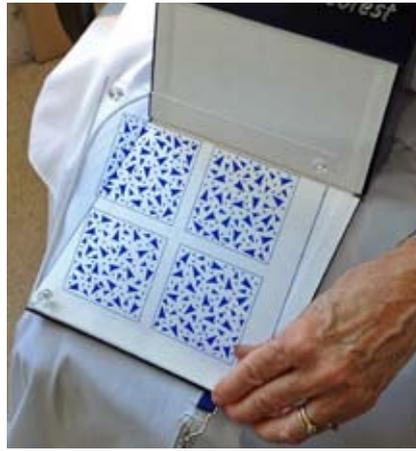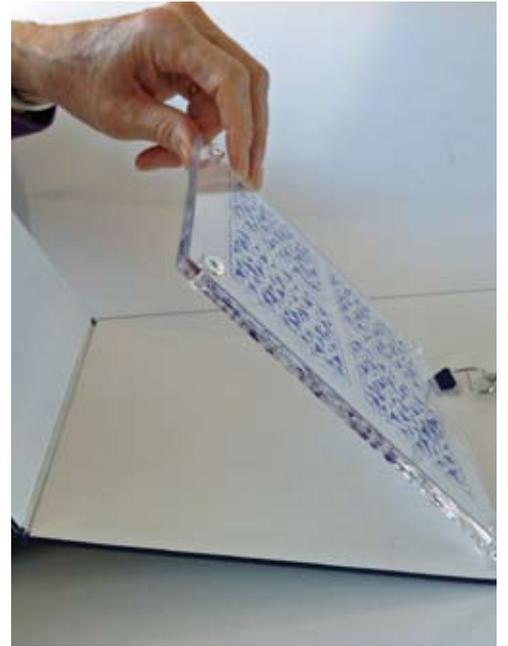# Instructions

Frisby
Near
Stereotest®

Rest the plate on the edge of the fold-down flap attached to the box. Lift its top edge a few cm/inches above the flap, while keeping the plate is square to the patient's line of vision. The tape is hooked on to the flap and held by the patient in the way shown below to control eye-to-plate distance.

Note how the top edge of the plate on is lifted up from the background by a few cm/inches above the background.


Target revealed monocularly

Do *not* hold the plate flat against the box when measuring stereoacuity as this can introduce shading cues revealing the target monocularly.

However If the patient initially fails to find the target when the test is presented correctly then **test understanding can be checked** by holding the plate flat against the box (or a piece of paper) to reveal the target monocularly. This deliberate introduction of shading cues to show the target can help the patient know what they are looking for - see Instructions for details.
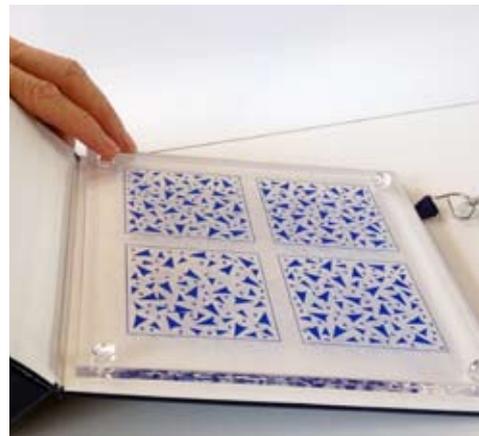
Holding the plate flat against a background can make the target visible monocularly.

This must be avoided when measuring stereoacuity.

However this form of presentation is **useful when checking for test understanding** (see opposite and later pages of this booklet).

HOW THE TEST WORKS

Testers should first familiarise themselves with how the *Frisby Near Stereotest* 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 **target circular patch** of 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 target and its surround being printed on opposite sides of the plate.

Testers with poor stereoscopic vision who have difficulty in discriminating the target-in-depth themselves can nevertheless administer the test by discreetly feeling the corner studs on each presentation. **The stud nearest the target has a flat discriminable by touch. The flat is on the same side as the target-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 active patient with one outstretched hand, with the carer's permission, while holding the plate steady with the other.

STEREOPSIS SCREENING

For screening the objective is to discover if the patient can reliably discriminate the target-in-depth using the thickest plate. Present the plate several times with target position varied randomly. **Patients with stereopsis** usually find the target quickly and confidently. **Patients with defective stereopsis** usually make hesitant responses with errors.

Test understanding by patients not finding the target can be checked in two ways. **First**, bring a piece of white card up against the plate–this makes the target visible monocularly. If the patient can then find it they have demonstrated they know what they are looking for. **Secondly**, stand the plate on a corner and twist it slowly to & fro. The monocular depth cue of motion parallax then makes the target visible in depth, even for patients without stereopsis. (Testers can check this for themselves by viewing the moving plate with one eye only). If a patient can find the target when the plate is twisted to & fro but not when held still, defective stereopsis can be recorded because the patient has demonstrated test understanding. **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

• **Begin by establishing test understanding.** If the patient does not see the target-in-depth quickly and easily, draw attention to it. Besides pointing to it, it can be helpful to say that the target is "*sticking out*" in front of its surround. Alternatively, if the plate is held the other way round, one can say that the target forms a "*hole*" in the pattern. Also, the target printed on the back page can be helpful in explaining the nature of the target-in-depth. Also, use the techniques described above in the Screening section for making the target visible monocularly while checking test understanding.

• **Hold the thickest plate steadily a few cm/inches in front of any convenient bright plain background** (such as the flap of the test box - see photos and the figure in lid). **Do not hold the plate directly against a background** after the initial test understanding phase, as that can introduce monocularly visible cues to the target. Avoid reflections and shadows caused by light sources behind or over the patient.

• **If the patient claims to be able to see the target-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 target. Give as many such presentations as you need to establish whether the patient can reliably discriminate the target. The interest of the young patient can be held by challenges to "find the hidden target", or "find the hidden hole".

• **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 capability. As noted earlier, it can be helpful to steady the head of the young and active patient with one outstretched hand, with the carer's permission, while holding the plate steady with the other.

• **Record Stereopsis Demonstrated if 3 or 4 confident and speedy correct responses are made**. Try a few more if in doubt because the patient is slow and hesitant. 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. Only record Stereopsis Present if reliable discrimination is established.

• **Record Stereopsis Not Demonstrated if the patient fails to pick out the square with the target reliably and confidently over repeated presentations** and/or if the patient reports being unable to see the target-in-depth even when it is pointed out. Be sure to try the plate both ways round before recording this result, and consider checking the patient's understanding using the 'twisting presentations' and other techniques described earlier.

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 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 target-in-depth.** If this does not happen, draw attention to the target-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 target-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 target 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 target by discreetly feeling the corner studs: the stud nearest the target has a flat surface discriminable by touch. The flat surface is on the same side of the plate as the target-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. The _Frisby Near Stereotest_ keeps such 'don't know' verdicts to a minimum 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 training presentations without the patient learning the 'correct' response.**

Moreover, even for very young subjects it is sometimes possible to check understanding using the techniques described above of showing **'twisting' presentations** and/or **placing a piece of white paper up against the plate**, both of which make the target visible monocularly.

In these ways, the _Frisby Near Stereotest_ thus makes it a feasible proposition to test children even less than one year old. The special presentation box of the **_Frisby Screening Stereotest_** provides an easy way of testing very young (or very old) patients. The **_Frisby Pocket Stereotest_** is also useful for screening (see video demonstrations on our web site: www.frisbystereotest.co.uk).

Important: After training and when stereoscopic ability is being demonstrated observe the precautions mentioned earlier about holding the test plates squarely and still, preventing head movements by the patient, and choosing new random positions over a series of presentations.

FURTHER DETAILS ON STEREOACUITY ASSESSMENT

Test the patient with various plate/distance presentations selected from the table shown later and/or in the lid to **determine the lowest disparity value that 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 in the box lid, 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 use 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, etc, and using repeated presentations until satisfied that the patient can or cannot make reliable discriminations.

Record the lowest disparity which the patient can reliably discriminate. This stereo threshold 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 (the often-used value of 65mm applies for the disparities shown in the table). Also, it is difficult to be completely sure about eye-to-test distance (although the _Frisby Near Stereotest_ does provide a tape measure to help with this problem).

Finally, in the case of the _Frisby_ test slight variations in the thickness of the plastic sheet used for the plates mean that any given set of plates is likely to depart in some degree from the nominal real thickness of 6mm, 3mm and 1.5mm. 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:

$$\text{Disparity} = \frac{206{,}264.81 \ (I.z)}{1.49 \ d^2} \quad \text{sec arc}$$

$$\text{Disparity} = \frac{I.z}{1.49 \ d^2} \quad \text{radians}$$

where I is the interpupillary distance, d is the viewing distance, z is the average plate thickness as measured with a micrometer, and 1.49 is the refractive index of the acrylic plastic from which the plate is made. The number 206,264.81 converts radians to sec arc.

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
100	(40)	55	25	15
120	(47)	40	20	10
150	(60)	25	10	5

The table gives disparities rounded to 5 sec arc. If exact values are needed, these should be calculated from first principles (see formula above).

Record the lowest disparity that the patient can reliably discriminate. This **stereo threshold** is a measure of **stereoacuity**.

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

CAUTION

The corner studs 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.

Orthoptic advice Professor Helen Davis, Academic Unit of Ophthalmology & Orthoptics, University of Sheffield, S10 2TN, UK

All **Frisby Stereotests** are presented in good faith as a guide in assessing stereopsis. The diagnosis and any resulting actions are the sole responsibility of the practitioner.

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Stereotest Ltd 137 Brookhouse Hill, Sheffield, S10 3TE, UK.

www.frisbystereotest.co.uk

email   frisby@frisbystereotest.co.uk

Tel   +44 (0) 114 230 7819

www.frisbystereotest.co.uk for advice on this test and also on the:-

Frisby Screening Stereotest, comprising the 6mm plate in a special presentation box suitable for screening very young children.

Frisby Pocket Stereotest, comprising smaller 6mm and 3mm plates in a pocket-sized wallet, for screening very young children.

Frisby Davis Distance (FD2) Stereotest suitable for 3m to 6m presentation distances.

This page serves as the back cover of the Instructions booklet. The logo can help in showing patient's what to search for as the target - see page 8.