SIXTH FRAMEWORK PROGRAMME
PRIORITY 1.6. Sustainable Development, Global Change and Ecosystem
1.6.2: Sustainable Surface Transport

# 506716

| | |
|---|---|
| Title | **Results of the 2nd Comprehension Test on pictograms conducted in Austria and the Czech Republic** |
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| Summary | **The 2nd Comprehension Test was conducted in two countries and performed as a Paper and Pencil Test. 15 variants of 11 referents were retested after the redesign following the recommendations of the 1st Comprehension Test. This test was taken by 307 participants. 7 referents showed improvements due to the redesign.** |
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# LIST OF ABBREVIATIONS

| | |
|---|---|
| 1st CT | 1st Comprehension Test |
| 2nd CT | 2nd Comprehension Test |
| CDV | Centrum dopravního výzkumu |
| CJT | Comprehensibility Judgement Test |
| CT | Comprehension Test |
| DUK | Danube University Krems |
| IIID | International Institute for Information Design |
| In-Safety | Infrastructure and Safety |
| ISO (9186) | ISO Standard 9186: ”Test methods for judged comprehensibility and for comprehension” |
| ITS | Intelligent Transport Systems |
| VC | Vienna Convention On Road Signs and Signals |
| VMS | Variable Message Sign(s) |

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# PARTICIPATING BODIES / CREDITS

This test was carried out under the Sixth Framework Programme of the European Commission, within the Project "IN-SAFETY", Activity A2.2 "Pictograms substituting verbal messages on VMS".

**Submitting party, Leader of Work Package 2 and Activity A2.2:**

International Institute for Information Design (IIID), Vienna, Austria

**Leader of Testing Activities, Testing Partner and Analysis:**

Danube University Krems (DUK), Austria

**Testing Partner:**

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# 1. INTRODUCTION

The IN-SAFETY Project focuses on the prerequisites for a successful implementation of Intelligent Transport Systems (ITS) in order to enhance the self-explanatory nature of roads.

European drivers have to cope with increasingly complex traffic environments, including vertical and horizontal signing; which is often supported by Telematics. Thus, there is a high need for a self-explanatory road environment at a personalized level which would offer intuitive guidance to the driver and information when this is needed. The information given should be related to the driver's particular needs (route, disabilities, preferences, etc). A self-explanatory road will protect the driver from making errors and will enhance his/her comfort.

Due to the fact that information displayed on Variable Message Signs (VMS) is usually shown in the local language, the complexity of information is confusing and leads to driver mistakes and safety risks. The objective of this activity within work package 2 is to increase the self-explaining road environments by presenting a proposal of homogenized and comprehensive pictograms to substitute verbal messages on VMS.

# 2. METHOD

## 2.1. Test procedure

The defined stages for the development and testing procedure of pictograms recommended within the final IN-SAFETY proposal are:

1) Collection of the information needed concerning the standardization of graphical symbols and the technical requirements of VMS.
2) Collection of a set of existing and proposed variants for each referent/meaning.
3) Comprehensibility Judgement Test, according to ISO 9186, to eliminate incomprehensible solutions at an early stage: The Comprehensibility Judgement Test was conducted in April 2006, in four European countries, for 33 referents a total of 243 variants were tested by a total of 825 respondents. 56 variants have been taken into account for further testing, several variants were proposed for redesign.[1]
4) The Comprehension Test (CT), according to ISO 9186, was conducted in three European countries, and performed as a Paper and Pencil Test. 84 variants of 33 referents had been tested and evaluated by 604 participants. 20 of the referents reached the ISO score of 66 % and were recommended for the final proposal.[2] 11

[1] See: Brugger Ch. (2006): Comprehensibility Judgement Test; Report In-Safety, 506716. 30/04/2006.
[2] See: Siebenhandl K., Brugger Ch., Simlinger P., Egger S., Hollo P., Weinberger J., Vasek J. (2007): Results of the Comprehension Tests on pictograms conducted in Austria, the Czech Republic and Hungary; Report In-Safety, 506716. 05/01/2007.

variants were proposed for redesign and retesting.

5) The outcomes of the 2nd Comprehension Test (2nd CT), the analysis of 11 variants are addressed within this paper.
6) Checking comprehensibility of variants under conditions of impaired vision.
7) Animated pictograms are to be tested separately. The test results have to be compared to the results of static pictograms.
8) Acceptance as a standard graphical symbol, which has been evaluated the most comprehensible and surpasses the criterion of acceptability.

The evaluation criteria and methods for testing follow the ISO 9186 "Test methods for judged comprehensibility and for comprehension"[3]. Details on applying the CT can be found in this standard.

## 2.2. Comprehension Test Methodology

In the CT, one of the variants is shown in combination with a statement of the general context in which the graphical symbol is expected to be seen. Respondents are asked to note what they think the symbol means and what action they would take in response to it.

The CT for each variant has to be conducted with at least 50 respondents, who are expected to be familiar with the referent. A respondent sees only one variant of a referent.

The analysis of the CT involved three independently working judges, who assigned each response to one of the following seven standard categories:

- Cat.1.: Correct understanding of the symbol is certain
  (Estimated probability of correct understanding over 80%)
- Cat.2.: Correct understanding of the symbol is very probable
  (Estimated probability of correct understanding between 66 and 80%)
- Cat.3.: Correct understanding of the symbol is probable
  (Estimated probability of correct understanding between 50 and 65%)
- Cat.4.: The meaning which is stated is the opposite of that intended
- Cat.5.: Any other response
- Cat.6.: The response given is "Don't know"

[3] ISO, International Standardization Organization (2001): ISO 9186, Graphical symbols – Test methods for judged comprehensibility and for comprehension. Geneva: ISO.

- Cat.7.: No response is given

An overall score for each variant is obtained by weighing and summing the percentages of responses in the different categories. The variant with the highest overall score is the most comprehensible variant.

As there is no further specific score determination within the current ISO Standard, the analysis on the results follows the criteria according to ISO 9186 (first edition 1989)[4], which provides the following evaluation scheme:

"If the comprehension score for this variant exceeds 66, then this variant may be used to define the standard image content.

Where two variants have the same comprehension score, the most comprehensible variant can be identified by taking the one having the lowest percentage of responses in category 5 ("the response is wrong").

For critical referents (e.g. safety symbols) the 66 criterion shall be rigorously adhered to.

For less important referents the criterion may be relaxed by including category 3 responses in the cumulative value in order to comply with the 66 criterion"

### 2.2.1. Preparation of the Test Material

The test material was distributed to the partner institutions via E-mail as MS-Word documents accompanied by a detailed guide for preparation and printing.

There was a total of three series, which had to be sampled into booklets (cp. fig. 1). Each series was coded by a letter (A, B, or C) and contained 5 pictograms. 16 referents were retested within this 2nd CT. The testing partners were instructed to check that only items of one series are in each booklet.

It was recommended that at least 50 test-booklets for each series should be prepared.

[4] ISO, International Standardization Organization (1989): ISO 9186: First Edition, Procedures for the development and testing of public information symbols. Geneva: ISO.

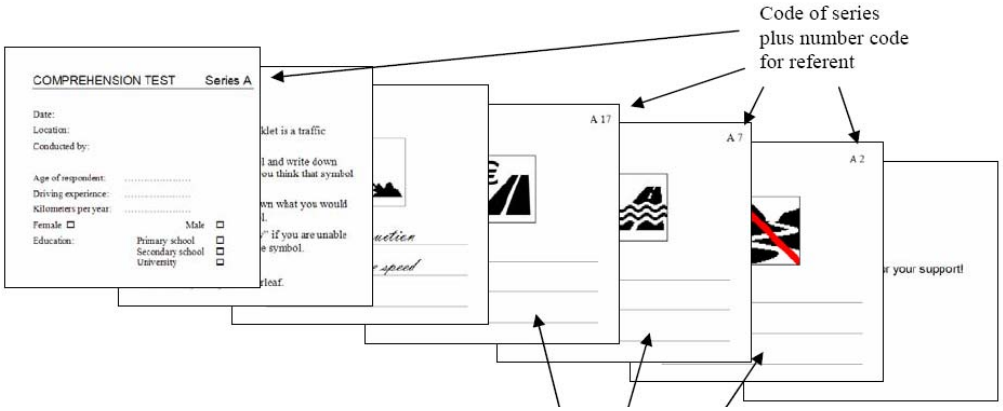



*Figure 1: Preparation of the test booklets, source: Brugger, Ch.*

### 2.2.2. Referents

The referents were split up into three series in order to ensure reliable testing (cp. table 1)

*Table 1: 2nd Comprehension Test: Assignment of Referents to Series*

| Code | Referent No. | Referent Name | Variants | Series A | Series B | Series C |
|---|---|---|---|---|---|---|
| 2nd Comprehension Test _ Paper and Pencil | | | | | | |
| 1 | 3.2.2.5 | Last exit before bridge | 2 | | B1 | C1 |
| 2 | 3.2.2.1 | Last exit before toll check point | 2 | A2 | | C2 |
| 3 | 2.3.11 | Objects/obstacles on the road | 1 | | B3 | |
| 4 | 2.3.2 | Accident has happened | 1 | | | C4 |
| 5 | 3.3.5 | Emergency number | 2 | A5 | B5 | |
| 6 | 3.3.2.2 | Park and ride | 2 | | B6 | C6 |
| 7 | 4.15 | Underground trains depart every 15 minutes | 1 | A7 | | |
| 8 | 3.3.2.4 | Ferry boat | 1 | | | C8 |
| 9 | 1.2.1.5 | Next exit closed | 1 | A9 | | |
| 10 | 1.2.1.1 | Road ahead closed | 1 | | B10 | |
| 11 | 4.10 | Truck to rail terminal | 1 | A11 | | |
| | | Total | 15 | 5 | 5 | 5 |

### 2.2.3. Testing

Each testing organisation (Danube University Krems (DUK) and Centrum dopravního výzkumu (CDV)) had to conduct the test with at least 50 respondents for each series. The participating institutions were informed that the sample of respondents should resemble the

eventual user population in terms of age, sex, and educational level. Persons with severe visual impairments (no correction possible) were not allowed to take part. The sample should preferably consist of respondents who are expected to be familiar with the referents. Therefore, only participants holding a driving licence were selected. Respondents who had already taken part in the CJT and in the 1st CT were not invited for testing the comprehension of symbols within this 2nd CT.

The test was conducted as a paper and pencil test; participants were given a verbal instruction and received the booklets with five symbols to be judged thereafter. Each booklet also contained a small introduction on the first page:

"We are studying the comprehensibility of symbols used on highways. Please, write down below the shown symbol, what you think the symbol means, and what action you would take in response to it."

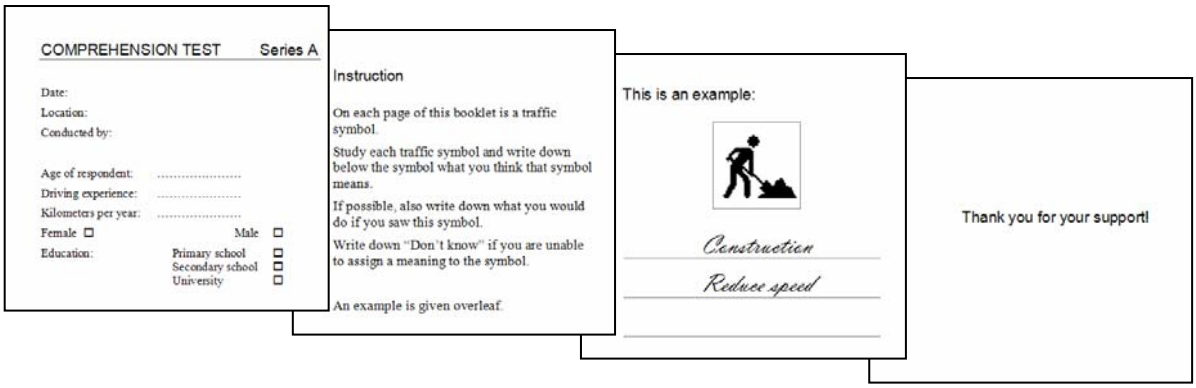



*Figure 2: Instruction on Performing the Comprehension Test, source: Brugger, Ch.*

### 2.2.4. Participants

Two countries (Austria and the Czech Republic) participated in the 2nd CT. Overall 307 respondents (206 male, 101 female) answered the 2nd CT with 157 participants in Austria, and 150 participants in the Czech Republic.

Only persons holding a driver's licence were invited to the test. Due to the high amount of male participants within the Czech test series, gender equality was not reached. But overall, a similarity of the sample with the driver population in terms of age, educational level, and driving experience was achieved. Detailed sample characteristics are shown in table 2.

*Table 2: Sample Characteristics of the 2nd Comprehension Test*

| | Austria | Czech Republic | Total | Total Values and Means |
|---|---|---|---|---|
| **Respondents** | | | | |
| | 157 | 150 | **307** | |
| Average Age (in years) | 31 | 44 | **37** | |
| **Gender** | | | | |
| Men | 71 | 135 | **206** | 67% |
| Women | 86 | 15 | **101** | 33% |
| **Educational Level** | | | | |
| Primary | 22 | 56 | **78** | 25% |
| Secondary | 97 | 89 | **186** | 61% |
| University | 38 | 5 | **43** | 14% |
| Unknown | 0 | 0 | **0** | 0% |
| **Driving Experience** | | | | |
| Average distance travelled/year (km) | 15.396,66 | 37.380,00 | | **26.388,33** |
| Years | 12.14 | 22.29 | | **17.22** |

# 3. ANSWERS OF THE 2ND COMPREHENSION TEST

### 3.2.2.5: Last exit before bridge

| |  | | |  | | |
|---|---|---|---|---|---|---|
| | **Variant B** | | | **Variant C** | | |
| | | | | | | |
| **Austria** | B | | | C | | |
| Category | f | % | Score | f | % | Score |
| Certain | 13 | 31.0 | 26 | 7 | 13.0 | 11.9 |
| Very probable | 16 | 38.1 | 24 | 12 | 22.2 | 15.3 |
| Probable | 3 | 7.1 | 3 | 5 | 9.3 | 4.2 |
| Opp. meaning | | | | | | |
| Wrong | 5 | 11.9 | | 14 | 25.9 | |
| Don't know | 5 | 11.9 | | 16 | 29.6 | |
| No response | | | | | | |
| Total | 42 | 100 | **53.0** | 54 | 100 | **31.4** |
| **Czech** | | | | | | |
| **Republic** | B | | | C | | |
| Category | f | % | Score | f | % | Score |
| Certain | 8 | 16 | 16 | 6 | 12 | 12 |
| Very probable | 0 | 0 | 0 | 0 | 0 | 0 |
| Probable | 41 | 82 | 41 | 29 | 58 | 29 |
| Opp. meaning | 0 | 0 | 0 | 0 | 0 | 0 |
| Wrong | 1 | | | 12 | | |
| Don't know | | | | 2 | | |
| No response | | | | 1 | | |
| Total | 50 | 98 | **57** | 50 | 70 | **41** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Overall score** | | **B** | **55** | | **C** | **36.2** |

| **Most frequent responses**[5] | | |
|---|---|---|
| | Variant B | Variant C |
| **Category 1** | Last exit before bridge | Last exit before bridge |
| | Highway bridge | Last exit before overpass |
| | Bridge, last exit | Bridge ahead, exit before |
| **Category 2** | Exit possible | Exit near |
| | Exit in front | Exit possible |
| **Category 3** | Possibility for exit | Possible to exit on the right |
| **Category 5** | Serpentines ahead | Exit to underpass |
| | Winding street | Exit to tunnel |
| | Blind bend | Tunnel closed |
| | Sharp bend | Exit to underpass |
| | Right hand bend | Exit to tunnel |

Variant B is comprehended best. Answers like “Blind bends” or “Winding street” within category 5 lead to the conclusion that the symbol of the bridge itself is not comprehended. Still, an improvement after redesign by 6.4 points from 48.6 to 55.0 was achieved. As the comprehension rates of the referent cannot be further enhanced by design, and since it is not safety-relevant, variant B can be recommended for application. Announcement of the symbol prior to introduction is recommended to make its meaning public.

[5] Austrian and Czech testing group

### 3.2.2.1: Last exit before toll check point

| |  | | |  | | |
|---|---|---|---|---|---|---|
| | **Variant A** | | | **Variant C** | | |
| | | | | | | |
| **Austria** | A | | | C | | |
| Category | f | % | Score | f | % | Score |
| Certain | 9 | 19,1 | 18,8 | 13 | 22,4 | 22,0 |
| Very probable | 10 | 21,3 | 15,6 | 17 | 29,3 | 21,6 |
| Probable | 1 | 2,1 | 1,0 | 4 | 6,9 | 3,4 |
| Opp. meaning | 4 | 8,5 | -8,3 | 8 | 13,8 | -13,6 |
| Wrong | 17 | 36,2 | | 12 | 20,7 | |
| Don't know | 6 | 12,8 | | 4 | 6,9 | |
| No response | | | | | | |
| Total | 47 | 100 | **27,6** | 58 | 100 | **33,5** |
| **Czech** | | | | | | |
| **Republic** | A | | | C | | |
| Category | f | % | Score | f | % | Score |
| Certain | 29 | 58 | 58 | 31 | 62 | 62 |
| Very probable | 2 | 4 | 3 | | 0 | 0 |
| Probable | 7 | 14 | 7 | 11 | 22 | 11 |
| Opp. meaning | | 0 | 0 | | 0 | 0 |
| Wrong | 7 | | | 6 | | |
| Don't know | 4 | | | 1 | | |
| No response | 1 | | | | | |
| Total | 50 | 76 | **68** | 49 | 84 | **73** |

| | | | | | |
|---|---|---|---|---|---|
| **Overall score** | | **A** | **47,8** | **C** | **53,25** |

| **Most frequent responses**[6] | | |
|---|---|---|
| | Variant A | Variant C |
| **Category 1** | Last exit before toll road | Last exit before toll road |
| | Toll road ahead - last exit | Toll road ahead |
| **Category 2** | Exchange office, supermarket or toll road ahead | Toll station ahead |
| | International highway exit | Toll road |
| **Category 3** | Information about exit | Exit to the right |
| | Exit will follow, toll station ahead | |
| **Category 4** | Toll road begins after next exit | Exit leads to toll road |
| | Exit leads to toll road | After exit toll station |
| **Category 5** | Exchange office ahead | Bank or ATM |
| | Exit | Highway exit |
| | Last exit before EURO ZONE | Exchange office, bank |
| | Highway exit | EURO board |
| | EURO highway | |

Both variants did not reach the score of 66. Most answers focus on toll station or toll road ahead, whereas the meaning of “last exit before“ seems not to be comprehended.

Both tested variants did not perform well in comparison to the variants tested within the 1st CT, where Variant D was comprehended best, reaching a score of 79.8. This variant uses in combination with the pictogram the verbal indication of “toll / tol / tull / peage / peaje / maut / m yto / útdíj”, which leads to the assumption that the verbal indication of "toll" might be a prerequisite for correct understanding.

[6] both Austria and Czech Republic

### 2.3.11: Objects/Obstacles on the road

| |  | | |
|---|---|---|---|
| | **Variant B** | | |
| | | | |
| **Austria** | B | | |
| Category | f | % | Score |
| Certain | 28 | 66,7 | 56 |
| Very probable | 0 | 0 | |
| Probable | 3 | 7,1 | 3 |
| Opp. meaning | | | |
| Wrong | 9 | 21,4 | |
| Don't know | 2 | 4,8 | |
| No response | | | |
| Total | 42 | 100 | **59,0** |
| **Czech** | | | |
| **Republic** | B | | |
| Category | f | % | Score |
| Certain | 35 | 70 | 70 |
| Very probable | | 0 | 0 |
| Probable | 3 | 6 | 3 |
| Opp. meaning | | 0 | 0 |
| Wrong | 7 | | |
| Don't know | 5 | | |
| No response | | | |
| Total | 50 | 76 | **73** |

| | | |
|---|---|---|
| **Overall score** | **B** | **66** |

| **Most frequent responses** | |
|---|---|
| | Variant B |
| **Category 1** | Obstacles on the road |
| | Obstacle |
| **Category 3** | Damaged road surface |
| | Stones on the road |
| **Category 5** | Accident ahead |
| | Unconsolidated verge |
| | Road surface slippery |
| | Danger, falling stones |

This variant was tested within the 1st Comprehension Test (CT) and was afterwards redesigned, due to the low ISO Scores (Variant A: 14,2 - Variant B: 26,8 - Variant C: 3,5). Variant B was improved by design to increase its score from 26.8 (CT) to 66. Within this test the pictogram was comprehended well, the picture content is approved.

### 2.3.2: Accident has happened

| | | | |
|---|---|---|---|
| |  | | |
| | **Variant C** | | |
| | | | |
| **Austria** | C | | |
| Category | f | % | Score |
| Certain | 24 | 46,2 | 46,2 |
| Very probable | 7 | 13,5 | 10,1 |
| Probable | 3 | 5,7 | 2,9 |
| Opp. meaning | 0 | | |
| Wrong | 16 | | |
| Don't know | 2 | | |
| No response | | | |
| Total | 52 | | **59,1** |
| **Czech** | | | |
| **Republic** | | | |
| Category | f | % | Score |
| Certain | 18 | 36 | 36 |
| Very probable | 23 | 46 | 34,5 |
| Probable | 1 | 2 | 1 |
| Opp. meaning | 0 | 0 | 0 |
| Wrong | 8 | | |
| Don't know | 0 | | |
| No response | 0 | | |
| Total | 50 | | **71,5** |

| | | |
|---|---|---|
| **Overall score** | **C** | **65,3** |

| **Most frequent responses** | |
|---|---|
| | Variant C |
| **Category 1** | Accident happened |
| | Accident ahead |
| | Accident on the road |
| | Point of traffic accident |
| | Accident happened |
| **Category 2** | Attention, high accident frequency |
| | Accident, overturned car |
| | Accident stage |
| | Frequent accidents in this stage |
| | Attention, high accident frequency |
| **Category 3** | Dangerous bend |
| | Unsafe shoulder |
| **Category 5** | Danger of skidding |
| | Attention side wind |
| | Slippery road |
| | Side winds |
| | Danger of turning over the car |

The performance of this pictogram was improved by design and increased its score from 52.7 (CT) to 65.3 (2nd CT).

### 3.3.5: Emergency Number

| |   | | |   | | |
|---|---|---|---|---|---|---|
| | **Variant A** | | | **Variant B** | | |
| | | | | | | |
| **Austria** | A | | | B | | |
| Category | f | % | Score | f | % | Score |
| Certain | 29 | 60,4 | 60,4 | 32 | 65,3 | 64 |
| Very probable | | | | | | |
| Probable | 18 | 37,5 | 18,8 | 15 | 30,6 | 15,0 |
| Opp. meaning | | | | | | |
| Wrong | 0 | 0 | | 2 | 4,1 | |
| Don't know | 1 | 2,1 | | | | |
| No response | | | | | | |
| Total | 48 | 100 | **79,2** | 49 | 100 | **79** |
| **Czech** | | | | | | |
| **Republic** | A | | | B | | |
| Category | f | % | Score | f | % | Score |
| Certain | 41 | 82 | 82 | 42 | 84 | 84 |
| Very probable | 1 | 2 | 1,5 | | 0 | 0 |
| Probable | 6 | 12 | 6 | 8 | 16 | 8 |
| Opp. Meaning | | 0 | 0 | | 0 | 0 |
| Wrong | 2 | | | | | |
| Don't know | | | | | | |
| No response | | | | | | |
| Total | 50 | 96 | **89,5** | 50 | 100 | **92** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Overall score** | | **A** | **76,5** | | **B** | **79** |

| **Most frequent responses** | | |
|---|---|---|
| | Variant A | Variant B |
| **Category 1** | Emergency call number | SOS Number, Help |
| | Call for Help + Number | Emergency call |
| | First Aid -Emergency. Call | |
| **Category 2** | Emergency telephone box | Telephone for emergency calls |
| **Category 3** | Highway telephone box | Call for Help, telephone available |
| | Telephone box | |
| | Problems-operator will help | |

The ISO Scores of both variants were improved through the redesign. Within the 1st CT, variant A reached a score of 51.2 and variant B 25.6 which was increased to 76.5 and 79.0 (2nd CT). The referent is comprehended better within this test series, as the indication of SOS and the emergency number was added. Variant B is proposed for application.

### 3.3.2.2: Park and Ride

| |  | | |  | | |
|---|---|---|---|---|---|---|
| | **Variant B** | | | **Variant C** | | |
| | | | | | | |
| **Austria** | B | | | C | | |
| Category | f | % | Score | f | % | Score |
| Certain | 44 | 91.7 | 88 | 56 | 100 | 94.9 |
| Very probable | | | | | | |
| Probable | 1 | 2.1 | 1 | | | |
| Opp. meaning | | | | | | |
| Wrong | 1 | 2.1 | | | | |
| Don't know | 2 | 4.2 | | | | |
| No response | | | | | | |
| Total | 48 | 100 | **89** | 56 | 100 | **94.9** |
| **Czech** | | | | | | |
| **Republic** | B | | | C | | |
| Category | f | % | Score | f | % | Score |
| Certain | 8 | 16 | 16 | 16 | 32 | 32 |
| Very probable | | 0 | 0 | 18 | 36 | 27 |
| Probable | 7 | 14 | 7 | 5 | 10 | 5 |
| Opp. meaning | | 0 | 0 | | 0 | 0 |
| Wrong | 11 | | | 7 | | |
| Don't know | 22 | | | 4 | | |
| No response | 2 | | | | | |
| Total | 50 | 30 | **23** | 50 | 78 | **64** |

| | | | | | |
|---|---|---|---|---|---|
| **Overall score** | | **B** | **56** | **C** | **79,45** |

| **Most frequent responses** | | |
|---|---|---|
| | Variant B | Variant C |
| **Category 1** | Park and Ride | Park and Ride |
| **Category 2** | Parking place in vicinity of train station | Parking place medical centre, railway station |
| | Train and Parking Space, to change here | Train station and parking place |
| | | |
| **Category 3** | Change here for train | Parking place, possible to ride a train |
| | Train arriving | Parking place and train depot |
| | Parking allowed | Parking place |
| **Category 5** | Parking place including restaurant | Train depot |
| | Parking place with repair service | Railway crossing |
| | | Train stop |

Both variants are well known and highly comprehended among the Austrian participants, whereas in Czech Republic only variant C achieved good results. The reason might be that the concept of variant C adheres to the Vienna Convention[7] example, while variant B has never been introduced in Czech Republic.

In comparison to the 1st CT variants, where referents depicting "P + Train" scored considerably well, a redesign of variant A allowed for an increased score from 78,3 (Variant A, CT) to 79,45 (Variant C, 2nd CT). Nevertheless, the referent given in the Vienna Convention (Annex 1, Section E, Sign E, 14b), which was tested within the 1st CT, scored best (83,7 Variant D, 1st CT) among all tested variants, despite the fact that the term "METRO" is not used in all European countries.

Having in mind that "P+R" is not commonly used in Europe, the design concept following the Vienna Convention (P + symbol / name of transport) is suitable for drivers unfamiliar with "P+R" as well as for those used to it.

[7] United Nations; Economic and Social Council; Economic Commission for Europe; Inland Transport Committee (1968): "*Vienna Convention: Convention on Road Signs and Signals*", Vienna.

### 4.15: Underground train departs every 15 minutes

| |  | | |
|---|---|---|---|
| | **Variant A** | | |
| | | | |
| **Austria** | A | | |
| Category | f | % | Score |
| Certain | 17 | 35,4 | 35,4 |
| Very probable | | | |
| Probable | 11 | 22,9 | 11,5 |
| Opp. meaning | | | |
| Wrong | 12 | 25,0 | |
| Don't know | 8 | 16,7 | |
| No response | | | |
| Total | 48 | 100 | **46,9** |
| **Czech** | | | |
| **Republic** | A | | |
| Category | f | % | Score |
| Certain | 19 | 38 | 38 |
| Very probable | 2 | 4 | 3 |
| Probable | 4 | 8 | 4 |
| Opp. meaning | | 0 | 0 |
| Wrong | 13 | | |
| Don't know | 11 | | |
| No response | | | |
| Total | 49 | 50 | **45** |

| | | |
|---|---|---|
| **Overall score** | **A** | **45,95** |

| **Most frequent responses** | |
|---|---|
| | Variant A |
| **Category 1** | Train departs every 15 minutes |
| | Train is going through every 15 minutes |
| **Category 2** | Train departs in 15 minutes |
| | Next train arrives in 15 minutes |
| **Category 5** | 15 minutes to drive to railway crossing |
| | Railway crossing in 15 min. |
| | Waiting time for train to pass |
| | Train station, train delayed |
| | Truck railway transport |

The element representing a more generic rail-based transport mode proved to be less effective than the variants tested in the 1st CT, where Variant D scored 53,7.

The answers relate more to a kind of information on rail based transport, like “train station ahead”, “railway crossing every 15 minutes”. To specifically identify underground transport, variant D of 1st CT could be approved. Since it is not safety relevant 53,7 are sufficient.

### 3.3.2.4: Ferry Boat

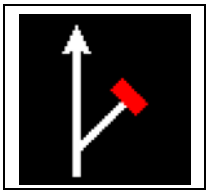
| | | | |
|---|---|---|---|
| |  | | |
| | **Variant C** | | |
| | | | |
| **Austria** | C | | |
| Category | f | % | Score |
| Certain | 52 | 89,7 | 88,1 |
| Very probable | 2 | 3,4 | 2,5 |
| Probable | 2 | 3,4 | 1,7 |
| Opp. meaning | | | |
| Wrong | 2 | 3,4 | |
| Don't know | | | |
| No response | | | |
| Total | 58 | 100 | **92,4** |
| **Czech Republic** | C | | |
| Category | f | % | Score |
| Certain | 49 | 98 | 98 |
| Very probable | | 0 | 0 |
| Probable | | 0 | 0 |
| Opp. meaning | | 0 | 0 |
| Wrong | | | |
| Don't know | 1 | | |
| No response | | | |
| Total | 50 | 98 | **98** |

| | | |
|---|---|---|
| **Overall score** | **C** | **95,2** |

| **Most frequent responses** | |
|---|---|
| | Variant C |
| **Category 1** | Ferry, Ferry boat, car-ferry |
| **Category 2** | Way to ferry |
| **Category 3** | Attention, way out of ferry |
| **Category 4** | - |
| **Category 5** | Bridge, aquaplaning |

This more simplified variant of ferry scored at 95,2, with insignificant difference to the best performing Variant B of 1st CT (96,4). Both are approved. In general it is recommended to employ Variant C, since it is more simplified, archaic and bears fewer detailed elements.

### 1.2.1.5: Next exit closed



**Variant A**

| **Austria** | | A | |
|---|---|---|---|
| Category | f | % | Score |
| Certain | 4 | 8 | 8 |
| Very probable | 34 | 68 | 51 |
| Probable | 14 | 8 | 4 |
| Opp. meaning | 0 | 0 | 0 |
| Wrong | 6 | | |
| Don't know | 2 | | |
| No response | | | |
| Total | 50 | | **63** |
| **Czech Republic** | | | |
| Category | f | % | Score |
| Certain | 11 | 22 | 22 |
| Very probable | 32 | 64 | 48 |
| Probable | 0 | 0 | 0 |
| Opp. meaning | 0 | 0 | 0 |
| Wrong | 6 | | |
| Don't know | 1 | | |
| No response | | | |
| Total | 50 | | **70** |

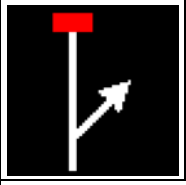
| **Overall score** | | **A** | **66,5** |
|---|---|---|---|

| **Most frequent responses** | |
|---|---|
| | Variant A |
| **Category 1** | Next exit closed |
| | Closed exit to the right |
| | Exit closed |
| | Next exit closed |
| **Category 2** | Street on the right is ending |
| **Category 3** | Blind alley |
| | Junction is blind alley |
| | Dead end street on the right |
| | Dead end street, driving through forbidden |
| **Category 4** | **-** |
| **Category 5** | Emergency escape exit to the right |
| | Speed bump |
| | Crossing with dead end street |
| | Stopping distance |
| | Street is diverted here |

This variant, as well as the next variant “Road ahead closed” did not perform well in Austria, whereas the Czech participants comprehended the pictograms better. The reason might be that both variants were never introduced in Austria in this form.

It is recommended to approve variant A for “Next exit closed”, tested within the 1st CT, which scored 74.

### 1.2.1.1: Road ahead closed

| | | | |
|---|---|---|---|
| |  | | |
| | **Variant B** | | |
| | | | |
| **Austria** | B | | |
| Category | f | % | Score |
| Certain | 13 | 26,5 | 26,0 |
| Very probable | 20 | 40,8 | 30,0 |
| Probable | 2 | 4,1 | 2,0 |
| Opp. meaning | 1 | 2,0 | -2 |
| Wrong | 5 | 10,2 | |
| Don't know | 8 | 16,3 | |
| No response | | | |
| Total | 49 | 100 | **56,0** |
| **Czech** | | | |
| **Republic** | B | | |
| Category | f | % | Score |
| Certain | 23 | 46 | 46 |
| Very probable | 23 | 46 | 34,5 |
| Probable | 1 | 2 | 1 |
| Opp. meaning | | 0 | 0 |
| Wrong | 3 | | |
| Don't know | | | |
| No response | | | |
| Total | 50 | 94 | **81,5** |

| | | |
|---|---|---|
| **Overall score** | **B** | **63,25** |

| **Most frequent responses** | |
|---|---|
| | Variant B |
| **Category 1** | End of the road |
| | Road ahead closed, take next exit to the right |
| | Take diversion on the right side, road closed |
| **Category 2** | Blind alley ahead, take diversion on the right side |
| | Dead end ahead, take next exit |
| **Category 3** | Obstacle on the road ahead |
| **Category 4** | I have to go on the street ahead |
| **Category 5** | Emergency braking stage |
| | Obstacle on the road ahead |
| | Emergency zone |

This variant has not scored as high as variant C of 1st CT (83,4), which is proposed for approval.

This variant, as well as the variant “Next exit is closed” did not perform well in Austria, whereas the Czech participants comprehended the pictograms better. The reason might be that both variants have never been introduced in Austria in this form.

## 4.10: Truck to rail terminal

| | | | |
|---|---|---|---|
| |  | | |
| | **Variant A** | | |
| | | | |
| **Austria** | A | | |
| Category | f | % | Score |
| Certain | 24 | 52,2 | 50 |
| Very probable | 1 | 2,2 | 1,6 |
| Probable | 1 | 2,2 | 1 |
| Opp. meaning | | | |
| Wrong | 18 | 39,1 | |
| Don't know | 2 | 4,3 | |
| No response | | | |
| Total | 46 | 100 | **52,6** |
| | | | |
| **Czech Republic** | A | | |
| Category | f | % | Score |
| Certain | 33 | 66 | 66 |
| Very probable | 7 | 14 | 10,5 |
| Probable | | 0 | 0 |
| Opp. meaning | | 0 | 0 |
| Wrong | 7 | | |
| Don't know | 3 | | |
| No response | | | |
| Total | 50 | 80 | **76,5** |

| | | |
|---|---|---|
| **Overall score** | **A** | **64,55** |

| **Most frequent responses** | |
|---|---|
| | Variant A |
| **Category 1** | Truck railway transport |
| **Category 2** | Freight transport on the railways |
| | Information on possibility for cargo transport (not for the whole truck) |
| **Category 3** | Car train, commercial transport |
| **Category 4** | - |
| **Category 5** | Trucking, freight vehicle on the road, Heavy truck on the road, keep distance, overweight cargo transport |

This referent scored well (64,55), and because it is not safety-relevant it is proposed for approval.

# 4. DISCUSSION AND CONCLUSION

Based on the results of the 1st CT a total of 11 referents (in 15 variants) had been redesigned and retested within the 2nd CT. As shown in table 3 in total 6 variants have been improved by the redesign[8].

*Table 3: Performance of Variants*

| Code | Referent No. | Referent Name | Variants | Series | | | ISO Score | | | Suggestions |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | A | B | C | |
| 2nd Comprehension Test | | | | | | | | | | |
| 1 | 3.2.2.5 | Last exit before bridge | 2 | | B1 | C1 | | 55 | 36,2 | Variant B recommended (not safety relevant), has to be learned |
| 2 | 3.2.2.1 | Last exit before toll check point | 2 | A2 | | C2 | 47,8 | | 53,25 | 1st CT, Variant D: 79,8% recommended |
| 3 | 2.3.1.1 | Objects/obstacles on the road | 1 | | B3 | | | 66 | | Variant B recommended |
| 4 | 2.3.2 | Accident has happened | 1 | | | C4 | | | 65,3 | Improvement was reached |
| 5 | 3.3.5 | Emergency number | 2 | A5 | B5 | | 76,5 | 79 | | Variant B recommended |
| 6 | 3.3.2.2 | Park and ride | 2 | | B6 | C6 | | 56 | 79,45 | Variant C recommended (VC) |
| 7 | 4.1.5 | Underground trains depart every 15 min. | 1 | A7 | | | 45,95 | | | 1st CT, Variant D: 53,7% recommended |
| 8 | 3.3.2.4 | Ferry boat | 1 | | | C8 | | | 95,2 | Variant C recommended + 1st CT Variant B: 96,4% |
| 9 | 1.2.1.5 | Next exit closed | 1 | A9 | | | 66,5 | | | 1st CT Var. A:74% recommended |
| 10 | 1.2.1.1 | Road ahead closed | 1 | | B10 | | | 63,25 | | 1st CT Var. C 83,4% recommended |
| 11 | 4.1.0 | Truck to rail terminal | 1 | A11 | | | 64,55 | | | Variant A recommended, not safety relevant |
| | | Total | 15 | 5 | 5 | 5 | | | | |

The variants of Nr. 2 “Last exit before toll check point” (3.2.2.1.) and Nr. 7 “Underground train departs every 15 minutes” (4.1.5.), Nr. 9 “Next exit closed” (1.2.1.5.) and Nr. 10 “Road ahead closed” (1.2.1.1.) have been redesigned, but didn’t reach a better score in comparison to the 1st CT series:

For the meaning of “Last exit before toll check point” two variants were tested, both did not perform sufficiently well in comparison with the variants tested within the 1st CT, where variant D was comprehended best, reaching a score of 79,8. This variant uses additionally the verbal indication of “PEAGE / MAUT /TOLL”, which leads to the assumption that the verbal indication of "TOLL" is essential for understanding.

The referent of “Road ahead closed” received a score of 63,25 within the 2nd CT, which was

[8] Marked “grey” within the table

not as high as variant C of 1st CT (83,4). Therefore variant C (Road ahead closed) is proposed for approval.
“Underground train depart every 15 minutes” represented a more generic rail-based transport mode after the redesign. This variant proved to be less effective as the variants tested in the 1st CT, where variant D scored 53,7.
It is recommended to approve the variants of the 1st CT for these four variants.

The performance of “Last exit before bridge” (3.2.2.5.) improved its score after the redesign by 6,4 points from 48,6 (1st CT) to 55 (2nd CT). As the pictogram cannot be further improved by design, and due to the fact that its meaning is not safety relevant, the score is sufficient for recommendation.

The pictogram for referent “Truck to rail terminal” (4.1.0) scored 64,55, which is lower then the suggested 66 of ISO Score. As this referent is not safety relevant, the pictogram is recommended for approval.

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