
Comprehension of symbols indicating beginning and end of a parking prohibition

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Summary

Results of this sign-comprehension study strongly suggest the UN's 1968 Vienna Convention on Road Signs and Signal's sign H4a (Beginning of parking prohibition) should show an upward pointing arrow, instead downward. Furthermore, proposed new symbol TS2900, because of better understanding, should replace the arrow on sign H4c (End of parking prohibition).

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0 Motivation: A Core Principle

During the author's participation as an expert in the United Nation's Expert Group on Road Signs and Signals eleventh session in Geneva, Switzerland, in which the UN's 1968 Vienna Convention on Road Signs and Signal's signs, the H-section of signs were assessed, it became subjectively obvious that the upward pointing arrow of sign H4c is in contradiction with a most fundamental, but never in writing described principle of the Convention.

After having reviewed each sign of the Convention it can be safely stated that on a road sign „upward“ reflects the road users direction of view or movement in the vast majority of signs, and never opposes that principle. This inherent knowledge, only presented by the images of road signs but never in writing, is essential to even understand road signs without shown arrows.

This is further supported when road signs as Two-way traffic (A23) etc. are examined: Not just one downward pointing arrow is shown but another one facing upward, so road users can build on the intuitive understanding of the meaning of the upward arrow, whose presence allows to judge that in relation to this arrow (“my” direction of movement), something is moving in the opposite direction, towards the road user.

In fact, a single vertically downward pointing arrow is only represented in sign H4a, and given the rationale above, can be expected to have its meaning misunderstood or ambiguous.

This study, examining three separately conducted surveys on sign comprehension, is geared to shed light on the validity of assumptions above, and probes a new symbol proposal that would not oppose this “core principle”, and should therefore be well understood.

Stefan Egger,
2017-07-19

Note: *In this PDF document, codes to designate signs in the Convention were modified, for the sake of improved text search- commas and blank spaces were omitted, but letters, numbers and their sequence remain unchanged, e.g.:*

H, 4a is H4a

G, 13 is G13

C, 18 is C18

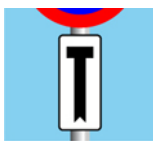
1 Outset

The general, common use of vertically oriented arrows in the UN's 1968 Vienna Convention on Road Signs and Signals (the "Convention") give raise to the anticipation that the reverse of that use, as forseen by the Convention for additional panels H4a and H4c leads to confusion. It was deemed necessary to clarify this, in order provide the Convention's sign system with better consistency, making it more intelligible and therefore safer for road users to participate in road traffic.

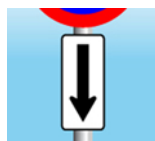
2 The Study

2.1 Goals

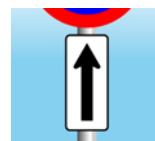
This study examines responses from three individual micro online-surveys (100 participants each from up to 35 countries) to explore whether the meanings of upward and downward pointing arrows, as given in the Convention's¹⁾ H4a and H4c set to convey the messages "Beginning of a parking prohibition" and "End of a parking Prohibition" are unambiguously understood. In addition, it is explored if an alternative proposal TS2900 derived from common principles of a set of the Convention's signs could provide unambiguous understanding of the concept of "end of" to substitute H4c. Third, it is attempted to understand whether signs H4a and H4c should be reversed to reflect common use of arrows in the Convention.



TS2900²⁾,
Survey 1



H4a³⁾,
Survey 2



H4c³⁾,
Survey 3

2.2 Results

Symbol proposal TS2900, survey 1

The new proposal for "End of a parking prohibition" (TS2900) to be used on additional panels has scored considerably positive (67 out of 100 respondents, survey 1).

Symbol of additional panel H4a, survey 2

It seems obvious that H4a, whose use stands in opposition to the common use of the downward arrow in the Convention is none the less comprehended to stand for the concept of "Beginning of a parking prohibition" (71 respondents out of 100, survey 2).

Symbol of additional panel H4c, survey 3

Yet, the upward arrow, according to the Convention's H4c to signal "End of a parking prohibition", is understood to mean "Beginning of a parking prohibition" by even more (84 out of 100, survey 3) respondents (according to common use of upward arrow in the Convention).

These main findings are entirely supported by individual results of four countries most influential to the surveys, all of them having signed, and three (exception: UK) having ratified the Convention: Austria, Germany, Iran, United Kingdom.⁴⁾:

- Survey 1 country results surpass H4a and H4c (surveys 2 and 3) in conveying the meaning of "End of a parking prohibition" (between 42 % and 75 %).
- Survey 2 country results are in accordance with total results, but slightly lower (between 62 % and 70 %), preferring H4a to mean "Beginning of a parking prohibition".
- Survey 3 country results (between 78 and 100 %) confirm the total outcome that H4c is the preferred symbol to convey "Beginning of a parking prohibition".

2.3 Conclusions

As the ambiguity of the understanding of arrows in H4a and H4c is confirmed, it seems advisable to reverse arrows in H4a and H4c to common Convention use.

Furthermore, since both the upward and the downward arrow are comprehended to mean "Beginning of a parking prohibition" (but the upward arrow to a higher degree), and the new proposal TS2900 scored 67 (38 resp. 51 higher than H4a or H4c), it is the only tested option to clearly convey the message of "End of a parking prohibition".

It seems appropriate to suggest departing entirely from the downward arrow to avoid confusion, and introduce symbol TS2900 to convey the meaning "End of a parking prohibition". The upward arrow should attain the meaning "Beginning of a parking prohibition", following its common use throughout the Convention.

TS2900 is built on the concept of several existing Convention signs: G13 (No through road), and its logic's surrogates (G2a, G2b, G12b). This way it is expected to make the concepts of "Beginning of a parking prohibition" and "End of a parking prohibition" more understandable through better distinction, while at the same time, the Convention's "system" as a whole profits from a more consistent use of vertical oriented arrows.

2.4 Method

Understanding the meaning of arrows is deemed to rely on context:

- to the message of the governing road sign (in this case, the “Parking prohibition sign” C18 above the additional panel bearing an arrow)
- to the relation to other road signs in the vicinity (another parking prohibition sign plus additional panel in viewing distance could provide indications to understand the one in question)
- and to the recalled understanding of common use of arrows in a known system (what does an upward- or downward pointing arrow mean in general, which known/often seen sign allows for deduction of a meaning for the arrow on the additional panel in question?)

To prevent participants from making up contextual relations between the three images (showing one sign plus additional panel in each survey) to not allow to come up with conclusions on the meaning of arrow use, each image was examined in one of three individually distributed surveys, made accessible only when the earlier issued survey was already closed. So respondents were rendered relying on their own knowledge.

In road traffic, backward movement to look at a previously passed sign is difficult or impossible, usually forcing a vehicle's driver to

- not understand the sign and panel and move on, or park there despite being uncertain,
- or feel reassured and park.

Reflecting this forced choice in real life, surveys were deliberately set to provoke an answer without the option of "don't know".

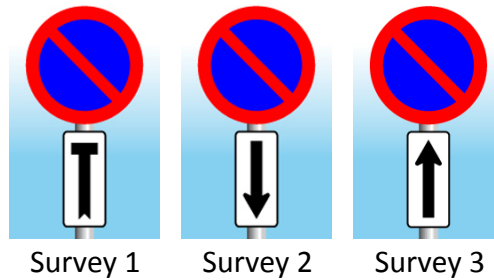
In order to reach respondents from as many countries as possible, and since the simple "either-or" choice of the main question allowed for completion of the surveys in 1 to 3 minutes, the surveys were conducted online.

Distribution went via the Author's LinkedIn, Twitter, Facebook, Messenger and Email contacts. Theme-related groups in LinkedIn were furnished with requests for participation. Data collection commenced via Monkeysurvey.com, from 2017-06-01 to 2017-07-08.

3 Survey Details

Table 1: Research Questions and Response Options

Research questions and response options remained the same throughout all three surveys. Only the image was replaced for every survey.



Below the image this text was given: "Please respond within 20 seconds to question 1., without looking up the answer, thank you! (The survey takes approx. 3 minutes.) Thank you!"

Q1: Does the image show the beginning or the end of a no parking area?

Options [End] [Beginning]

Q2: Do you own a driving licence?

Options [Yes] [No]

Q3: How many years of driving experience do you have?

Options [0 - 2 years] [3 - 5 years] [6 - 10 years] [10 - 20 years] [More than 20 years]

Q4: How long do you drive per day on average?

Options [0 - 30 min] [30 - 60 min] [1 - 2 hours] [More than 2 hours]

Q5: In what country do you live?

Options [Pull down choice of world's countries]


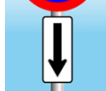

Q6: What is your age?

Options [Open numerical entry]

Q7: Your gender?

Options [Male] [Female]

Table 2: Data Tabulation

	 Proposal TS2900 "end"			 H4a			 H4c		
	Survey 1	Survey 2	Survey 3	Beginning	End	Total	Beginning	End	Total
Q1: No Parking									
n	33	67	100	71	29	100	84	16	100
Q2: No licence									
n	5	5	10	6	3	9	3	1	4
Q3: Experience									
0-2 years, n	7	8	15	9	4	13	7	3	10
Results	46,7%	53,3%	100,0%	69,2%	30,8%	100,0%	70,0%	30,0%	100,0%
3-5 years, n	0	1	1	4	3	7	7	1	8
Results	0,0%	100,0%	100,0%	57,1%	42,9%	100,0%	87,5%	12,5%	100,0%
6-10 years, n	1	3	4	9	4	13	10	3	13
Results	25,0%	75,0%	100,0%	69,2%	30,8%	100,0%	76,9%	23,1%	100,0%
11-20 years, n	8	15	23	18	5	23	22	1	23
Results	34,8%	65,2%	100,0%	78,3%	21,7%	100,0%	95,7%	4,3%	100,0%
More, n	18	39	57	31	13	44	38	8	46
Results	31,6%	68,4%	100,0%	70,5%	29,5%	100,0%	82,6%	17,4%	100,0%
Q4: Time									
0 - 30 min, n	18	42	60	36	19	55	50	13	63
Results	30,0%	70,0%	100,0%	65,5%	34,5%	100,0%	79,4%	20,6%	100,0%
30 - 60 min, n	7	11	18	26	4	30	18	2	20
Results	38,9%	61,1%	100,0%	86,7%	13,3%	100,0%	90,0%	10,0%	100,0%
1 - 2 hours, n	6	12	18	8	3	11	15	0	15
Results	33,3%	66,7%	100,0%	72,7%	27,3%	100,0%	100,0%	0,0%	100,0%
More than 2 hours, n	2	2	4	1	3	4	1	1	2
Results	50,0%	50,0%	100,0%	25,0%	75,0%	100,0%	50,0%	50,0%	100,0%
Q5: Country*									
Austria, n	7	21	28	16	10	26	18	4	22
Results	25,0%	75,0%	100,0%	61,5%	38,5%	100,0%	81,8%	18,2%	100,0%
Germany, n	7	5	12	4	2	6	6	0	6
Results	58,3%	41,7%	100,0%	66,7%	33,3%	100,0%	100,0%	0,0%	100,0%
Iran, n	0	0	0	14	6	20	18	5	23
Results	0,0%	0,0%	0,0%	70,0%	30,0%	100,0%	78,3%	21,7%	100,0%
UK, n	13	23	36	4	2	6	0	0	0
Results	36,1%	63,9%	100,0%	66,7%	33,3%	100,0%	0,0%	0,0%	0,0%
USA, n	0	4	4	3	2	5	0	2	2
Results	0,0%	100,0%	100,0%	60,0%	40,0%	100,0%	0,0%	100,0%	100,0%
Q7: Gender									
Male, n	22	50	72	39	19	58	42	5	47
Results	30,6%	69,4%	100,0%	67,2%	32,8%	100,0%	89,4%	10,6%	100,0%
Female, n	11	17	28	32	10	42	42	11	53
Results	39,3%	60,7%	100,0%	76,2%	23,8%	100,0%	79,2%	20,8%	100,0%

n = Number of respondents

*) Countries selected from a total of 48, which have passed the 5 respondents benchmark.

3.1 Individual Survey Results

As a no-budget initiative set to find indications and possible improvements on the understanding of H4a and H4c, additional research questions (Q2 – Q7) are investigated only if insights can be expected to explain the main results of Q1. This additional effort will be taken when the need arises or resources are available.

Within the frame explained above, response-options (e.g. "country") reaching at least 5 participants in one of the three surveys are considered to be of relevance and are further investigated.

3.1.1 Survey 1

The newly proposed symbol for the additional panel (TS2900) is drawing its design from the logic of the general use of the upward pointing arrow and especially of the upward arrow terminating in a horizontal block as used in G13 and other signs. It is speculated that road users, having understood the predominant concept in the Convention, where the "upward pointing arrow" in the vast majority of signs is to be interpreted as "onward", "forward", "ahead", etc. would logically understand TS2900 as "End of parking prohibition", when combined with sign C18 "Parking prohibition".

Q1:

67 out of 100 respondents answered as expected, judging the proposed symbol to be the "End of parking prohibition".

Q2:

In comparison to surveys 2 and 3, survey 1 has the highest number of respondents (10) not owning a driving license. Their responses on Q1 were perfectly divided: 5–end, 5–beginning and therefore more undecided than respondents holding a license. It might be reasoned that the lack of traffic education may be a reason for that, but cannot be taken for certain given the low total number of respondents in this category.

Q3:

Not investigated

Q4:

Not investigated

Q5:

Interestingly, 21 (75 %) out of 28 respondents from Austria understood the proposal as intended ("End"), despite that in this country G13 "No through road" is unknown. In addition, H4 are not in use but words, communicating beginning "Anfang" and end "Ende".

In Germany, 5 (41,7 %) out of 12 respondents answered "end" although G13 is used there.

In the UK, G13 is used. 23 (63,9 %) out of 36 responded "end".

Q6:

Not investigated

Q7:

50 (69,4 %) out of 72 male participants and 17 (60,7 %) out of 28 female respondents answered "end".

3.1.2 Survey 2

Judging the meaning of the downward pointing arrow as perceived by road users. It is presumed, as this arrow's meaning stands in opposition to common use of the downward arrow in the Convention, that it would be perceived as "end".

Q1:

71 respondents out of 100 judged the meaning of the downward arrow as "beginning"- in the way as intended in the Convention with regard to H4a.

Q2:

6 (66,7 %) from a total of 9 respondents not owning a driving license answered "beginning", which in general reflects the tendency of total responses.

Q3:

Not investigated

Q4:

Not investigated

Q5:

16 (61,5 %) out of 26 respondents from Austria understood the proposal as "beginning", which is a less clear tendency than in survey 1. It has to be noted that in Austria, H4 are not in use but words, communicating beginning "Anfang" and end "Ende"

In Germany, 4 out of 6 respondents answered "beginning". H4 are not used there.

In Iran, 14 (70 %) out of 20 responded "beginning". Participants show a less long driving experience (max 20 years) and are younger (between 18 and 37 years old).

Q6:

Not investigated

Q7:

39 (67,2 %) out of 58 male participants and 32 (76,2 %) out of 42 female respondents answered "beginning".

3.1.3 Survey 3

Judging the meaning of the upward pointing arrow as perceived by road users. It is presumed, as this arrow's meaning stands in opposition to common use of the upward arrow in the Convention, that it would be perceived as "beginning".

Q1:

84 respondents out of 100 judged the meaning of the upward arrow as beginning- opposite to what Convention foresees with regard to H4c, but in line with common use of that arrow in the Convention.

Q2:

3 from a total of 4 respondents not owning a driving license answered "beginning", which in general reflects the tendency of total responses.

Q3:

Not investigated

Q4:

Not investigated

Q5:

18 (81,8 %) out of all 22 respondents from Austria understood the proposal as "beginning", which is the clearest tendency of all surveys, showing the highest percentage of expected answers. It has to be noted that in Austria, H4 are not in use but words, communicating beginning "Anfang" and end "Ende"

In Germany, 6 (100%) out of 6 respondents answered "beginning" although H4 are not used there.

In Iran, 18 (78,3 %) out of 23 responded "beginning". Most participants show driving experience between 0 and 10 years and are younger (between 22 and 35 years old).

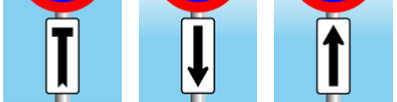
Q6:

Not investigated

Q7:

42 (89,4 %) out of 47 male participants and 42 (79,2 %) out of 53 female respondents answered "beginning".

Table 3: Number of Respondents from 48 Countries

Country				Total n	C. signed*	C. ratified**
	Survey 1	Survey 2	Survey 3			
Australia	3	2	2	7	No	No
Austria	28	26	22	76	Yes	Yes
Belgium	2		1	3	Yes	Yes
Bulgaria		1	1	2	Yes	Yes
Canada		3	1	4	No	No
Chile		1	2	3	Yes	Yes
China		2		2	No	No
Denmark	1	2	2	5	Yes	Yes
Djibouti	1			1	No	No
Finland		1	2	3	Yes	Yes
France	1	1	2	4	Yes	Yes
Germany	12	6	6	24	Yes	Yes
Greece			3	3	No	Yes
Hungary		1	4	5	Yes	Yes
Iceland		1	1	2	No	No
India	1	2	2	5	No	Yes
Iran (Islamic Republic of)		20	23	43	Yes	Yes
Iraq	1			1	No	Yes
Ireland		1		1	No	No
Israel		1	1	2	No	No
Italy	2	4	1	7	Yes	Yes
Japan			1	1	No	No
Lebanon			1	1	No	No
Lithuania			1	1	No	Yes
Luxembourg		1		1	Yes	Yes
Netherlands	2		1	3	No	Yes
New Zealand		1		1	No	No
Nigeria			2	2	No	Yes
Norway			1	1	Yes	Yes
Philippines	1	1	1	3	Yes	Yes
Portugal			2	2	Yes	Yes
Qatar	1			1	No	No
Republic of K	1			1	Yes	No
Republic of Moldova			1	1	No	Yes
Romania		1	2	3	Yes	Yes
Russian Fede	1			1	Yes	Yes
Singapore		1		1	No	No
Slovakia			1	1	No	Yes
Slovenia	1	2	1	4	No	No
South Africa			1	1	No	No
Spain		1		1	Yes	No
Sweden	1	1	2	4	Yes	Yes
Switzerland		1	2	3	Yes	Yes
Taiwan		3	1	4	No	No
Turkey			1	1	No	No
U. K. of Grea	36	6		42	Yes	No
U. S. of Amer	4	5	2	11	No	No
Venezuela		1		1	Yes	No
Total n	100	100	100	300		

Convention: *) signed, **) ratified, accessed or succeeded.⁴⁾

4 Resources

- 1) United Nations: Convention on Road Signs and Signals, done at Vienna on 8 November 1968, Annex 1, Section C, para. 9(c)(iv)
- 2) TS2900, Stefan Egger, May 2017, iiidre.weebly.com
- 3) United Nations: Convention on Road Signs and Signals, done at Vienna on 8 November 1968, Annex 3, H, 4a & H, 4c
- 4) United Nations, 2017-07-17, http://www.unece.org/trans/conventn/legalinst_10_rtrss_crss1968.html