SCREEN TESTS USED TO MAP OUT OCULAR DEVIATIONS

ROODHOOFT J. M.

ABSTRACT

A century ago Hess described how to map out ocular deviations on two pieces of paper in cases of diplopia. This paper discusses how to obtain useful information regarding ocular deviations from a chart that has been obtained from screen tests (Hess, Lancaster, Lees, Weiss).

RÉSUMÉ

Hess a décrit il y a un siècle son procédé étudiant par un graphique double les déviations des yeux en cas de diplopie. Cet article discute l'utilité de quatre procédés d'examen de diplopie (l'écran de Hess, Lancaster, Lees, Weiss).

SAMENVATTING

Hess beschreef een eeuw geleden hoe bij diplopie de scheelzienshoeken op twee vellen papier worden opgetekend. Dit artikel bespreekt het nut van de grafiek bekomen met vier proeven (Hess, Lancaster, Lees, Weiss) die uitgevoerd worden om een diplopie te ontleden.

KEY WORDS

Hess screen test, Lancaster screen test, Lees screen test, Weiss screen test.

MOTS-CLÉS

Procédés de Hess, Lancaster, Lees, Weiss.

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INTRODUCTION

It is mandatory that a method to map out ocular deviations should be easy to perform as well for the patient as for the doctor and that the instrumentation should be cheap, easy to obtain and effortless to handle. It is mandatory that disabilities of the motor functions of the eyes causing diplopia be written out in such a manner that an examination can be repeated under the same circumstances and that the results of successive examinations can be compared to the results of previous ones (7). The point of issue of this paper is to discuss how to obtain useful information regarding ocular deviations from a chart that has been obtained from a Hess, Lancaster, Lees or Weiss screen test.

MATERIAL AND METHODS

Two images seen simultaneously by the two eyes can be dissociated by several tricks, amongst those complementary colours and a mirror. In Hess and Lancaster and Weiss screen tests the two eyes are dissociated using lenses of different colours (figures 1,2,3). In the Lees screen test, the eyes are dissociated using two opalescent glass screens at right angles to each other, bisected by a two-side plane mirror (figure 4).

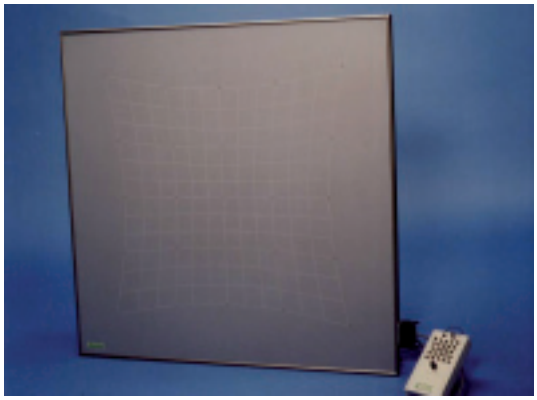
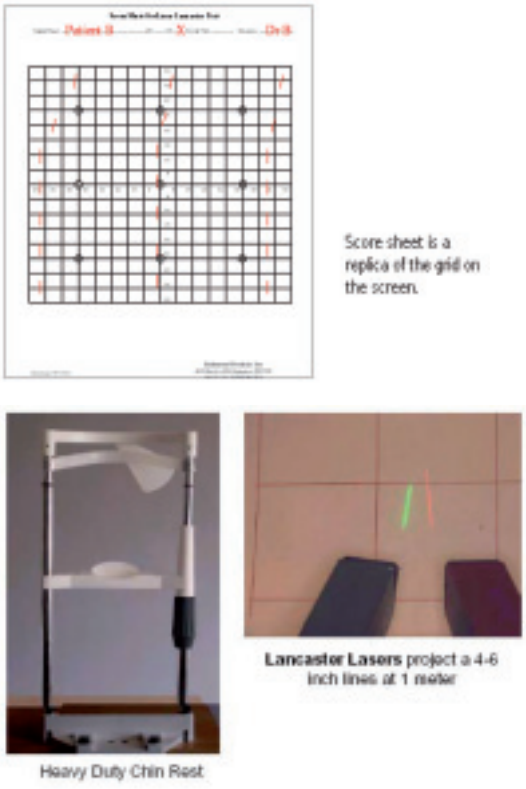


Figure 1:
Figure 1 shows a modern Hess Red-Green Screen Test - photo by courtesy of Evans (Instruments) Ltd., 35 Howlett Way, Thetford, Norfolk IP24 1HZ, U K.
The screen is approximately 25 mm thick and houses 25 red light sources which can be individually illuminated by way of the operator's control box, connected via a remote cable. The wall-mounted screen is marked with a tangled scale covering 30 degrees in 5-degree steps, in each of the four directions of gaze. Dissociation is by use of a standard pair of red-green goggles and the patient's responses are confirmed by a torch producing a focusable arrow head of green light.



▲ *Figure 2:*
Figure 2 shows a modern Lancaster Red-Green Screen Test - photo by courtesy of Richmond Products, Inc., 4400 Silver Ave SE, Albuquerque, NM 87108, USA.
In 1939 Lancaster constructed a white screen with horizontal and vertical lines, forming squares of equal size with a side of 7 cm. Besides the screen (nowadays 150 cm x 150 cm) are needed: a pair of torches (generating an image of a line) , goggles of complementary colours and a chart with two outlines to record results. Most often also a chinrest is used to avoid head movement during the test. The score chart that is shown here is also a replica of the screen that is to be used.

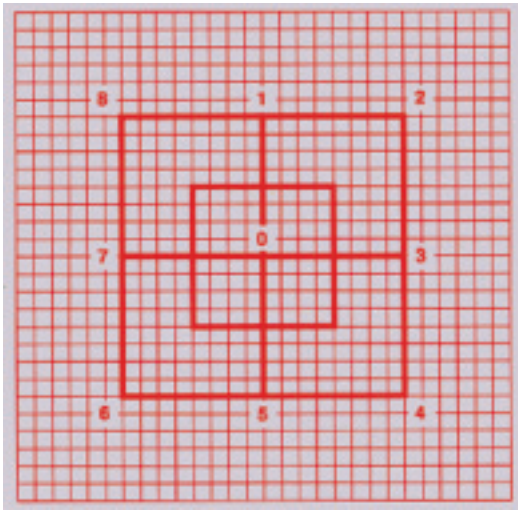


Figure 3:
Figure 3 shows a Weiss screen test, the free form. - Copy by courtesy of Jean Weiss of figure on page 7 of "Déséquilibres oculomoteurs et Coordimètre" by Jean Weiss, Cercle d'Etudes, de Recherches et d'Enseignement de la Strabologie, Paris, France, 1992.
The patient wears red-green goggles and his head is fixated by using a chinrest. The eyes of the patient are at a distance of 50 cm of the centre of the screen. The screen is of white colour and has dimensions of about 100 cm x 100 cm. The screen shows red vertical and horizontal lines, forming squares with a side of 2,5 cm. The screens also shows eight red dots each numerated according to the different directions of gaze. The patient has a torch in his hand that projects a red arrow on the screen. The arrow has to be placed on one of the numbers on the screen. The test is done with normal day lighting.

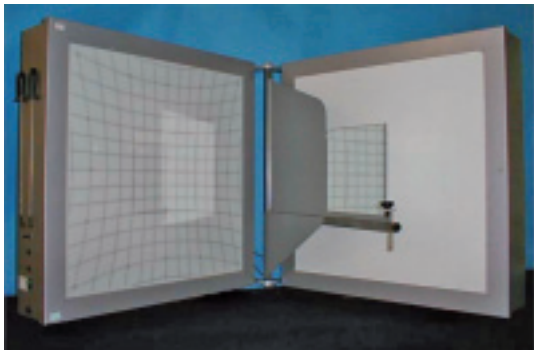


Figure 4:
Figure 4 shows a modern Lees screen Test - photo by courtesy of Evans (Instruments) Ltd., 35 Howlett Way, Thetford, Norfolk IP24 1HZ, UK.
The two metal housings have a special white translucent screen, printed with a tangent pattern on the inner surfaces - this is not visible until internally illuminated. The screens are set precisely at right angles and dissociation is achieved by use of a mirror system.

1. HESS RED-GREEN SCREEN TEST

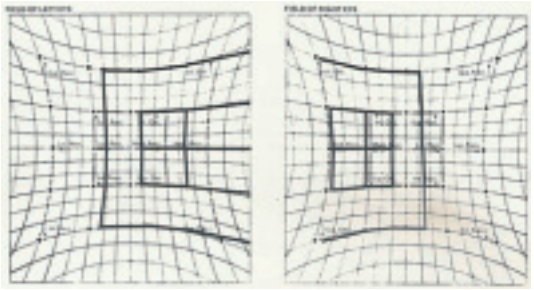
Description of the test

The ophthalmologist Walter Hess, at work in Switzerland, was looking for an easy method to write down the results of the examination of patients with diplopia. In Köln, Germany, Hess presented in 1908 a paper with the title "Neue Untersuchungsmethode bei Doppelbildern" (a new method of examination in patients with diplopia) (8). This paper became legendary because it was a first guideline describing how to map out the deviation of the eyes on two schemes sketched on a piece of paper. For this purpose Hess putted into use the well-known idea of complementary colours and a table of black colour without any blistering. The dimensions of the table were 120 x 120 cm. The distance from the basis of the nose of the patient to the centre of the table was one meter. A chinrest helped to stabilize the head of the patient. Four green lines were drawn on the table; two of these green lines crossed two other green lines so that these four green lines bordered a square. The side of the square measured 30°. The doctor moved a black pointer on which one red marker was fixed. The four green lines and the red marker were made of wool and felt. The patient wore red-green goggles. The room was dark enough so that no details of the wall could be seen through the red-green goggles. The right eye looked through the red lens and was the fixating eye. The right eye with the red glass saw only a red marker. The left eye with the green glass saw only green lines. The test was first done with the red glass before the right eye. The patient warned the doctor at the moment the red marker crossed a green line and that point was marked with a red pencil on a piece of paper that showed green lines forming a square as on the table.

The test was thereafter repeated with the green glass before the right eye. The patient warned again the doctor at the moment the red marker crossed a green line and that point was marked with a pencil on a second piece of paper that showed the same figure as the first piece of paper. The points were interconnected so that an outline was formed on both pieces of paper (a

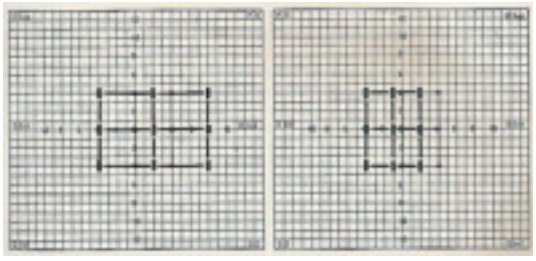
Hess screen chart). Four points were a satisfactory number to make a good outline (field), which displayed graphically the position of the eyes and the motor functions of the eyes within a known visual field. So Hess found that

- in case of palsy of one muscle of one eye:
  The outline was smaller on one piece of paper (the primary deviation). This test was useful to discover the paralyzed muscle: a knowledge of the movement of each muscle in the different directions of gaze helped to find the paralyzed muscle. In order to help reminding the different functions of the muscles in the different directions of gaze the name of those muscles are mentioned on the schemes. The smallest outline showed one point that was much further inwardly compared to the four points that represent an outline from an eye with orthophoria. That point that was much further away inwardly pointed to the paralysed muscle.
  The paper with the smallest outline presented the eye with the muscle palsy, the paper with the largest outline presented the healthy eye. The whole outline presenting the healthy eye moved in the direction of the muscles that still work efficiently and are antagonists of the eye muscle showing palsy (the secondary deviation) (figure 5 and 6).



left eye right eye

Figure 5:
Figure 5 shows a typical chart record of a Hess screen test for a case of an acquired right sixth nerve paralysis.
There is considerable non concomitance present. Examination of right and left eye chart in association will reveal the primary and secondary deviation. The smallest field points towards the eye with a diminished function of the lateral rectus. (Copy by courtesy of the editor of figure in "Diagnosis and management of ocular motility disorders" by Joyce Mein & Roger Trimble, second edition , Blackwell Scientific Publications, Oxford, 1991, p.318.)



left eye right eye

Figure 6:
Figure 6 shows a typical chart record of a Hess-Lancaster screen test for a case of an acquired right sixth nerve paralysis. (Copy by courtesy of the editor of figure 126 in "Strabismes, hétérophories, paralyses oculo- motrices" by René and Suzanne Hugonnier , 3^{e} edition, 2^{e} print, Masson, Paris, 1976, p. 343) The nine projections of the non-fixing fovea are determined and recorded as a short line. The recorded lines are connected to form a square-like figure.

  This test was useful for follow-up of cases. In these cases two points were often a satisfactory number to make a decent outline showing improvement or worsening of the motor functions of the eyes within the known visual field. Also in these cases the two outlines (fields) became more and more equal or dissimilar in size (figure 8).
- in case of strabismus:
  This test was useful to measure the angle of deviation and to compare the angle of deviation before and after strabismus surgery. In those cases the field was equally small on both pieces of paper. It was not always possible to do the test (see below).
- in case of diplopia due to malingering or hysteria:
  This test was remarkably precise to detect the true nature of the diplopia.

By comparing the fields of the two eyes for position, size and shape, Hess invented an accurate, attractive and easy method to measure graphically the deviation of the eyes and to describe the extraocular muscle function. The test is still used daily in practices in this part of the world.

Advantages and disadvantages of the test

A Hess screen test requires a decent visual acuity and normal colour vision of each eye to be

Table 1: *stipulations for using a screen test used to map out ocular deviations*

	Hess screen test	Lancaster screen test	Lees screen test	Weiss screen test
Normal retinal correspondence	yes	yes	yes	yes
Normal visual acuity	yes	yes	yes	yes
No large visual field defects	yes	yes	yes	yes
Normal colour vision	yes	yes	no	yes
Adequate lighting	yes	yes	yes	no

Table 2: *advantages of a screen test used to map out ocular deviations*

Hess screen test	milestone in the history of mapping out ocular deviations, easy to do
Lancaster screen test	detects cyclodeviation
Lees screen test	doesn't require normal colour vision
Weiss screen test	cheap to buy, real guide when treating ocular deviations by prisms

useful (8). It also requires a normal retinal correspondence since the results will be inaccurate if the patient cannot superimpose two macular images (8). The fovea of each eye shall have a common visual direction or else the deviation that shall be mapped out will not be the right one. It is not always possible to do the test in cases of strabismus, as suppression is present (table 1).
The fields can be obtained from children as old as eight years.
This test was only a success for a while because it became too expensive: the green lines in wool and felt on the table and the red marker on the pointer were not complementary any longer due to ageing. Furthermore it was hard to find new complementary colours and a new table was difficult to construct. Nowadays it is easier to find new complementary colours and the Hess red-green screen test is made of a grey (or black) wall-mounted screen that has green (or red) light points at 15° interval and is made of a torch that produce red (or green) light with the help of batteries or an electric feeding system. The torches may give a linear image (Forster torches). The light points of the screen can be illuminated on a time as selected by the doctor (figure1) (table 2).
Recently a Hess screen test was developed that is to be used on a computer (22).

2. LANCASTER RED-GREEN SCREEN TEST

Description of the test

The ophthalmologist Walter B. Lancaster, at work in New England, U.S.A., was not bewildered by the Hess screen test because Hess paid too much attention to the quadrilateral field and paid too little attention to the knowledge of the physiologic actions of the muscles. In 1939 Lancaster published a new screen test, designed in order to improve the cover test, a reliable method of diagnosis of the direction of any deviation of the eyes (12).
The deviation of the eyes was easily detected, measured and mapped when the doctor saw how the deviation was shown by the patient on a white screen on the wall in front of the patient at a distance between one and four meters. The screen showed vertical and horizontal lines, forming squares of equal size with a side of 7 cm. The doctor made notes on a piece of paper that showed a small duplicate of the tangent screen on the wall. The deviations could be easily recorded in all important directions of gaze (figure 6).
The patient wore red-green goggles. The room was dark enough so that no details of the wall could be seen through the red-green goggles. The right eye looked trough the red lens and

was the fixating eye. The doctor showed the red light. The patient showed the position of the non-fixating eye by projecting the green light seen through the non-fixating eye so that for him the green light was superimposed on the red light. The separation on the screen on the wall was the measure of the deviation of the eye under cover. The recordings on the field of the Lancaster screen test were direct readings: a green spot on the left of the red spot means that the left eye has been deviating to the left: the images are localized according to the visual axes.
In cases of a muscle palsy Lancaster made two fields. In those cases the second field was done while the doctor was holding the green torch and while the patient was holding the red torch. The right eye wears the red lens all the time during the Lancaster screen test in contrast to the Hess screen test where the red - green goggles are switched half time the test procedure. Lancaster did not use a chinrest helping to stabilize the head of the patient; in fact some times he repeated the test with the head of the patient inclined to the right and the left shoulder. As Lancaster used spots that were streaks, long and narrow, torsional deviations of the eyeballs could also be documented.

Advantages and disadvantages of the test

Lancaster found his test of greatest value in cases of paralysis or paresis of one or more extraocular muscle (the test allows the identification of the paretic muscle), useful in cases of squinting of the eyes (stipulating that there is normal retinal correspondence) and less useful in cases of heterophoria (13).
In the 1950's some European ophthalmologists praised this test for those reasons:
- The ocular dissociation is much larger compared to the Hess screen test: this may well be his greatest benefit (9).
- It is easy and fast to accomplish, often one field is sufficient and it is easy to identify the primary and secondary deviation (1,6,9).
- It identifies accurately a cyclodeviation (11,12,21) (table 2).

The Lancaster screen test - as a Hess screen test - requires a decent visual acuity, normal colour vision of each eye and a normal retinal correspondence (14). There should be no central scotoma or suppression area or a major visual field defect (15). Furthermore both tests are useless if the lighting of the room is inadequate (8,12,15) (table 1).
One of the main causes of error in the Lancaster screen test is fluctuations due to accommodation and consequently of vergence (26). The recording of ocular deviations is not as accurate as recording of visual acuity and the deviation may vary to several degrees in extent (12).
For the patient the Hess screen test is easier compared to the Lancaster screen test. In the first test two colours are lined next to each other; in the second test the orientation of the light of the torch has to be shown parallel to each other (6).
Hugonnier improved the technique of the Lancaster screen test by fixating the distance of the examination at one meter (a deviation of one cm on the checked screen means a deviation of one prism diopter), by introducing Foster torches and by using a chinrest fixating the head (9). Halbron improved the technique of the Lancaster screen test using preferently two fields in all cases (6) (Figure 2) .
Larmande emphasized that in some cases the interpretation of the recorded fields is difficult. The fields of a patient with a unilateral palsy of the lateral rectus muscle and the fields of a patient with a bilateral palsy of the lateral rectus muscle must not be confounded. In cases of supranuclear palsy the Lancaster screen test may show a normal result. That is why the Lancaster screen test should always be combined with other tests to verify the muscle balance (15).
In 1939 it was hard to find torches of decent quality but this is no longer the case today.

3. LEES SCREEN TEST

Description of the test (20)

Two boxes, at right angle to each other, show each a window with opalescent glass. The opalescent glass screens show a drawing of a Hess screen chart. Each window can be lighted at will. The patient is seated 50 cm from the window in such a way that one eye sees one window and the other eye the other window by us-

Table 3: *differences between the red-green screen tests used to map out ocular deviations*

Hess screen test	the red - green goggles are switched half time the test procedure does require darker room
Lancaster screen test	right eye wears the red lens all the time during the test direct readings detects cyclodeviation: hence more difficult for the patient does require darker room
Weiss screen test	the red - green goggles are switched half time the test procedure doesn't require darker room exists in two forms: a free one and a multiple choice one

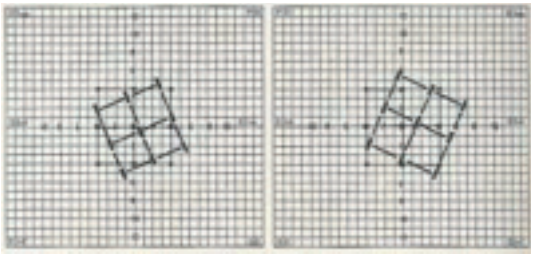
Table 4: *differences in degree of dissociation and way of dissociation between the tests used to map out ocular deviations*

	degree of dissociation	way of dissociation
Hess screen test in 1908	+	red - green dissociation
Hess screen test in 2007	+ +	red - green dissociation
Lancaster screen test	+ +	red - green dissociation
Lees screen test	+ + +	dissociation by a two-side plane mirror
Weiss screen test	+	red - green dissociation

ing a two-side plane mirror. The patient is seated with the head looking to an unlighted window. The head leans on a chinrest, which is placed at the end of the support that carries the mirrors at a distance of 50 cm from each window. The head has to remain motionless during the test (figure 4).
The right eye looks to the unlighted window. The left eye looks to the window that is continuously lighted. The doctor shows a point on the Hess screen chart of the lighted window and asks the patient to show the same point on the unlighted window. The doctor lightens this window for a few seconds to see where the patient had shown the point on the Hess chart of that screen. The point is noted on a piece of paper that reproduces the Hess screen chart that is presented on the screen. The test is thereafter repeated with the patient sitting with the head looking to the window that was continuously lighted in the first part of the test.

Advantages and disadvantages of the test

Dissociation obtained with mirrors is of a higher degree compared to red-green screen tests and the eyes are not covered by any means (17). The success of the Lees screen test 50 years ago is due to the fact that this method didn't need neither the complementary red-green colours - hence normal colour vision is not necessary in this test - nor the costly torches. Additionally the test allows the same conclusions as the red-green screen tests.
The Lees screen test, such as the red-green screen tests, requires a decent visual acuity, normal retinal correspondence and adequate dimming of the room (table 1, 2).
It is often said that torsional deviations cannot be traced using the Lees screen test. However, the pointer can be changed to a modified pointer with a T-piece attached by a universal joint (4). This allows the notation of torsional deviations of the eyeball.
In children this test is not easier than the red-green screen tests (19). The children - only as early as eight years old - have indeed to be seated on a chair of which the height has to be adjusted to the level of the chin support but the head has no support on the part of the forehead. The head has to be as close to the mirror as possible.
The exact fields are sometimes difficult to make and may give rise to irregular findings to read: Grüsser presents an example of a screen chart



left eye right eye

Figure 7:
Figure 7 shows a Hess-Lancaster screen chart showing a bilateral palsy of the fourth nerve and excyclotropia. (Copy by courtesy of the editor of figure 130, p. 348 in "Strabismes, hétérophories, paralyses oculo-motrices" by René and Suzanne Hugonnier , 3^{e} edition, 2^{e} print, Masson, Paris, 1976). There is a V pattern, extorsion of both eyes towards the outside and the vertical deviation is not so important. This figure illustrates also the tilt of the Lancaster chart as described by A. Spielmann and al. (21).

with two fields of unequal size. These differences in size are not a consequence of muscle palsy but are a consequence of a reflection of one screen on a plane mirror, that is not exactly positioned (5). Such remarks are important and emphasize that an examination of the muscular balance requires a global examination - a screen test is no substitute for a thorough examination of the muscular balance - and in cases of doubt there should without hesitation be a control by another method of screen test.

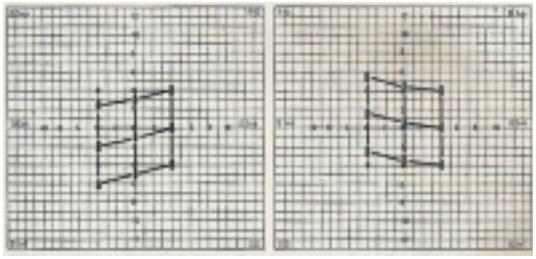
4. WEISS RED-GREEN SCREEN TEST

Description of the test (23)

Forty years ago Weiss, at work in France, described an easier and cheaper method mapping out ocular deviations on two pieces of paper in cases of diplopia. The two eyes are dissociated using lenses of different colours. There is only one torch that projects only a red light. The screen is of white colour and shows vertical and horizontal lines, forming squares with a side of 2,5 cm (a deviation of one cm on the checked screen means a deviation of five prism diopter at a distance of 50 cm). The screen also shows eight red points placed in the form of a square and one red point middle in the square (figure 3). The eye that looks trough the green lens sees the red points (the fixating eye). The eye that looks trough the red lens does not see the red points or the screen. The patient is seated 50 cm from the screen in daylight. The head is stabilized by a chinrest. The doctor asks the patient to show one of the nine points that the doctor has pointed to the patient. This point is written down on a chart in the hand of the doctor. Like the Hess screen test, the red - green goggles are switched half time the test procedure. This method exits of two variants: a free form and a multiple choice form. The difference is made by the kind of screen that is used. The second form allows measurement of the ocular deviation in the different directions of gaze without interrupting the fusion. That screen differs from the one described above: each square on the screen contains a black round dot in each corner of the square, which is not seen through the lenses of complementary colours.

Advantages and disadvantages of the test

The Weiss screen test, such as a Hess screen test, requires a decent visual acuity and normal colour vision of each eye and a normal retinal correspondence. There should not be a major visual field defect. There is no need for a



left eye right eye

Figure 8:
Figure 8 shows a Hess-Lancaster screen chart showing superior oblique palsy right eye on a congenital base (congenital torticollis). The two fields are equal in size because the palsy is old. (Copy by courtesy of the editor of figure 129, p. 347 in "Strabismes, hétérophories, paralyses oculo-motrices" by René and Suzanne Hugonnier, 3^{e} edition, 2^{e} print, Masson, Paris, 1976). Reading the fields does not tell if the primary deviation is a result of a palsy of the right superior rectus muscle or a palsy of the left superior oblique muscle.

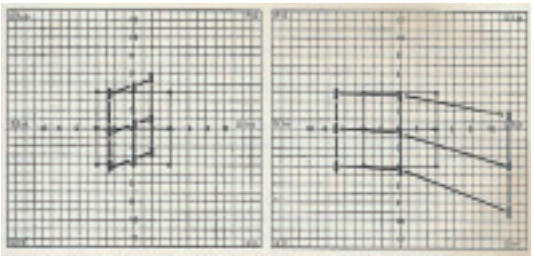
darkened room. The test does not ask for much equipment. There is no possibility to detect a cyclodeviaton as only one torch is used. The dissociation between the eyes is of a weak degree (table 1, 2, 3, 4).
The main advantage of this test is that this test is a real guide when treating ocular deviations by prisms. In those cases the free form and the form with multiple choice have to be used (18).

In which way can a screen chart help the clinician?

Screen tests are a superb way of investigating the extraocular muscle balance and are used in daily practice for the evaluation of those cases Hess (and Lancaster) found his modus operandi the obvious means: cases of palsy of one (or more) muscle(s), of strabismus (stipulating normal retinal correspondence) and of diplopia due to malingering. The last fifty years the benefit of these tests grew and it became clear that screen tests are useful for the diagnosis of:

- any torsional deviation
  Spielmann and Spielmann call attention to the observation of the tilt of the Lancaster chart, an indirect qualitative and probably quantitative sign of cyclodeviaton whatever it might be (an ex- or an incyclodeviation) and whatever its origin (21). The tilt of the Lancaster chart is a consequence of a spiraling of the deviations around the primary position and is a measure of the degree of cyclodeviation (figure 7). Klainguti and al. also believe there is a correlation between the bidimensional graphic demonstration of eye deviations (rotation of the field become by the Hess, Lancaster or Lees method) and cyclotorsion (11).
- a bilateral palsy of the fourth nerve (figure 7)
  Most cases are seen in adults after a blunt cranial trauma. The discomfort of the patient is a consequence of the excyclotropia as sequel of a bilateral palsy of the fourth nerve. In case a red - green screen test is used the test with the torches will clearly show an excyclodeviation during the examination procedure; in case a Lees screen test is used cyclodeviation will be shown using a modified pointer with a T-piece on the pointer. The fields will show a small vertical deviation and a clear V-pattern. According to Hugonnier these fields are characteristic. According to Klainguti the diagnosis of a bilateral palsy of the fourth nerve is present when the tilt of the field on the chart is superior to 15° in the infraversion or when there is an inversion of the vertical deviation in dextroversion and levoversion or when there is an inversion of the vertical deviation in the Bielschowsky head tilt test (11).
- diplopia due to restricted movement of one or more muscles such as in cases of blow-out fracture or dysthyroid eye disease (9,24). The tests are particularly useful for the follow-up of such cases.
- superior oblique palsy on a congenital base
  Congenital torticollis shows on the chart two fields that are equal in size (figure 8). Dextroversion shows complete concomitancy; levoversion shows no vertical deviation. Reading the fields does not tell if the primary deviation is a result of a palsy of the right superior rectus muscle or a palsy of the left superior oblique muscle. There is overaction of the left inferior oblique muscle and of the right inferior rectus muscle. The deviations on the fields are nearly equal in size for each muscle. According to Hugonnier these fields are diagnostic. It is important to recognize these forms of squint as they can cause eye-strain at any age. Some of these patients have a permanent torticollis, facial asymmetry and scoliosis.

- the syndrome of retraction
  The syndrome of retraction is an entity that has common features: varying degrees of retraction of the globe, narrowing of the palpebral fissure and limitation of the extraocular movements. A typical horizontal retraction syndrome is called Stilling - Duane syndrome. This syndrome is usually divided in three types (16). In Stilling - Duane type 1 the ability of the affected eye to abduct is limited; the ability of the affected eye to adduct is slightly abnormal. In Stilling - Duane type 2 the ability of the affected eye to abduct is (nearly) normal; the ability of the affected eye to adduct is limited. In Stilling - Duane type 3 the ability of the affected eye to abduct and adduct is limited. The fields, shown on the chart, are pathognomical for this type 3. The



left eye right eye

Figure 9:
Figure 9 shows a shows a Hess-Lancaster screen chart showing the syndrome of retraction. The fields show a palsy of both the left lateral rectus muscle and the left medial rectus muscle, associated with an overaction of the right medial rectus muscle and an overaction of the right lateral muscle. (Copy by courtesy of the editor of figure 146, p. 389 in "Strabismes, hétérophories, paralyses oculo-motrices" by René and Suzanne Hugonnier, 3^{e} edition, 2^{e} print, Masson, Paris, 1976) The fields, shown on the chart, are pathognomical for Stilling - Duane syndrome type 3.

fields show a palsy of both the left lateral rectus muscle and the left medial rectus muscle, associated with an overaction of the right medial rectus muscle and the right lateral muscle (10) (figure 9).

- Myasthenia gravis, a disorder of neuromuscular transmission.
  The most common presenting manifestation is ptosis and diplopia. An intravenous injection of prostigmine will improve the strength of weak muscles for a while in cases of myasthenia gravis. There is a place for these screen tests in the diagnosis of myasthenia gravis (3,25). As diplopia in myasthenia gravis is fluctuating and intermittent this test should not be used on a regular basis.

Screen tests are also useful for:

- the verification of a field
  If the clinician finds a field that is unexpected, as the results on the screen chart do not come up to the expectations of the examination, then it is worthwhile to verify the screen chart with the fields obtained from an examination with another screen test (5).
- a scoring method of charts
  Recently a scoring method of charts has been promoted for comparisons between charts for sequential examinations of an individual patient or for comparison of different patients with the same disorder (2,24).

CONCLUSION

The straightforwardness of these screen tests makes them very useful and allows having a recorded note in the chart of the patient about the amount of heterophoria or heterotropia in all the principal positions of gaze. These tests are obligatory in all cases presenting themselves for examination. In many cases there are only four points to check to have an idea of a field on a chart. Although in selected cases a clue to the diagnosis of a motility disorder is possible, these tests alone are no substitute for a thorough examination of the muscular balance.

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Address for correspondence and reprints:
ROODHOOFT J.M., M.D.
Collegestraat 56/J
B - 2300 Turnhout
Belgium
e-mail: roodhy@scarlet.be