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AN INVESTIGATION INTO BILINGUAL (WELSH/ENGLISH) TRAFFIC SIGNS

by

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ABSTRACT

The reading times of three types of bilingual (English/Welsh) advance direction signs have been compared with their mono-lingual, all English, equivalents by some 28 subjects, several of whom speak Welsh.

Increased reading times were found with most of the bilingual signs. The increases were greatest if the Welsh name was placed above the English name on the sign. Similar results were found for a number of warning and regulatory signs which had supplementary panels bearing worded messages.

One exception to the general findings was for a simple primary route (green background) sign for a crossroads with one destination shown in each direction. Providing the English version of the place name was positioned above the Welsh there was apparently no increase in reading time.

Also considered in the report is the increased area of the signs and the consequent increased cost.

1. INTRODUCTION

A considerable amount of research into traffic sign design has been carried out over the last 15 – 20 years. From this research principles of design have been evolved and in the main these are equally applicable to bilingual traffic signs as they are to monolingual ones.

One of the basic facts about sign design is that the number of words or names on the sign directly affects the time taken to read the sign. It is always important therefore that the number of words or names on a traffic sign should be kept to a minimum. Making traffic signs bilingual will of course increase the number of words on the signs; consequently in considering their provision this is one of the major problems to be faced.

The time taken to read a direction sign depends on the order in which the individual reads the names on the sign. On some occasions the name required will be the last to be seen. The size and design of the sign should therefore be such that it allows all drivers adequate time in which to find the name they want, no matter in what order the names are scanned. Previous investigations have shown that this time may be expressed approximately as $^{N}/3 + 2$ seconds where N is the number of names of the sign[1]. However, this work

was carried out with names which might be considered to have equal importance or be equally in need of scanning by the driver, i.e. without reading them he cannot reject any names as not applying to him until he has found the name he requires. In considering bilingual signs a different situation might exist. If all the names on a sign require an equivalent in the second language one might expect an increased reading time equivalent to doubling the number of names but since a driver will need to scan the names of one language only he may be able to dismiss the names in the other language without specifically reading them. This he will be able to do if some characteristic such as position on the sign, colour or script enables him quickly to identify the names either in his own language or in the language to be dismissed.

Any increased reading time will of course mean that the drivers' eyes are off the road ahead for that much longer, which is obviously undesirable and may be dangerous in a critical situation. The following tests have therefore been conducted to determine how best to add the Welsh language to traffic signs in order to minimise the resultant increased reading time. The work was undertaken at the urgent request of the Committee of Inquiry into Bilingual Traffic Signs appointed by the Secretary of State for Wales. The time allowed for the work was strictly limited and the research reported represents less than a full investigation of the problem.

In the tests it was anticipated that if signs in Wales were to be bilingual then both languages would be given equal prominence on the signs. Subjects for the tests were predominantly English speaking. Six of the subjects were Welsh and were Welsh speaking though all stated that they would make use of English on traffic signs.

In the experiments described below various methods of adding Welsh were compared and the effect of adding the Welsh above and below the English was investigated.

Also considered in the report is the increase in area of the signs resulting from adding the Welsh and the consequent effect on the cost of the signs.

2. THE EXPERIMENTS

Two test methods were used:

2.1 Projection experiment

Slide transparencies of the test signs were projected onto a screen. The subjects taking part in the experiment were able to switch the slides on and off at will so that the time for which each slide was visible on the screen was under their control. Slides of directional signs and slides of signs showing worded messages on supplementary plates below warning or regulatory signs were viewed. The subject's task was to determine the direction to a destination previously specified which would appear on the direction signs or to read the worded message in the case of the non-directional signs. This he was asked to do as quickly as he could. The time for which each sign appeared on the screen was measured. One hundred and twenty slides were viewed by each of 18 subjects.

In this experiment a comparison of the reading times of the various signs is obtained free from the variance introduced by also having to concentrate on driving the car. The experiment also had the merit of allowing large numbers of reading times to be obtained in a short time.

2.2 Track experiment

In these tests direction signs were erected at the side of the track. The subject drove past the signs as if on the public road and again had to find the direction to a destination given to him before reaching the sign.

The car which the subjects drove was fitted with a head-up display. This is an optical system similar to that fitted to some military aircraft whereby information in the form of numbers, letters or symbols can be projected on to the windscreen and the pilot or driver sees the image of these not on the windscreen but as a virtual image apparently out in the real world in front of him. The equipment fitted to the car in this experiment displayed a pair of numbers which changed every second. The subject's task was to read out the numbers whilst driving the car. Because of the apparent position of the numbers he was able to do this whilst looking at the road ahead. However, whilst reading these numbers he was unable to read the road signs and had to look away from the task to read them. The number of displayed number pairs which the driver missed whilst reading the sign was thus an indication of the time taken to read the sign.

Six signs were displayed around the track which is in the form of a figure 8. A number of different routes round the track were used so that the subject saw the signs in different sequences as the experiment progressed. Six subjects took part in this part of the tests, five of whom were Welsh speaking.

Another track experiment was also carried out in which four subjects drove round the track reading the signs in the same way but they did not perform the subsidiary task. Instead each of these subjects wore a piece of equipment called the eye mark recorder. This is a device which the subject wears on his head. Pictures transmitted down flexible coherent fibre optic cables are recorded on cameras mounted in the car. By means of this equipment a spot of light is superimposed on a film of the scene ahead of the driver to indicate where in that scene the driver is looking. The equipment is fully described elsewhere[2]. By analysis of the film so produced, the exact duration for which the driver's eyes were directed to the sign can be measured.

In both track experiments (with the head-up display and with the eye marker) the subject was told by the experimenter when to look at the sign. This prevented the danger of the subject looking at the sign before it was within reading distance which would have resulted in spuriously long reading times.

The laboratory's research track is private and there was no other traffic present during these tests.

3. THE SIGNS

3.1 Direction signs

Three ordinary advance direction signs were chosen for the tests:

(i) A primary route (green background) sign for a simple crossroads showing three destinations

(ii) A non-primary route (white background) sign also for a simple crossroads showing three destinations. These signs (i and ii) were both of the 'map' layout type.

(iii) A non-primary route (white background) sign for a two-way forked junction. This sign was of the list layout type and showed five destinations.

Figure 1 shows examples of each of the signs. Each sign was compared with equivalent bilingual signs which are shown in Figs. 2, 3 and 4.

In the projection experiment, also included with the simple crossroad map type direction signs were some monolingual (all English) signs with two destinations in each direction, i.e. six destinations in all. (See Fig. 5). It was considered that it would be useful to compare the reading times for these with the bilingual three-destination signs which have the same total number of names.

The names for use on all the signs were taken from the list of primary destinations for Wales and Monmouthshire shown in Appendix I of Informatory Signs for use on All-Purpose Roads[3]. The Welsh language equivalents were supplied by the Welsh office and are those shown in A Gazetteer of Welsh Place-Names[4].

It is appreciated that if direction signs are made bilingual in Wales, only Welsh places which currently have English language names in common use will require a bilingual equivalent. Although this is the minority of names in Wales it is the large majority of the primary destinations for Wales, most of which are, incidentally, in South Wales. In the tests all the names on the bilingual test signs were English language names of Welsh places requiring a different Welsh language version. There were three exceptions to this which are mentioned later in section 4.1.

No specific junction was represented by any of the signs and the names were used in a random order on the signs. This avoided any bias in the results due to a subject's prior knowledge of the geography of Wales or of the location of particular places.

For the track experiment signs of types i, ii and iii were erected at various places around the track. Erected at other places around the track were their bilingual equivalents. All the signs in the track experiment had 2 in. x-height lettering. The more normal 4 in. x-height lettering is unsuitable for the sight distance available at most places on the test track. The subjects were therefore asked to drive at 20 mile/h which is appropriate to this reduced letter size.

3.2 Varieties of bilingual version tested

In an attempt to achieve the target of enabling the driver to dismiss the second language and concentrate on his own language, three versions of script were used for the Welsh names.

(a) The same script and same colour as the English. A small bar linked the English/Welsh bilingual pairs. (See Fig. 2.) It was felt that the bar helped to make it obvious that they were bilingual name pairs and not two separate destinations.

(b) An upper case script but still in the same colour . (See Fig. 3.)

(c) The same script as the English but in a different colour. (See Fig. 4.)

On signs with green backgrounds the Welsh version was in yellow. On signs with white backgrounds the Welsh was in white on a brown background.

All versions were tested with both English and Welsh at the top of each bilingual pair.

3.3 Other signs

In the projection experiment as well as slides of the direction signs described above, slides of some warning and regulatory signs were included. Examples of the bilingual version are shown in Fig. 6. Each sign had a supplementary plate bearing a worded message. Signs with one plate bearing the English language version of the message were compared with signs having two plates, one bearing the message in English and one in Welsh. Again, signs with the English panel and signs with the Welsh panel at the top were compared and the Welsh was tested in all three versions described above. (3.2)

Throughout the tests different versions of the Welsh were not mixed. The signs or slides were therefore presented in blocks, the subject being told at the beginning of each block how the Welsh would appear on the signs and whether it would be at the top or bottom of each pair of names (or plates). The order of presentation of the various signs within each block was carefully randomized. Also the blocks containing the various versions of Welsh were presented to each subject in a different order.

This order of presentation was chosen to eliminate as far as possible the effects of learning (which was noticeable in the experiments) but allowing the subject to know which version of Welsh to expect and where it would appear on the sign. It was considered that a driver would know this if he were driving through Wales using bilingual signs and therefore ought to know in the experiment.

4. THE RESULTS

The results for each experiment are treated separately and conclusions are then drawn from all the data.

4.1 Results of the projection experiment

Table 1 gives the average time in seconds subjects took to read the signs. This experiment had the largest number of subjects (18) and the widest range of people with respect to age and driving experience. The absolute times, however, are not those which one might expect in normal driving because the subjects were able to devote all their attention to the signs.

The mean reading times show that nearly all the bilingual signs took longer to read than their equivalent monolingual versions. However an exception occurred with the simple cross roads, three-destination, green signs. With these there was apparently no increase in reading time by adding Welsh providing the English name was at the top of each bilingual pair. A statistically significant increase of about 10 per cent (taking all Welsh versions together) occurred if the Welsh was at the top of each bilingual pair of names on these signs. The reading times were then about equal to having six separate destinations (i.e. the same total number of names).

With the white background simple cross roads signs adding Welsh increased the reading time by some 15 per cent if the English name was above the Welsh and by about 30 per cent if the Welsh was at the top of each pair. With these signs the bilingual versions having Welsh at the top had longer reading times than the corresponding all-English sign with six names on it.

Lastly, as far as direction signs are concerned, the making bilingual of the five-destination, 'list' layout, signs caused a large increase of some 28 per cent in reading times (again taking all Welsh versions together). Unlike the other signs whether English or Welsh was at the top of each pair of names resulted in less difference, probably because these signs simply appeared as a list of names.

It has been suggested that the design of the bilingual version of this sign which was used in the tests was not sufficiently clear. Further experimentation was not carried out as it was felt that no significant improvements could be made because of the inherent complication of the sign. Nevertheless some suggested alternative designs are shown in Fig. 8 which may make the sign a little clearer in making it more obvious that the names appear in pairs. All of the suggested alternatives result in a sign of larger area and therefore proportionately higher cost. (See para. 4.4 below.)

The results for the non-direction signs show an increase in reading time of about 9 per cent when the English language plate is mounted above the Welsh one. A more marked increase is again apparent if the Welsh panel is at the top, the increase then being about 20 per cent.

The waiting limited sign was treated separately because with this sign a more fundamental change to the regulations and to the general concept of the sign would be required to alter the colour and style of the sign. It was therefore thought appropriate to position the Welsh and English version side by side. A 12 per cent increase in the reading time was caused by doing this.

Also included in this experiment were three signs which had some bilingual pairs of names and some single Welsh names (see Fig. 7). Mixtures of this sort apparently caused quite large increases in reading times. However, only one sign of each type was included and consequently the amout of data obtained for these signs was small. Nevertheless in the case of the crossroads signs the increased reading times were significantly larger than the corresponding fully bilingual signs. It is not certain why this should be, but it is possible that lack of consistency of this kind gave rise to confusion.

4.2 Results of the track experiment

Table 2 gives the average time in seconds for which the six drivers had their eyes diverted from the head-up display task whilst reading the signs. The basic pattern of results in this experiment is very similar to that of the projection experiment. As in the projection experiment it is noticeable that with the simple crossroads green background signs there is apparently no increase in reading time by adding Welsh if the English is at the top of each pair. There is a marked increase of about 15 per cent if the Welsh is at the top.

With the white background crossroads signs there is an increased reading time due to adding Welsh in both cases but again is generally more marked (28 per cent) if the Welsh is above the English, compared with 12 per cent if the English is at the top.

With the more complicated list layout signs the reading times are generally longer and the results for this sign, unlike the projection experiment, again show a difference between putting English or Welsh at the top of each bilingual pair. The increase is about 15 per cent if the English is at the top and about 41 per cent if the Welsh is at the top.

The four results for the white background signs where the Welsh version is in the upper case (capitals) script also show a different pattern from the projection experiment. The reading times for these signs are high when the English is at the top and unusually low when the Welsh is at the top. These differences are difficult to explain and may be due to random chance variations which are inherently greater in this experiment due to the coarser measurement and fewer subjects. However, it has been considered by a random sample of the public that this version of the signs with the Welsh shown in an upper case (all capitals) script is aesthetically unacceptable and the variations were not therefore considered further.

Apart from these differences, the findings of the projection experiment which, with more signs and more subjects, was basically more thorough, support the results obtained under the more realistic conditions of the track experiment.

4.3 Results of the track tests using the eye mark recorder

Table 3 gives the average time in seconds for which the subjects had their eyes directed towards the signs. Only four subjects took part in these tests and there is therefore considerably more variance in the results. In these tests only the version of Welsh using lower case scripts either in the same or a different colour from the English were tested (versions a and c). The pattern of results was similar to the other two experiments. Adding Welsh to the simple green signs caused only a small and not statistically significant increase to the reading time. Adding Welsh to the simple white signs caused a significant increase of about 30 per cent in the reading time but the data were too sparse to show the differences observed in the other experiments due to putting English or Welsh at the top. Also the results for the list layout five-destination signs showed a marked increase of 40 per cent by adding Welsh. The results thus far for all three experiments are summarized in Table 4.

4.4 Comparison of Welsh versions

Nowhere are there clear indications as to which script or colour is preferable for adding Welsh to the signs. Experiment one shows that with green signs the shortest average reading time is obtained with the Welsh in the same script as the English but coloured yellow and situated below the English.

With white background signs Welsh in the upper case script gives the shortest reading time in experiment 1 but this finding is not confirmed and is in fact reversed in experiment 2. Also it should be repeated that many people consider this version aesthetically unacceptable.

Both sets of bilingual version of the crossroads signs show that providing English is positioned above the Welsh shorter reading times are obtained than with the monolingual signs with twice the number of destinations (i.e. the same total number of names but all English). It may be, therefore, that some property of the name pairs has made it obvious that they are bilingual pairs and not two separate destinations. If so, all the methods used in these tests were apparently equally effective in achieving this.

With the worded supplementary panels below the warning and mandatory signs the coloured version of Welsh situated below the English gave the shortest reading times.

The marked conclusion from experiments one and two is that adding the Welsh above the English causes the greatest increase in reading time with nearly all the signs tested.

5. EFFECT ON SIGN AREA AND COST

The cost of traffic signs is determined mainly by their area. The table below gives the relative areas of the monolingual and bilingual signs used in these tests:

		2-in. x-height (as used in the tests)	4-in. x-height (the normal minimum for public roads)	Increase in area of bilingual signs
MAP LAYOUT	3 names (monolingual)	10.3 sq ft	41 sq ft	
	6 names (bilingual)	16.2 sq ft	65 sq ft	57%
LIST LAYOUT	5 names	8.5 sq ft	34 sq ft	
	10 names	15.7 sq ft	63 sq ft	85%

On public roads the normal minimum letter size for advance direction signs of this type would be 4-in. The cost of the signs complete with lighting etc. in this size would be about £200 for the simple cross roads signs and about £170 for the Y junction list layout sign. If all the names on these signs required bilingual equivalents (as they did in this experiment) these costs would probably rise to £325 and £315 respectively. The costs would be correspondingly greater, of course, for larger letter sizes. The addition of a further supplementary panel to warning and regulatory signs would cost about £4 excluding the cost of the labour required to fit them.

6. CONCLUSIONS AND DISCUSSIONS

The following conclusions may be drawn from the tests:

1. Adding Welsh to direction signs increases the reading time of all the signs tested except the simple primary route (green background) crossroads signs showing three destinations. With these signs, providing the English name is put at the top of each pair of names, there is apparently no increase in reading times.

2. With non-primary route (white background) signs of both 'map' layout and 'list' layout, there is a more marked increase in reading time by adding Welsh which is usually much greater if the Welsh name is positioned above the English name. Two out of three experiments showed this markedly. The third experiment was of limited scope and apart from the gross changes in reading times there was insufficient data to show other changes.

3. Providing the English was at the top of each bilingual pair of names, the bilingual three-destinations signs showed shorter reading times than the six-destination monolingual signs which have the same total number of names.

4. The results for the warning and regulatory signs which had supplementary plates bearing worded messages were similar to those for the white direction signs, namely that adding a plate bearing the message in

Welsh increased the reading time and the increase was greatest if the Welsh plate was positioned above the English one.

The absolute times recorded in these experiments are likely to be somewhat shorter than would be the case in normal driving. In the projection experiment the subjects had only the signs to concentrate on and although in the track experiments the subjects were driving, they did not have other traffic to worry about. In all these tests the subjects could be expected to be in a state of alertness.

The subjects for these experiments were mainly English. However, the main track tests had five out of six Welsh speaking subjects though all said they would normally use English on the road signs. (The situation existing in Wales is that out of a population of some 2.5 m about 600,000 speak Welsh and of these many use English as their first language.)

Because increased reading times result in drivers having their attention diverted from the task of driving safely along the road for longer periods of time, then on this consideration if further traffic signs in Wales are to be bilingual the Welsh should be added below the English. It is noted that of the existing bilingual signs in Wales some have the Welsh uppermost and others the English (see Fig. 8).

These tests revealed areas where further investigation would seem warranted. In particular signs which displayed some bilingual pairs of names and some single Welsh names is one of these. If their reading times had been solely dependent on the number of names on the signs then one would expect the reading times to fall somewhere between the monolingual signs and the fully bilingual signs. Although only three such signs were included in the tests their reading times were well above those for the fully bilingual signs. It may be, therefore, that the lack of consistency has given rise to confusion causing the higher reading times.

Also in view of the finding with the simple crossroads signs with green background it would be worth investigating a more complicated primary route sign.

Finally a reduction in letter size on traffic signs, particularly the advance direction signs of the type tested is unacceptable. This has been fixed taking into account all the relevant factors of speed of traffic, position of the sign etc. Therefore in order to accommodate the Welsh an increase in area of the signs will be necessary. This will increase the cost of the signs proportionately. The bilingual signs used in this experiment had 57 per cent greater area than their monolingual equivalents for the three-destination signs and 85 per cent greater area for the five-destination signs.

7. ACKNOWLEDGEMENTS

Grateful thanks are due to my colleague Mr. I.D. Carter for his assistance throughout and to Mr. C. Gent for his assistance with the statistical design of the experiments and his patient help with the analysis of the data. The co-operation of Mr. A. Lloyd Harries, Mr. J. Rhys and Mr. W.M. Rogers of the Welsh Office in answering my many questions concerning the Welsh for the signs is appreciated.

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TABLE 1

Mean reading times (in seconds) obtained in the projection experiment

	ALL ENGLISH		ENGLISH WELSH				WELSH ENGLISH		
			(a) Welsh in same script	(b) Welsh in capitals	(c) Welsh coloured	As in (a) but with some single names	(a) Welsh in same script	(b) Welsh in capitals	(c) Welsh coloured
DIRECTION SIGNS	6-Destinations	3-Destinations	3-Destinations				3-Destinations		
Green background Map type signs	1.57 ±0.046 (72)	1.49 ±0.046 (72)	1.50 ±0.065 (36)	1.49 ±0.065 (36)	1.41 ±0.065 (36)	1.82 ±0.092 (18)	1.57 ±0.065 (36)	1.59 ±0.065 (36)	1.64 ±0.065 (36)
White background Map type signs	1.62 ±0.046 (72)	1.31 ±0.046 (72)	1.58 ±0.065 (36)	1.43 ±0.065 (36)	1.52 ±0.065 (36)	1.76 ±0.092 (18)	1.64 ±0.065 (36)	1.66 ±0.065 (36)	1.74 ±0.065 (36)
	5-Destinations		5-Destinations				5-Destinations		
White background List type signs	1.64 ±0.082 (72)		2.22 ±0.115 (36)	1.98 ±0.115 (36)	2.26 ±0.115 (36)	2.40 ±0.164 (18)	1.99 ±0.115 (36)	1.78 ±0.115 (36)	2.51 ±0.115 (36)
OTHER SIGNS									
Various warning and regulatory signs	1.27 ±0.032 (180)		1.37 ±0.051 (72)	1.38 ±0.046 (90)	1.35 ±0.046 (90)		1.57 ±0.051 (72)	1.41 ±0.046 (90)	1.55 ±0.046 (90)
Waiting Limited 8am – 6pm 20 mins in any hour	2.69 ±0.115 (36)		3.01 ±0.12 (36)						

The figures below each mean are the standard deviations and the figures in brackets are the number of results from which the means were obtained.

TABLE 2

Mean reading times (in seconds) for which the drivers' eyes were off the road whilst reading the signs in the track experiment

	ENGLISH ONLY	ENGLISH WELSH			WELSH ENGLISH		
		(a) Welsh in same script	(b) Welsh in capitals	(c) Welsh coloured	(a) Welsh in same script	(b) Welsh in capitals	(c) Welsh coloured
Green background Map Layout 3 destinations	1.66	1.65	1.61	1.63	1.85	1.94	1.93
White background Map Layout 3 destinations	1.51	1.69	2.25	1.67	2.00	1.85	1.94
White background List Layout 5 destinations	2.24	2.33	3.08	2.35	3.58	2.58	3.33

TABLE 3

Mean reading times (in seconds) obtained from the Eye-Marker camera film

	ENGLISH ONLY	ENGLISH WELSH		WELSH ENGLISH	
		(a) Welsh in same script	(c) Welsh coloured	(a) Welsh in same script	(c) Welsh coloured
Green background Map layout 3 destinations	1.05 ±0.39	1.07 ±0.16	1.17 ±0.28	1.10 ±0.21	1.17 ±0.49
White background Map layout 3 destinations	1.00 ±0.25	1.54 ±0.46	1.30 ±0.42	1.30 ±0.21	1.30 ±0.20
White background List layout 5 destinations	1.28 ±0.37	1.82 ±0.37	1.77 ±0.67	1.70 ±0.36	1.99 ±0.60

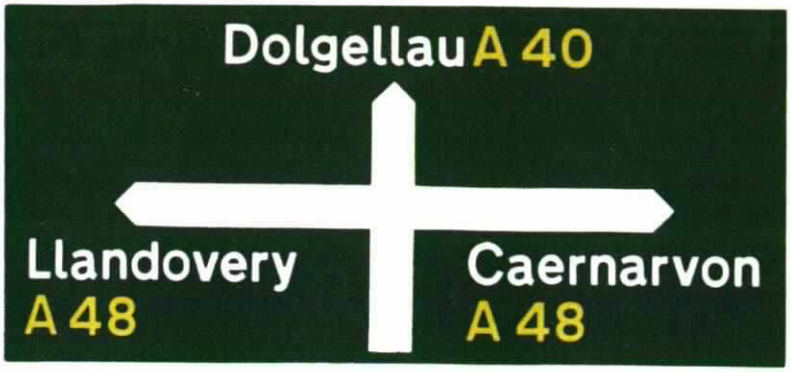
(The figures below each mean are the standard deviations. It will be noticed that these are large, which is due to the small number of subjects).

TABLE 4

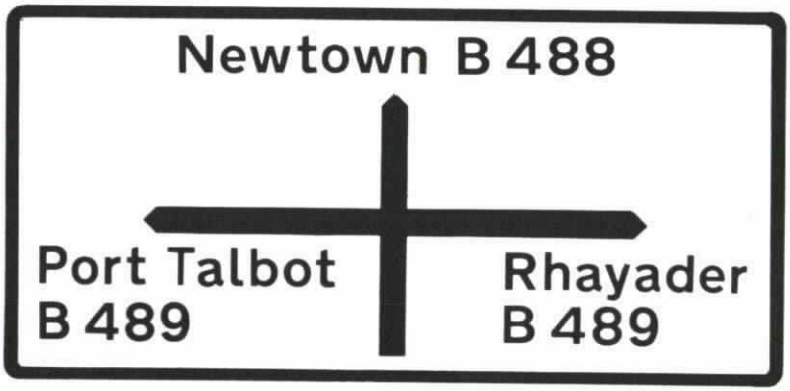
Summary of percentage increases in reading time over equivalent monolingual English signs

		ENGLISH WELSH	WELSH ENGLISH
Green background Map layout 3 destinations	Experiment 1 2 3	0 0 5	10 15
White background Map layout 3 destinations	Experiment 1 2 3	15 12 30	30 28
White background List layout 5 destinations	Experiment 1 2 3	28 15 40	28 41
Warning and regulatory signs	Experiment 1 only	9	20
Waiting sign	Experiment 1 only	12 (signs side by side)	

(i)

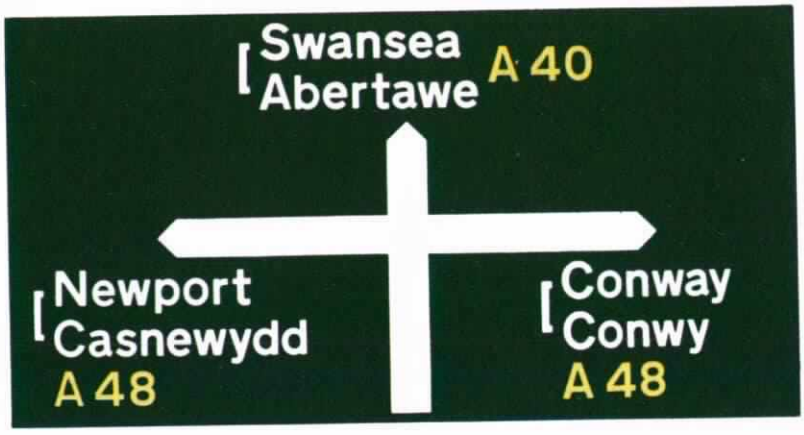


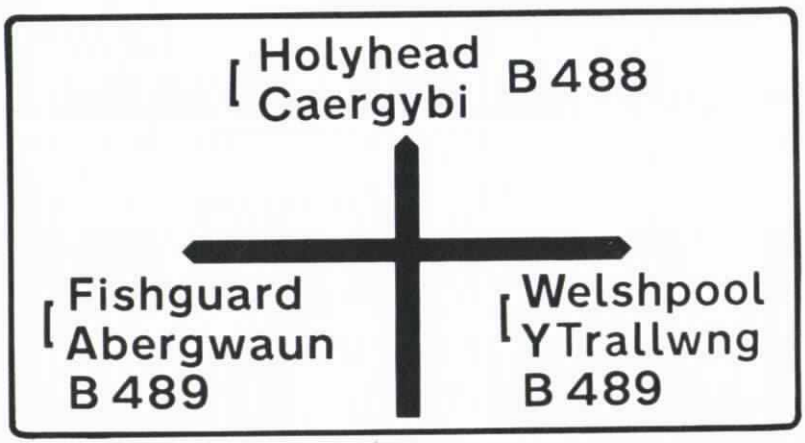
(ii)



(iii)

Fig 1 EXAMPLES OF MONOLINGUAL DIRECTION SIGNS USED IN THE TESTS





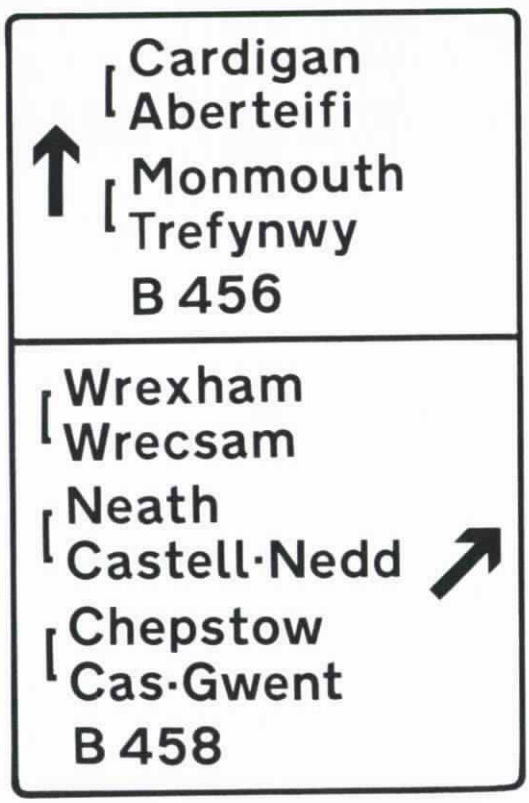
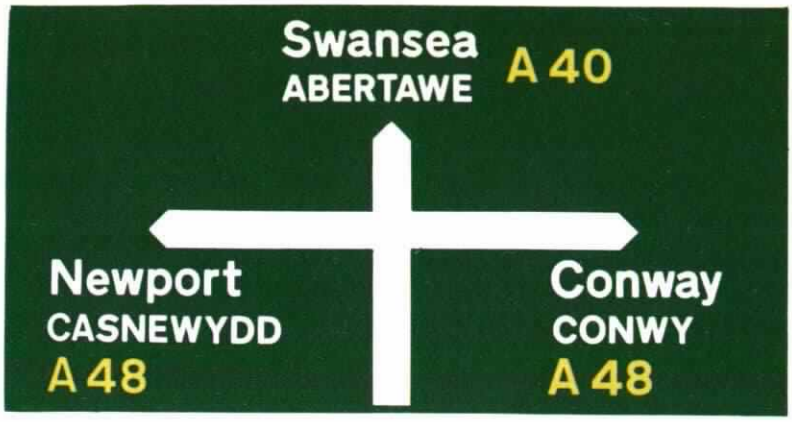


Fig 2 EXAMPLES OF THE THREE TYPES OF BILINGUAL DIRECTION SIGN IN VERSION (a) – WELSH IN THE SAME SCRIPT AND COLOUR
(Note the tie bar joining each bilingual pair)



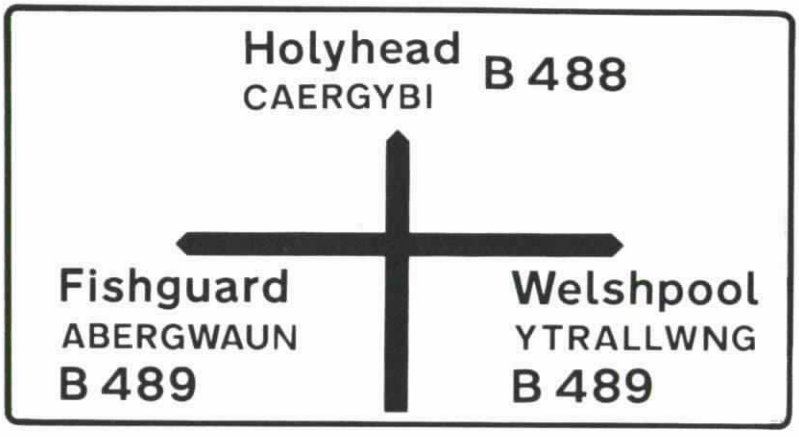
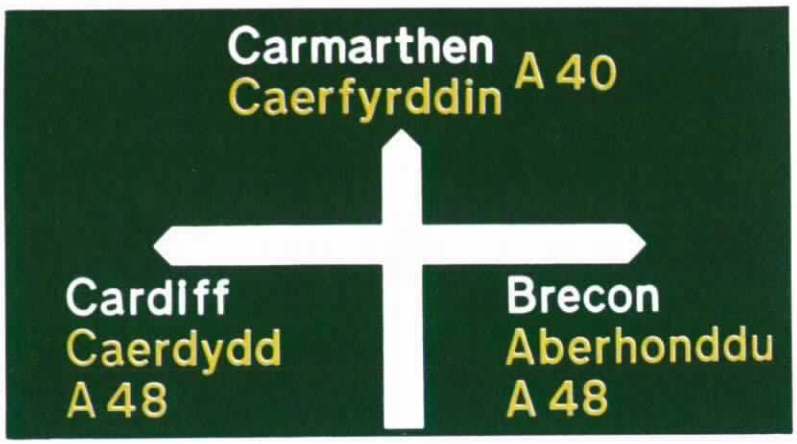


Fig 3 EXAMPLES OF THE THREE TYPES OF BILINGUAL DIRECTION SIGN IN VERSION (b)—WELSH IN UPPER CASE (CAPITAL) LETTERING



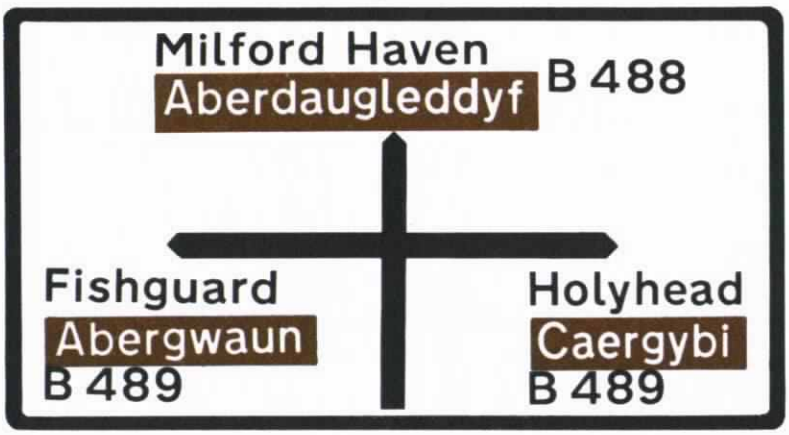


Fig 4 EXAMPLES OF THE THREE TYPES OF BILINGUAL DIRECTION SIGN IN VERSION (c)—WELSH IN THE SAME SCRIPT BUT A DIFFERENT COLOUR FROM THE ENGLISH

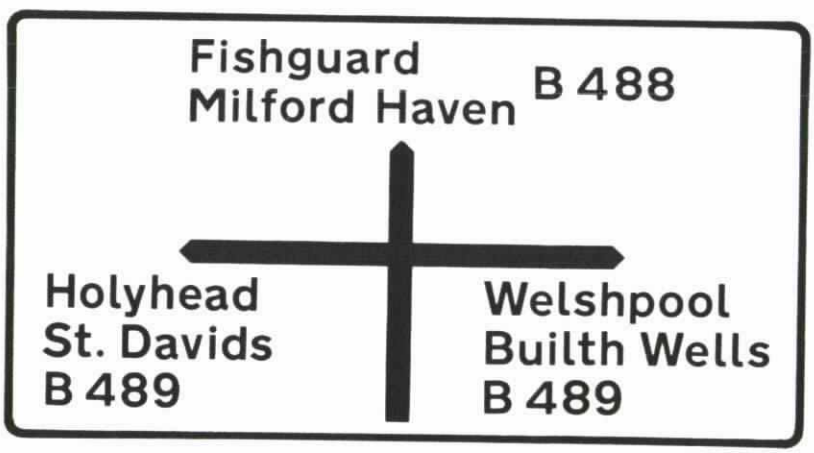


Fig 5 EXAMPLES OF MONOLINGUAL SIGNS WITH SIX DESTINATIONS

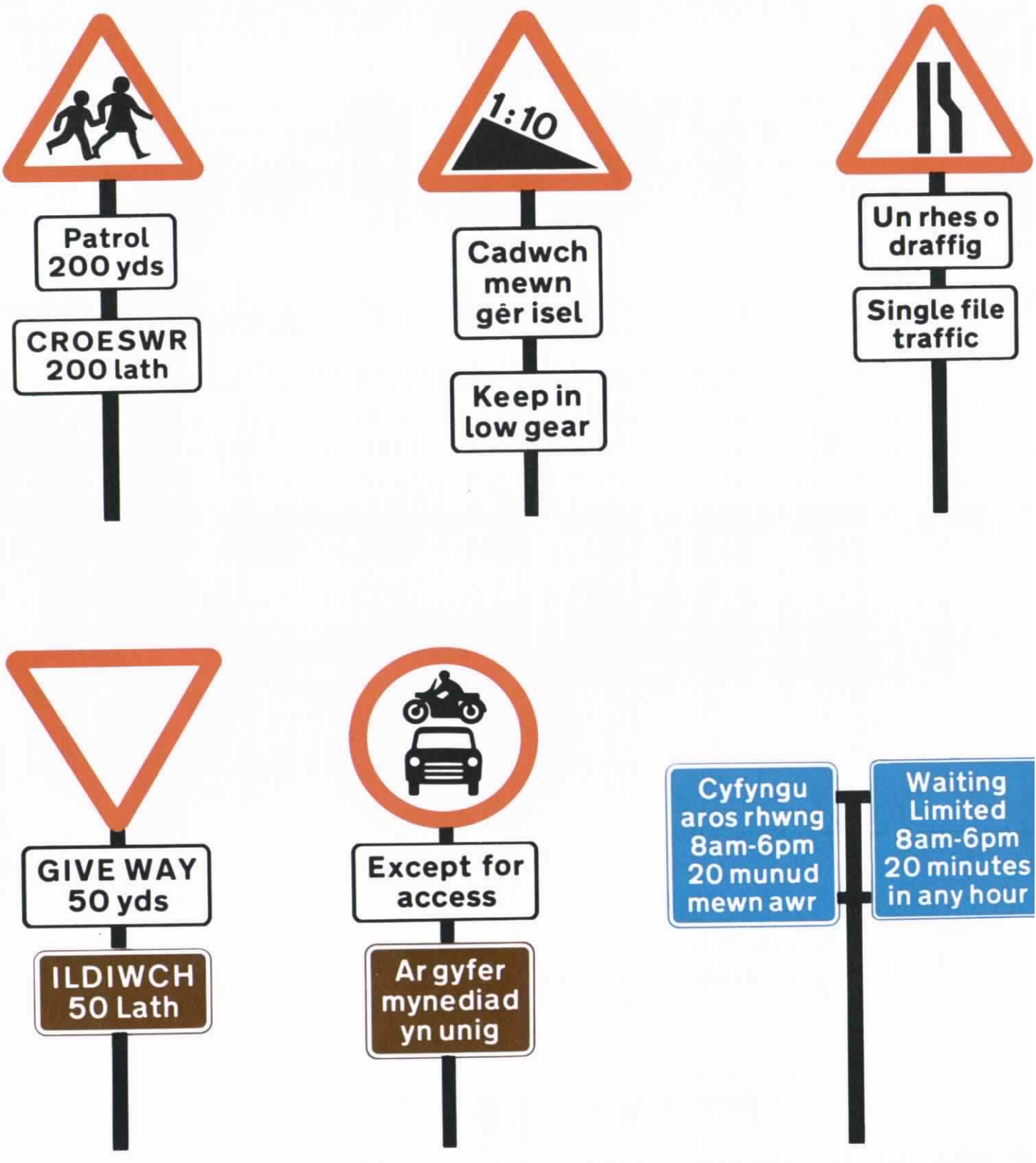
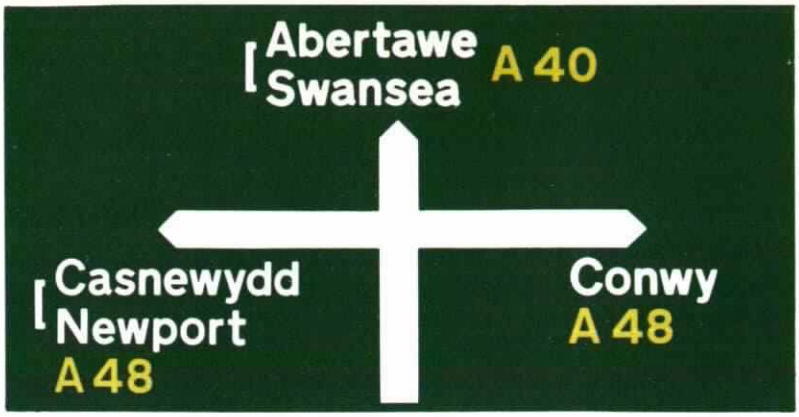
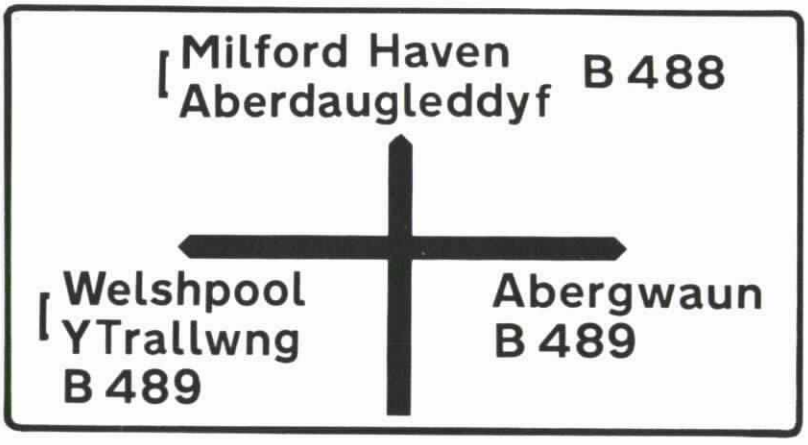


Fig 6 EXAMPLES OF NON-DIRECTIONAL SIGNS USED IN THE TESTS





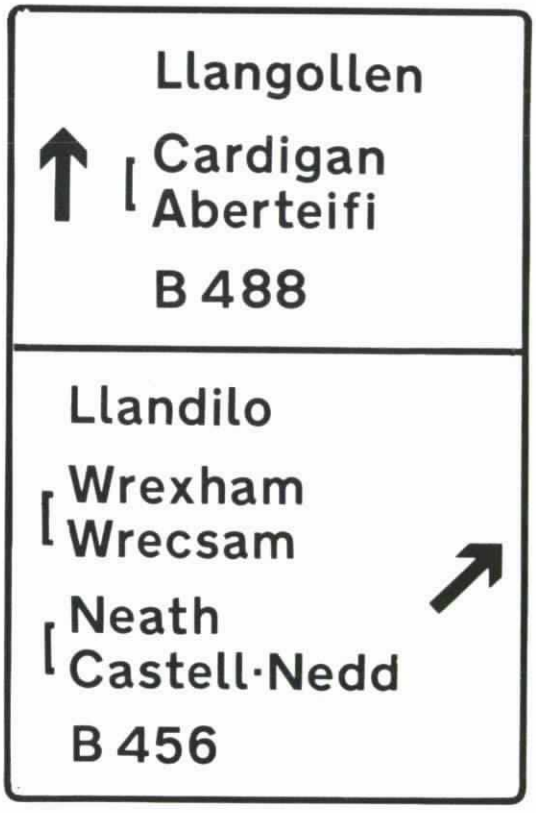
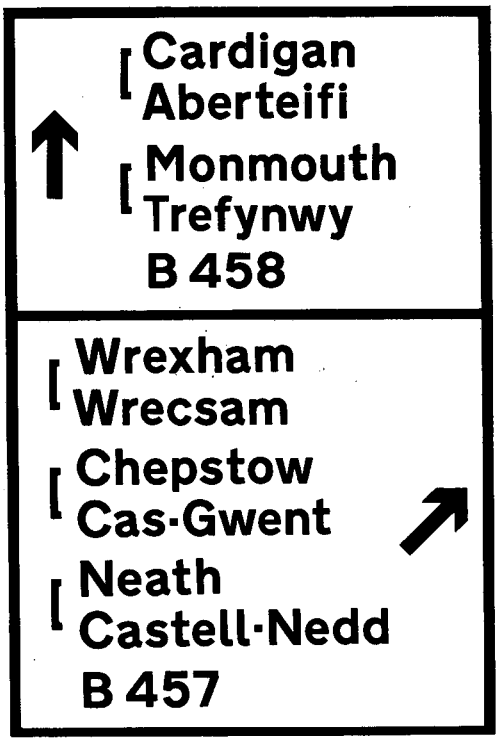
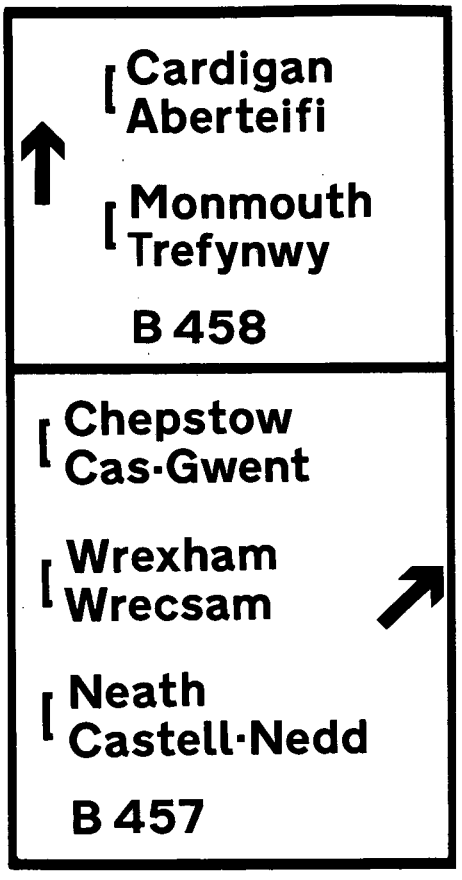


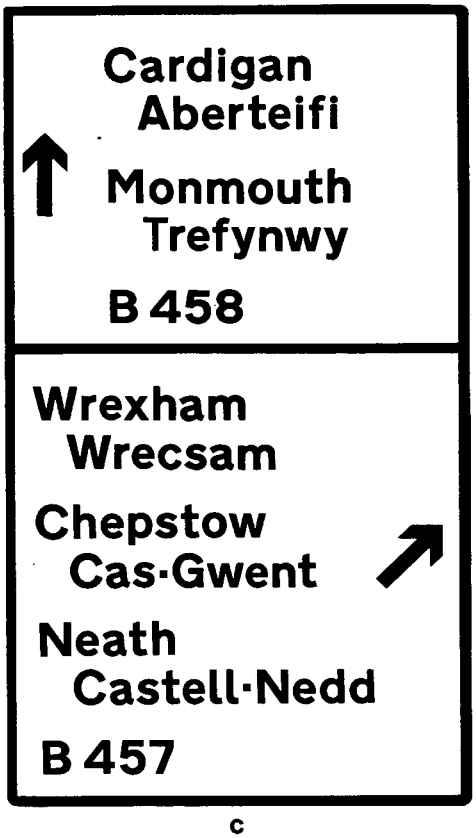
Fig 7 EXAMPLES OF MIXED SIGNS WITH SOME BILINGUAL PAIRS AND SOME MONOLINGUAL SINGLE NAMES



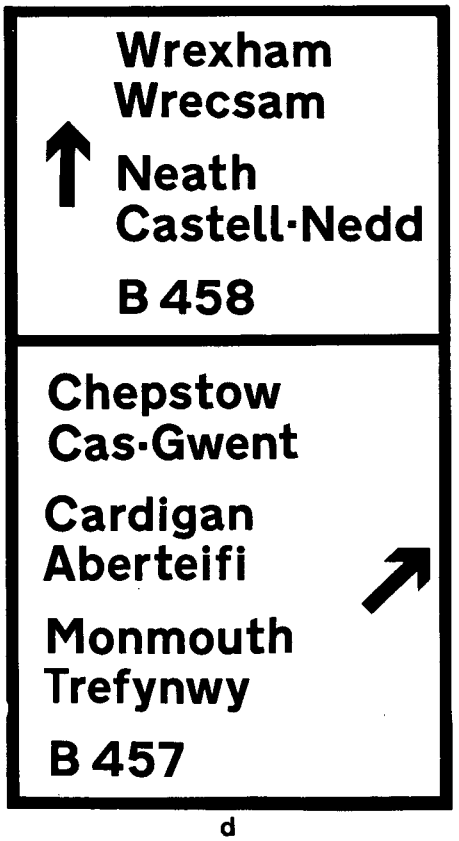
a



b



c



d

Fig 8 ALTERNATIVE VERSIONS OF SIGN (iii). THESE ARE ATTEMPTS TO MAKE THE SIGN CLEARER, IN PARTICULAR TO MAKE IT OBVIOUS THAT THE NAMES ARE IN PAIRS

(a) Sign as tested
(b) As (a) but with increased spacing
(c) Lower name of each pair inset and spacing increased from (a)
(d) As (c) without the insetting

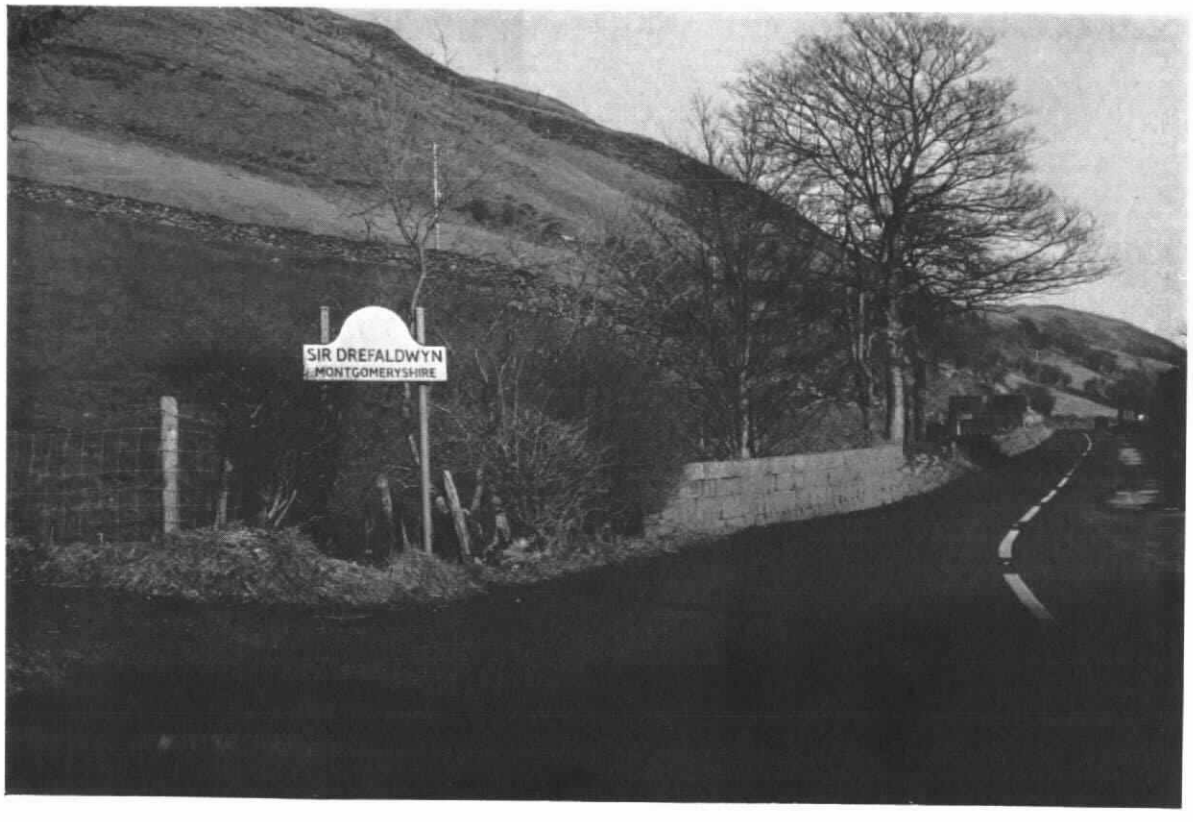


Plate 1 EXISTING BILINGUAL SIGNS IN WALES

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ABSTRACT

An investigation into bilingual (Welsh/English) traffic signs: K S RUTLEY: Department of the Environment, TRRL Report LR 475: Crowthorne, 1972 (Transport and Road Research Laboratory). The reading times of three types of bilingual (English/Welsh) advance direction signs have been compared with their mono-lingual, all English, equivalents by some 28 subjects, several of whom speak Welsh.

Increased reading times were found with most of the bilingual signs. The increases were greatest if the Welsh name was placed above the English name on the sign. Similar results were found for a number of warning and regulatory signs which had supplementary panels bearing worded messages.

One exception to the general findings was for a simple primary route (green background) sign for a crossroads with one destination shown in each direction. Providing the English version of the place name was positioned above the Welsh there was apparently no increase in reading time.

Also considered in the report is the increased area of the signs and the consequent increased cost.

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