

Appendix 4

Community Health
Headquarters
12 Lyndhurst Road
Nether Edge
Sheffield

Dear Patient

I am grateful for your help with my research project. Where you have indicated that you have received private treatment in the last two years, while attending NHS chiropody clinics, but are unsure whether this treatment was from a State-Registered Chiropodist or not, would you please write below, the name and address of the private Chiropodist concerned.

This information is for the purposes of my research only. The named Chiropodist will not be contacted, or mentioned by name or implication in publication of this research.

Thank you for your co-operation.

Yours sincerely

Mr D W Vernon
Divisional Chief Chiropodist
sheffield District Health Authority

Name of private Chiropodist concerned

Address of private Chiropodist concerned

Appendix 5

Northern Ireland Health Board	Population	Number receiving treatment	% of population receiving treatment
Northern	385700	5818	1.508%
Southern	291200	4536	1.557%
Western	260200	3333	1.281%
Eastern	645900	?	?

Assuming normal distribution,

The mean % of the population in the Northern, Southern, and Western Health Boards of Northern Ireland receiving

Chiroprody treatment = 1.448%

Standard Deviation = 0.147%

Using standard error of the mean = $\frac{\text{standard deviation}}{\sqrt{\text{sample size}}}$

$$SE \text{ mean} = \frac{0.147}{\sqrt{3}} = \frac{0.147}{1.732} = 0.349\%$$

There is 95% confidence that the mean % for the population lies within ± 1.96 SE of the sample mean

Therefore, there is 95% confidence that the population mean lies between $\pm 0.166\%$ of 1.448%

i.e. 1.614% > population mean > 1.282%

1.614% of 645900 = 10425

1.282% of 645900 = 828

Therefore, there is 95% confidence that the number of individuals receiving chiroprody treatment in the Eastern Board lies between 8280 and 10425 at present.

Therefore, the total probable individuals currently receiving chiroprody treatment from the Northern Ireland Health Boards =

Lower Limit	Upper Limit
5818	5818
4536	4536
3333	3333
<u>8280</u>	<u>10425</u>
21967	24112

Therefore, there is 95% confidence that the number of individuals receiving chiropody treatment from the Health Boards in Northern Ireland lies between 21967 and 24112

Appendix 6

Total number of patients receiving
chiroprody treatment in England
(D.H. Stats and Research, 1989) = 1,949,900

Total number of patients receiving
chiroprody treatment in Wales
(Health and Personal Social
Stats. for Wales 1989) = 138,225

Total number of patients receiving
chiroprody treatment in Scotland
(Scottish Health Stats. 1989) = 309,457

Total = 2,397,582

The minimum number of individuals receiving NHS treatment
in Northern Ireland = 21967

The maximum number of individuals receiving NHS treatment
in Northern Ireland = 24112

Therefore, the minimum number of individuals receiving
chiroprody treatment from the NHS in the U.K. = 2,397,582 +
21967 = 2,419,549. And the maximum number of individuals
receiving chiroprody treatment from the NHS in the U.K. =
2,421,694.

Appendix 7

Calculation of the standard error of the log mean for the number of patients attending each private practice.

95% of the normal range lies within ± 1.96 SD

Log mean = 2.7667

Log SD = 0.9289

For SE log mean, with 95% confidence interval:

$$\begin{aligned} \text{SE log mean} &= \pm 1.96 \times \frac{\text{SD}}{\sqrt{n}} \\ &= \pm 1.96 \times \frac{0.9289}{\sqrt{62}} \\ &= \pm \frac{1.8206}{7.87} \\ &= \pm 0.2313 \end{aligned}$$

Therefore, for the lower limit,

$$\begin{aligned} \text{Log mean} & 2.7667 \\ \text{SE Log mean} & \underline{0.2313-} \\ & 2.5354 \end{aligned}$$

And for the upper limit,

$$\begin{aligned} \text{Log mean} & 2.7667 \\ \text{SE Log mean} & \underline{0.2313+} \\ & 2.9980 \end{aligned}$$

Antilog for these figures:-

$$\text{Antilog mean (2.7667)} = 584.4$$

$$\text{Antilog lower limit (2.5354)} = 343.08$$

$$\text{Antilog upper limit (2.9980)} = 995.40$$

Therefore, there is 95% confidence that $343.08 < \text{Population mean} < 995.4$.

Where:

SD = Standard deviation.
n = Number of observations.
SE = Standard error.

Appendix 8

Calculation of the probable number of individuals receiving private state-registered chiropody treatment in the U.K.

Sample mean = 584.4

Lower limit for 95% confidence interval = 343.08

Upper limit for 95% confidence interval = 995.40

For the population mean,

Sample mean X no. private practices in U.K. =
population.

i.e. 584.4 X 1765 = 1,031,466

For the lower limit for 95% confidence interval for the population.

Sample lower limit X no. private practices in U.K. =
population lower limit.

i.e. 343.08 X 1765 = 605,536.2

For the upper limit for 95% confidence interval for the population.

Sample upper limit X no. private practices in U.K. =
population upper limit.

i.e. 995.4 X 1765 = 1,756,881

Therefore, there is 95% confidence that 605,536 < Population < 1,756,881.

Appendix 9

Calculation of the probable number of patients receiving both NHS and private chiroprody treatment concurrently.

SE proportion = $\frac{\sqrt{\text{Proportion X Proportion remaining}}}{\text{Sample size}}$

$$= \frac{\sqrt{0.12 \times 0.88}}{100}$$

$$= \frac{\sqrt{0.1056}}{100}$$

$$= \sqrt{0.0016}$$

$$= .0325$$

95% confidence interval is given by,

Proportion lies between proportion size \pm 1.96 (SE Proportion)

$$= .12 \pm 1.96 (.0325)$$

$$= .12 \pm .0637$$

Therefore, there is 95% confidence that the proportion of NHS patients receiving both NHS and private chiroprody treatment lies between .0536 and .1837, or between 5.63% and 18.37% of NHS chiroprody patients.

Appendix 10

The total number of patients treated at respective schools of chiropody over the past academic year.

<u>School treated</u>	<u>Number of patients</u>
Huddersfield School of Chiropody	3572
Plymouth School of Chiropody	8905
Durham School of Chiropody	5655
Cardiff School of Chiropody	3386
London Foot Hospital	5613
Chelsea School of Chiropody	11551
Northern College of Chiropody	13000
Northampton School of Chiropody	4559
Wessex School of Chiropody	3110
Northern Ireland School of Chiropody	12374
Sussex School of Chiropody	3120
Birmingham School of Chiropody	3560 - 4361 (with 95% confidence)
Edinburgh School of Chiropody	3811
Glasgow School of Chiropody	<u>8000</u>
TOTAL	90216 - 91017 (with 95% confidence)

Appendix 11

Calculation of probable number of treatments given to patients attending Birmingham School of Chiroprody per year.
(assuming normal distribution).

London Foot Hospital. 19108 treatments given to 5613 patients = 3.4 treatments/year.

Northern College. 53000 treatments given to 13000 patients = 4.1 treatments/year.

Sussex School. 10437 treatments given to 3120 patients = 3.345 treatments/year.

Glasgow School. 39489 treatments given to 8000 patients = 4.9 treatments/year.

Therefore, mean number of treatments/year = 3.699

$$SD = 0.382$$

$$SE \text{ mean} = \frac{SD}{\sqrt{\text{sample size}}} = .191$$

There is 95% probability that the population mean lies within 1.96 SE of the sample mean.

Therefore, there is 95% confidence that population mean = $3.699 \pm 1.96 (.191)$.

$$= 3.699 \pm .374$$

$$= 3.325 < \text{population mean} < 4.073$$

As 14,500 treatments were given to patients at this school over the last academic year, there is 95% confidence that the total patients receiving treatment at this school during this period

$$= \frac{14,500}{3.325} = 4361 \text{ for upper limit}$$

$$3.325$$

$$= \frac{14,500}{4.073} = 3560 \text{ for lower limit}$$

Therefore, there is 95% confidence that 3560-4361 patients received treatment at that school during the last academic year, confirming the Head of Schools' approximation of 3-4000.

Appendix 12

The calculation of the standard error of the proportion, and 95% confidence interval for the proportion of different lesion patterns observed in a sample of 300 chiropody records.

88% of lesion patterns observed were different

12% of lesion patterns observed were not different

Using SE proportion = $\sqrt{\frac{\text{proportion X proportion remaining}}{\text{sample size}}}$

$$\begin{aligned} \text{SE proportion} &= \sqrt{\frac{.88 \times .12}{300}} \\ &= .01876 \end{aligned}$$

95% confidence interval is given by:

$$\begin{aligned} \text{proportion} \pm 1.96 (\text{SE proportion}) \\ &= .88 \pm 1.96 (.01876) \\ &= .88 \pm .03677 \end{aligned}$$

Therefore, proportion for the population lies between .8432 and .9167.

i.e. between 84.32 and 91.67%.

Appendix 13

The calculation of the standard error of the proportion and 95% confidence interval for the proportion of lesion patterns observed only once.

82% of lesion patterns were observed only once.

18% of lesion patterns were observed more than once.

Using SE proportion = $\sqrt{\frac{\text{proportion} \times \text{proportion remaining}}{\text{sample size}}}$

$$\begin{aligned} \text{SE proportion} &= \sqrt{\frac{.82 \times .18}{300}} \\ &= \sqrt{\frac{.1476}{300}} \\ &= .02218 \end{aligned}$$

95% confidence interval is given by:

$$\begin{aligned} &\text{proportion} \pm 1.96 (\text{SE proportion}) \\ &= .82 \pm 1.96 (.02218) \\ &= .82 \pm .04347 \end{aligned}$$

Therefore, proportion for the population lies between .7765 and .86347.

i.e. between 77.65% and 86.347%.

Appendix 14

The calculation of the standard error of the proportion and 95% confidence interval for the proportion of patients without chiropodial pathology.

1% of patients had no chiropodial pathology.

99% of patients had chiropodial pathology.

Using SE proportion = $\sqrt{\frac{\text{proportion} \times \text{proportion remaining}}{\text{sample size}}}$

$$\begin{aligned} \text{SE proportion} &= \sqrt{\frac{.01 \times .99}{300}} \\ &= \sqrt{\frac{9.9}{300}} \\ &= .00575 \end{aligned}$$

95% confidence interval is given by:

$$\begin{aligned} &\text{proportion} \pm 1.96 (\text{SE proportion}) \\ &= .01 \pm 1.96 (.00575) \\ &= .01 \pm .01127 \end{aligned}$$

Therefore, proportion for the population lies between 0 and .0213.

i.e. between 0 and 2.13%.

Appendix 15

RESEARCH PROJECT: THE POTENTIAL OF CHIROPODY RECORDS AS AN AID TO FORENSIC AND MASS DISASTER IDENTIFICATION.

METHOD SHEETTest 1. Situation 1.

To determine whether a State-Registered Chiroprapist can identify a subject from records he/she has previously made on that individual.

Venue: Normal face to face patient contact situation.
Subjects: Take one in three of every patient attending for treatment, with the following exclusions:-

1. Those presenting without foot pathology.
2. Those with lower limb amputations.
3. Those under 65 years of age.
4. New patients.
5. Those who were not last treated by yourself.
6. Any subject who has already been tested in this exercise.

Ethical Considerations: Confidentiality must be maintained. Information recorded must be presented in such a way, that a named individual cannot be identified from the data. Permission to conduct the research must be obtained from the subject, and refusal to comply must be respected.

Numbers: The test is to be conducted on 30 subjects.

Method: The subject presents both feet for examination. That subjects record card has previously been paired with a randomly chosen record card of a patient also last seen by yourself. At this stage, do not look at the treatment notes, and cover up personal details (name, address, date of birth, etc.) with A4 width envelopes on both cards. Mix the two cards, so the correct card is unidentifiable. Draw one of these cards. There is a 50/50 chance of this card being the correct one for that subject.

Use the data capture form to note lesions present on the subject's feet, and compare with lesions noted on the record card, paying attention to retrospective notes.

Use your professional judgement to decide whether this comparison indicates that the notes on the card describe that subject or not. Check your decision, by exposing personal details on that card. Record by tick or cross, the correctness of your decision, along with the age and sex of the subject, and any relevant note of an

exceptionally easy or difficult case, or reason for failure to identify. If the record card did not belong to that subject, continue onto Test 2.

Test 2. Situation 1.

To determine whether a State-Registered Chiroprapist can identify a subject from five previous recipients of chiropody treatment, from records he/she has previously made on that individual.

To immediately follow 1 when required.
Circumstances and criteria as in 1.

Method: The remaining (correct) set of notes for the subject, still with personal details hidden, is mixed with four other randomly chosen sets of notes for patients last treated by yourself, again with personal details hidden with A4 width envelopes. You therefore have five sets of unidentifiable cards, of which one is the correct card. Using the data capture form as before, compare lesions noted on each card, with the subjects feet and again attempt to identify the correct card from this comparison.

Record the correctness of your decision as before, along with age and sex of the subject, and any relevant notes.

Test 1 and 2. Situation 2.

To determine whether a State-Registered chiroprapist can identify a subject from records previously made on that individual by another chiroprapist.

Please repeat the tests as in Situation 1, but using a specific single nominated chiroprapists' notes other than your own.

Test 1 and 2. Situation 3.

To determine how successful such identification procedures will be in practice.

Please repeat the tests as in Situation 1, but using notes made by chiroprapists taken at random.

This randomness can be undertaken as follows:

List the names of all chiroprapists whose workload coincides with your own (i.e. those who also work at the same clinics as yourself, or undertake domiciliary visits in the same area).

Take the first name on this list. Toss a coin. If heads are shown, Test 1 (and 2 depending on the results of 1) will be conducted in the next face to face contact arising, where treatment notes were last made by that chiropodist. If tails are shown, do not test the notes concerned when they arise, but pass these notes and undertake this procedure for the next named chiropodist on the list.

Keep going through the list in this way, until 30 test situations have been conducted and the results recorded as before.

Care must be taken when mixing cards to be tested with other randomly chosen cards. In order for all cards to be unidentifiable under test, the randomly chosen cards must also have been last written up by the same chiropodist who last made notes on the card being tested.

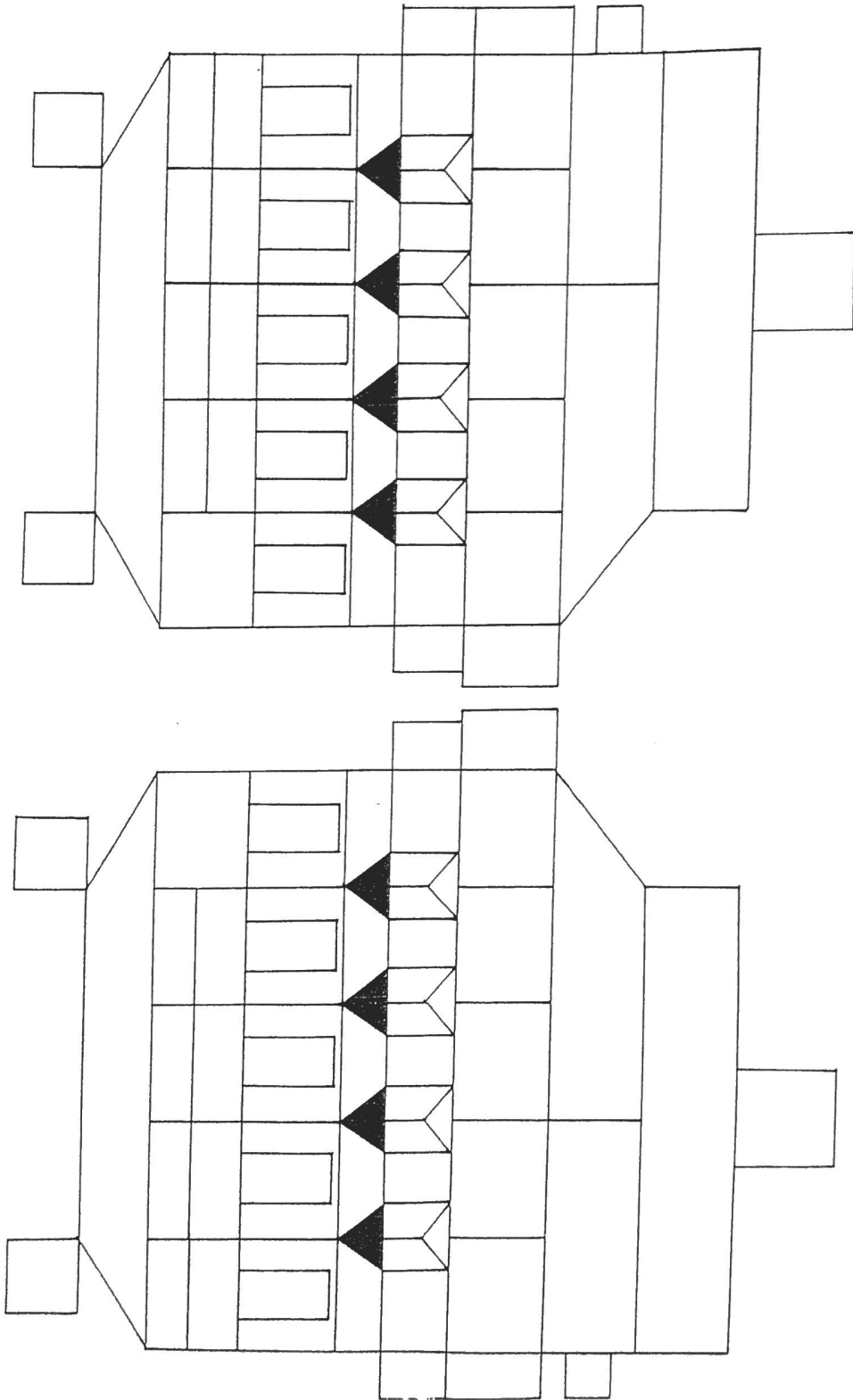
If the test is conducted in a clinic, foot care assistants or clerical staff can prepare other randomly chosen cards for mixing with the correct card for you, to ensure required 'blindness'.

If the test is being conducted in the domiciliary situation, where you have to prepare the cards yourself, choose these other cards by covering treatment notes and looking at final signatures only, taking cards with the required final signature and pairing one with the correct card for Test 1 and keeping four aside for Test 2 if required. This preparation is best undertaken at the start of your work session.

If you experience any difficulties with any of these tests, please don't hesitate to contact me.
Thank you for your help with this project.

Wesley Vernon
(Student B.Sc.(Hons.) course)
Sussex School of Chiropody
4th November, 1989.

Appendix : 17



Appendix 18

 χ^2 test for differences between proportions identified in Sheffield District/Brighton District for Test 1.Obtained frequencies (For Test 1 in Situations 1 and 2).

	Correct	Incorrect	Total
Sheffield	293	7	300
Brighton	222	78	300
Total	515	85	600

Null Hypothesis - that there is no difference between the two different Districts, in the success of identification in Test 1 Situations.

Using:

	Correct	Incorrect	Total
Sheffield	a	b	a+b
Brighton	c	d	c+d
Total	a + c	b + d	a+b+c+d

$$\chi^2 = \frac{(ad - bc)^2 (a+b+c+d)}{(a+b)(c+d)(b+d)(a+c)}$$

When comparing one sample with another, the rule for degrees of freedom is that they equal (Number of columns minus 1) x (Number of rows minus 1)

Thus, with the above 4 fold table, there is 1 degree of freedom.

$$\chi^2 = \frac{(293 \times 78 - 7 \times 222)^2 (600)}{(300)(300)(85)(515)}$$

Therefore, $\chi^2 = 69.094$

Entering the χ^2 table at 1 degree of freedom, 69.094 lies beyond 10.827, therefore, $0.001 > P$

Therefore, the probability of this difference occurring by chance is much less than 0.1% and is very highly statistically significant within the 99.9% confidence limit.

Appendix 19

χ^2 test for differences between proportions correctly identified/eliminated in Sheffield District/Brighton District for Test 2.

Obtained frequencies (For Test 2 in Situations 1 and 2).

	Correct	Incorrect	Total
Sheffield	158	3	161
Brighton	109	38	147
Total	267	41	308

Null Hypothesis - that there is no difference between identification from own notes, and identification from another's notes for the situation represented by Test 2 Situations.

Using:

	Correct	Incorrect	Total
Sheffield	a	b	a+b
Brighton	c	d	c+d
Total	a + c	b + d	a+b+c+d

$$\chi^2 = \frac{(ad - bc)^2}{(a+b)(c+d)(b+d)(a+c)}$$

When comparing one sample with another, the rule for degrees of freedom is that they equal (Number of columns minus 1) x (Number of rows minus 1)

Thus, with the above 4 fold table, there is 1 degree of freedom.

$$\chi^2 = \frac{(158 \times 38 - 109 \times 3)^2 (308)}{(161)(147)(41)(267)}$$

Therefore, $\chi^2 = 38.313$

Entering the χ^2 table at 1 degree of freedom, 38.313 lies beyond 10.827, therefore, $0.001 > P$

Therefore, the probability of this difference occurring by chance is much less than 0.1% and is very highly statistically significant within the 99.9% confidence limit.

Appendix 20

χ^2 test for differences between proportions correctly identified/eliminated from the chiroprodists own notes/another chiroprodists notes for Test 1.

Obtained frequencies (for Test 1).

	Correct	Incorrect	Total
From chiroprodists own notes	268	32	300
From another chiroprodists notes	247	53	300
Total	515	85	600

Null Hypothesis - that there is no difference between identification from the chiroprodists own notes, and identification from another chiroprodists notes for the situation represented by Test 1.

Using:

	Correct	Incorrect	Total
Own notes	a	b	a + b
Others' notes	c	d	c + d
Total	a + c	b + d	a+b+c+d

$$\chi^2 = \frac{(ad - bc)^2}{(a+b)(c+d)(b+d)(a+c)}$$

When comparing one sample with another, the rule for degrees of freedom is that they equal (Number of columns minus 1) x (Number of rows minus 1).

Thus, with the above 4 fold table, there is 1 degree of freedom.

$$\chi^2 = \frac{(268 \times 53 - 32 \times 247)^2}{(300)(300)(85)(515)}$$

Therefore, $\chi^2 = 9.514$

Entering the χ^2 table at 1 degree of freedom, 9.514 lies between 6.635 and 10.827, therefore, $0.01 > P > 0.001$

Therefore, the probability of this difference occurring by chance is less than 1% and is statistically significant within the 99% confidence limit.

Therefore, in the Test 1 situation, identification from the chiropodists own notes appears to be more successful than identification from anothers notes.

χ^2 test for differences between proportions correctly identified/eliminated from the chiropodists own notes/another chiropodists notes for Test 2.

obtained frequencies (for Test 2)

From chiropodists	Correct	127	18	Total	145
own notes	Incorrect				
From another chiropodists	Correct	140	23	Total	163
notes	Incorrect				
Total		267	41		308

Null Hypothesis - that there is no difference between identification from the chiropodists own notes, and identification from another chiropodists notes for the situation represented by Test 2.

Using:

Own notes	a	b	a + b
Others' notes	c	d	c + d
Total	a + c	b + d	a+b+c+d

$$\chi^2 = \frac{(ad - bc)^2}{(a+b+c+d)(a+b)(c+d)(a+c)}$$

When comparing the sample with another, the rule for degrees of freedom is that they equal (Number of columns minus 1) x (Number of rows minus 1).

Thus, with the above 4 fold table, there is 1 degree of freedom.

$$\chi^2 = \frac{(127 \times 23 - 18 \times 140)^2}{(145)(163)(41)(267)} = \frac{(308)^2}{(145)(163)(41)(267)}$$

Therefore, $\chi^2 = 0.19142$

Entering the χ^2 table at 1 degree of freedom, 0.455 lies beyond 0.19142. Therefore, $P > 0.50$. This result is not statistically significant, with the probability that this difference occurred by chance being greater than 50%. Thus, for the situation represented by Test 2, the Null Hypothesis that there is no difference in the success of identification from ones own notes and from others notes stands.

Appendix 22

χ^2 test for the differences in proportions currently identified by respective chiropractors in the Sheffield District, (for the combined results of situations 1 and 2 in Test 1).

Sheffield District Results

Chiropractor	Correct Identifications	Incorrect Identifications	Total
1	58	2	60
2	58	2	60
3	60	0	60
4	60	0	60
5	57	3	60
Total	293	7	300

Null Hypothesis - that there is no difference between the success rates of chiropractors in undertaking identification from chiropractor records in the Sheffield District for the Situation represented by Test 1. Assume the proportion identified is the same for each chiropractor as it is for all combined. This proportion is derived from the total identified, and for Sheffield = $\frac{293}{300}$

Calculation of χ^2 on the above figures for the Sheffield District

To find the expected number identified by each chiropractor, multiply the actual number in the total column by the proportion $\frac{293}{300}$.

Chiroprapist	Expected numbers		O-E		$(O-E)^2/E$	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
	I/Ds	I/Ds	I/Ds	I/Ds	I/Ds	I/Ds
1	58.6	1.4	-0.6	0.6	6.143^{-03}	.257
2	58.6	1.4	-0.6	0.6	6.143^{-03}	.257
3	58.6	1.4	1.4	-1.4	.0334	1.4
4	58.6	1.4	1.4	-1.4	.0334	1.4
5	58.6	1.4	-1.6	1.6	.0436	1.828
Total	293	7	0	0	.12268	5.142

(Where O = Observed No. and E = Expected No.)

$$\chi^2 = .12268 + 5.142 = 5.265$$

Degrees of freedom = (Number of columns minus 1) x (Number of rows minus 1) = (2-1) x (5-1) = 4 degrees of freedom.

Entering the χ^2 table at 4 degrees of freedom, $0.50 > P > 0.10$

Hence, the result is not statistically significant, i.e. The chiroprapists undertaking these identification Tests in the Sheffield District in the Test 1 Situation did so with the same degree of success, and the Null Hypothesis therefore stands.

χ^2 test for the differences in proportions correctly identified/eliminated by respective chiropodists in the Brighton District (for the combined results of situations 1 and 2 in Test 1).

Brighton District Results

Chiropodist	Correct identifications	Incorrect identifications	Total
6	42	8	60
7	36	24	60
8	60	0	60
9	42	18	60
10	42	18	60
Total	222	78	300

Null Hypothesis - that there is no difference between the success rates of chiropodists in undertaking identification from chiropody records in the Brighton District for the situation represented by Test 1.

Assume the proportion identified is the same for each chiropodist as it is for all combined. This total is derived from the total identified, and for Brighton = 222

Calculation of χ^2 on the above figures for the Brighton District

To find the expected number identified by each chiropodist, multiply the actual number in the total column by the proportion 222/300.