **Frisby Stereotest** keeps such 'don't know' verdicts to a minimum. This is because it uses a natural depth stimulus (and so avoids the need for often troublesome red/green or polaroid spectacles) and because it permits repeated presentations without the patient learning the 'correct' response. Moreover, it is sometimes possible to check understanding using the 'twisting presentations' technique even for very young subjects unable to grasp verbal instructions. The Frisby Stereotest thus makes it a feasible proposition to test children considerably younger than has been possible hitherto, sometimes children even less than one year old.

Important: Observe the precautions mentioned earlier about holding the test plates squarely and still, preventing head movements by the patient, and choosing new random positions when stereoscopic ability is being demonstrated.

FURTHER DETAILS ON STEREOACUITY ASSESSMENT

Test the patient with various plate/distance presentations selected from the table shown overleaf and in the lid to determine the lowest disparity value which the patient can reliably manage. It is suggested that the tester concentrate initially on the usual reading distance of 40cm. Accurate measurements are best made using the tape measure, held by the patient as illustrated in the figure to control eye-to-plate distance, with the test box rested either on a table or on the tester's lap. There is no need to bother with the tape until the tester has established the approximate distance at which the observer begins to fail.

Important: Observe the precautions mentioned above about holding the test plates squarely and still, preventing head movements by the patient, using repeated presentations until satisfied that the patient can or cannot make reliable discriminations, avoiding reflections, etc.

Record the lowest disparity which the patient can reliably discriminate. This stereothreshold is a measure of stereoacuity.

The table values are sufficiently accurate for customary clinical practice but it should be realised that (as for other stereotests) they are only approximations to the exact disparities. Interpupillary distance will vary for different patients, it is difficult to be completely sure about eye-to-test distance (although the *Frisby Stereotest* does provide a tape measure to help with this

problem), and there will inevitably be slight manufacturing variations in the tests themselves. In the case of the Frisby test, slight variations in the thickness of the plastic sheet used for the plates means that any given set of plates is likely to depart in some degree from the nominal real thickness of 6mm, 3mm and 1.5mm, and hence there will also be slight departures from the expected apparent thicknesses (of 4.03mm, 2.01mm, and 1.00mm respectively, reductions caused by the 1.49 refractive index of the plastic). Consequently, if the Frisby test plates are being used in a context where it is meaningful to know closer approximations to the exact disparities being presented, these can be worked out from the usual disparity formula suitably adjusted to cope with the apparent depth reduction effect. This formula is:-

$$\text{Disparity} = \frac{206264.81 (p.d.l)}{1.49(l^2)} \text{ sec arc}$$

where p is the interpupillary distance, l is the viewing distance, and dl is the plate thickness as measured with a micrometer.

DISPARITIES FOR STEREOACUITY ASSESSMENT

Viewing Distance		Plate Thickness		
cm	(in)	6mm	3mm	1.5mm
30	(12)	600	300	150
40	(16)	340	170	85
50	(20)	215	110	55
60	(24)	150	75	40
70	(28)	110	55	30
80	(32)	85	40	20

The table gives approximate disparities. If exact values are needed, these should be calculated from first principles, or closer approximations can be obtained using the advice given above.

Record the lowest disparity which the patient can reliably discriminate. This stereothreshold is a measure of stereoacuity.

Note: In versions of the test supplied before March 1990, the thinnest plate was 1mm thick, not 1.5mm as now. This change has led to slight changes in the disparity table.

CAUTION

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