

A SURVEY OF THE CLINICAL EVALUATION OF STEREOPSIS IN AUSTRALIAN ORTHOPTICS

R. A. Neill B.Sc.(Hons).

Physics Department, University of Newcastle, N.S.W. 2308

Abstract

A questionnaire which was intended to assess the relative importance of stereopsis evaluation in Australian orthoptics was sent to 189 orthoptists. This preliminary report analyses the answers given on the first seventy-one replies. Ninety-four percent of the replies stated that the orthoptist routinely tested stereopsis, the tests used included the Wirt-Titmus, synoptophore-based, TNO, Frisby and Lang Pen tests. The tests which were nominated as most frequently used were the Wirt-Titmus (54% of replies) and synoptophore-based stereotests (42% of replies). The test which was regarded as most reliable was the TNO test (50% of those who knew of the test). Efficient evaluation of stereopsis was regarded as important or very important by 95% of the replying orthoptists.

Key Words

Stereopsis, orthoptists' questionnaire.

Orthoptics has been defined as "The practice of methods (usually exercises), other than optical or surgical, for treating anomalies of binocular vision, and for overcoming deviation of the visual axis, whether such deviation be manifest or latent, and of helping to restore comfortable binocular single vision."¹ In its ultimate form, binocular single vision expresses itself as stereoscopic depth perception. In the light of the above definition it would seem to be of fundamental importance for the orthoptist to assess the quality of all patients' stereopsis. Definitions, however, do not necessarily reflect attitudes formed by experience; it is the latter which will determine whether or not a given test is performed. It does not matter how good a stereotest appears under strictly controlled laboratory conditions, if it is found wanting in the clinic it will not be widely used. In recent years a number of new stereotests have been introduced: the Frisby test² Random Dot E³, Randot⁴ and TNO test⁵. All of these tests have yielded encouraging results in initial trials, but it is reasonable to ask whether they have been accepted by orthoptists in general. In order to find out, a questionnaire was prepared and sent to 189 Australian orthoptists. Only orthoptists with two or more

years experience were petitioned. This article is a report of the answers given in the first seventy-one replies.

THE QUESTIONNAIRE

The questionnaire was headed by a short note explaining the motivation behind it. The note stated that the author "would value your (the orthoptist's) help in assessing the relative importance of stereopsis evaluation in Australian orthoptics". Replies to the questions were returned anonymously.

The orthoptist was asked to answer nine questions. The first (unnumbered) question requested that the respondent specify the city in which he or she was trained. This should have revealed any overall differences in the answers which could be accounted to the school of training. Eight numbered questions followed, they are detailed in Table One, along with the results.

Question One was intended to reveal whether the orthoptist in general uses tests of binocularity alone (Worth 4-dot test, cover test, prism test, etc.), or whether he or she considers the stereotests to be worthy of routine use.

Questions Two to Seven were intended to indicate which tests for stereopsis are presently used in the clinics (*Questions Two and Three*), how widespread has been the acceptance of the recently introduced stereotests (*Question Four*), whether or not stereopsis evaluation is regarded as a useful means of screening for amblyopia (*Question Five*) and which of the presently used tests are regarded as unreliable indicators of stereoscopic ability (*Questions Six and Seven*).

Question Four is of particular interest in that it revealed the proportion of the respondents who, considering that they knew the newer tests well, actually use the tests. If a reply to this question had some of the tests marked "Personally used", "Well known" or "Heard of" and some of the tests unmarked, then the unmarked tests were treated as if they were marked "Not known".

Much recent research has been devoted to the potential use of tests for stereopsis as stand-alone screening tests for amblyopia^{3,5,6,7}. Results have, in the main, been interpreted as favourable by the various researchers. *Question Five* sought to reveal whether or not orthoptists, as a body, agree with the conclusions of these workers.

All of the stereotests which are used at present are considered to have flaws of one form or another, for example recent projects have found that the results of the Wirt-Titmus may be contaminated by the influence of lateral displacement cues⁸ and the TNO test may be dissociative^{9,10}. In practice these flaws may be significant, in which case the tests will not be reliable. *Question Six* asked the orthoptists to specify which tests, if any, they considered unreliable and *Question Seven* asked them to state which tests were most reliable.

Question Eight may be looking somewhat into the future, as it asks the respondent to rate the importance of efficient stereopsis evaluation. Each of the answers to this question was grouped into one of four categories:

- a) *Very important*. If the answer stated that stereopsis evaluation was an essential aspect of the assessment of binocular vision, if it rated stereopsis evaluation as "vital", "extremely" important, "most" important etc., or if the orthoptist felt that stereotests should be performed as screening tests for certain occupations, the answer was categorised as *very important*.
- b) *Important*. If an efficient stereotest was considered to be a good supporting test for the other tests of binocularity, or if effective stereopsis

evaluation was considered "important", the answer was placed in this category.

- c) *Useful*. This category contained answers which claimed that stereopsis evaluation could only be considered the "junior partner" of the other tests for binocularity, that is, of limited value when compared with the other orthoptic tests.
- d) *Not useful*. This category requires no explanation.

RESULTS

(Refer Table 1 Page 85)

The results of the initial seventy-one replies to the questionnaire are detailed in Table One. Parentheses () enclose figures expressed as a percentage of the total number of replies. For the results of *questions six and seven* brackets [] enclose responses expressed as a percentage of orthoptists who had *heard of* the particular test in question.

Forty-four of the orthoptists who replied were Sydney trained, twenty-three were Melbourne trained and four were trained in the United Kingdom.

Question One.

Sixty-seven (94%) of the respondents indicated that they routinely test for stereopsis. One of the four negative responses was accompanied by a note stating that the orthoptist worked in a situation which did not allow routine stereotesting to be carried out.

Question Two.

Six different tests were nominated as personally used by the orthoptists. Sixty-seven of the respondents use the Wirt-Titmus test and sixty-five use the synoptophore-based stereotests. The TNO test is used by thirty-five of the orthoptists and eleven indicated that they use the Frisby test. Four replies nominated the Lang Pen test and one nominated a distance stereotest with vision projector chart (Topcon).

It is apparent that most orthoptists use more than one stereotest. Fifty percent of the group actually use three or more tests. Apparently more than one test is required to cover a reasonable range of stereoscopic situations, including near and far viewing, foveal and peripheral stimulation and patient age.

Question Three.

Once again the Wirt-Titmus test scored the highest number of responses (38). This was followed by the synoptophore-based tests (30),

the TNO test (13) and finally the Frisby test (3). These figures indicate that some orthoptists used two or more tests with equal frequency.

Question Four.

From the table it is apparent that, of the newer tests, a relatively high proportion of orthoptists had heard of the TNO (89%) and Frisby (83%) tests. The Random Dot E test was known to 67% of the group and the Randot test was known to 38%.

Of the people who had *heard of* these tests, the following proportions either used them personally or considered that they knew the tests well. For the TNO test 94% fell into one of these two classes. For the Frisby the figure was 49% and the Random Dot E and Randot tests were well known to 17% and 19% respectively.

Nobody used the Random Dot E or Randot tests personally, 68% of the orthoptists who knew the TNO test well used it personally and 41% of those who knew the Frisby test well actually used it. The more traditional tests, the Wirt-Titmus and synoptophore-based tests, were used personally by almost everyone (93% and 94% respectively).

The results of this question correlate fairly well with those of question two. Other tests which were used personally and marked as such in question four were card stereograms (3 people), Lang Pen test (3 people), Topcon projected stereotest and Haag Streit projection (1 reply each).

Question Five.

The answers to this question were divided into an indecisive ratio. Thirty-nine replies stated that stereotests are useful screening tests for amblyopia and twenty-six stated that they are not. Six replies were non-committal. The answers to this question displayed a slight dependence on school of training. Of the Sydney-trained orthoptists, 59% answered YES and 34% replied NO. The Melbourne-trained group were more evenly divided on this question: 48% YES and 43% NO. Because the Melbourne-trained group only consisted of twenty-three people, these figures must be treated with caution.

Question Six and Question Seven.

None of the tests were universally regarded as either reliable or unreliable. The TNO test scored the best with 50% regarding it as most reliable and only 9% regarding it unreliable. The Wirt-Titmus test as a whole was regarded most reliable by 46% of the respondents. A further 10% regarded the "circles" subtest as most reliable and 9% felt that

the "fly" subtest was unreliable. The test as a whole was considered unreliable in 21% of the replies. 18% of the group considered the synoptophore-based tests to be unreliable while 42% considered them most reliable. For the Frisby test the percentages were: most reliable 20%, unreliable 10%. Very few people were willing to venture an opinion on the relative merits of the Randot and Random Dot E tests; 7% and 8% respectively regarded the tests unreliable indicators of stereoscopic ability, 7% and 4% respectively rated them most reliable.

One of the orthoptists interpreted *Question seven* in a different way. She stated that a reliable indication of stereopsis in a patient was a quick response to any of the tests.

Question Eight.

The response to this question was very clear-cut. None of the replies stated that it was of no use to evaluate stereopsis. Only two replies (3%) were placed into the *useful* category. Sixteen replies (23%) rated efficient stereopsis evaluation as *important* and fifty-one (72%) rated it *very important*. The two remaining replies could not be categorised.

Results which show a dependence on school of training.

Only four of the people who replied were trained outside of Australia. This is too small a number to use in any regional analyses of the results. The remaining replies came from people trained in either Sydney or Melbourne. Most of the results showed no significant dependence on school of training. The answers to the question on amblyopia screening have already been discussed in this regard. There is, however, one other result which deserves mention. A higher proportion of the Melbourne-trained orthoptists have heard of the Frisby test, 91% as compared to 77% for Sydney trainees. Furthermore, of those who have heard of the test, a higher proportion of the Melbourne-trained people use the test personally (29% as compared to 15%). They also regard it as less unreliable than do the Sydney-trained respondents (4.8% of those who know of the test as compared to 12%) and a higher proportion of those trained in Melbourne nominated the Frisby test as most reliable indicators of stereoscopic ability (38% compared to 6%). However it must be re-emphasised that these figures should be considered with care as both groups are small. It is also possible that these figures could be a reflec-

tion of the place of present employment, rather than school of training. The present data set cannot be used to address this possibility.

DISCUSSION

The results of this survey show that the orthoptists in general regard the evaluation of stereopsis as an important aspect of orthoptic practice. The vast majority of the orthoptists who replied to this survey presently evaluate stereopsis on a routine basis despite the fact that they often regard the tests which they are using as unreliable. Of the newer tests, the TNO test is the most widely used, although the more recently introduced Frisby test appears to be establishing itself very rapidly. Nevertheless many of the orthoptists who know the newer tests well still persist in using the older Wirt-Titmus and synoptophore-based tests. It is not clear from the replies whether this is due to force of habit or because the more modern tests have not been found significantly better than the old ones.

Eleven of the replies stated that there was a need for a new, efficient, test for stereopsis. The specifications given for new tests included: suitable for use with *very* young children, a minimum of instrumentation, reasonable cost, better method of grading stereoscopic ability, a new test for viewing at six metres, preferable to have a free space test, suitable for use with all types of patients and that the test be easy to administer. While it would

seem difficult to meet all of these and other necessary criteria with a single test, the results of the survey show that if and when such a test is developed, it will be accepted rapidly by many Australian orthoptists.

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TABLE 1

1. Do you routinely test for stereopsis?

YES 67 (94%) NO 4 (6%)

2. Which tests for stereopsis do you use?

FRISBY	LANG PEN	SYNOPTOPHORE	TNO	TOPCON PROJECTED	WIRT-TITMUS
11 (15%)	4 (6%)	65 (92%)	35 (49%)	1 (1%)	67 (94%)

3. Which tests for stereopsis do you use most frequently?

FRISBY	SYNOPTOPHORE	TNO	WIRT-TITMUS
3 (4%)	30 (42%)	13 (18%)	38 (54%)

4. Which answer is most applicable to each of the following stereotests?

	PERSONALLY USED	WELL KNOWN	HEARD OF	NOT KNOWN
FRISBY	12 (17%)	17 (24%)	30 (42%)	12 (17%)
RANDOM DOT E	0 (0%)	8 (11%)	40 (56%)	23 (32%)
RANDOT	0 (0%)	5 (7%)	22 (31%)	44 (62%)
SYNOPTOPHORE	67 (94%)	3 (4%)	1 (1%)	0 (0%)
TNO	41 (58%)	18 (25%)	4 (6%)	8 (11%)
WIRT-TITMUS	66 (93%)	3 (4%)	2 (3%)	0 (0%)

5. Would you regard stereotests as useful screening tests for amblyopia?

YES 39 (55%) NO 26 (37%)

6. In your opinion which, if any, of the above tests for stereopsis are unreliable indicators of stereoscopic ability?

FRISBY	RANDOM DOT E	RANDOT	SYNOPTOPHORE	TNO	WIRT-TITMUS	FLY SUBTEST
6 [10%]	4 [8%]	2 [7%]	13 [18%]	6 [9%]	15 [21%]	6 [8%]

7. Which are most reliable indicators of stereoscopic ability?

FRISBY	RANDOM DOT E	RANDOT	SYNOPTOPHORE	TNO	WIRT-TITMUS	CIRCLES SUBTEST
12 [20%]	2 [4%]	2 [7%]	30 [42%]	32 [50%]	33 [46%]	7 [10%]

8. If a truly efficient stereotest is available or became available, how important would you regard stereopsis evaluation?

VERY IMPORTANT	IMPORTANT	USEFUL	NOT USEFUL
51 (72%)	16 (23%)	2 (3%)	0 (0%)

Table One

Details of the answers given on the first seventy-one replies to the questionnaire. Figures enclosed by parentheses () are expressed as percentages of the full seventy-one replies. Figures enclosed by brackets [] are expressed as percentages of those orthoptists who had heard of the particular test in question. Percentages are given to the nearest whole number.