

A Successful Attempt to Reduce Traffic Accidents

—The Effectiveness of Forming a Factual Accident Cause Concept (ACC) for Drivers—

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The most frequent causes of accidents in Japan are perceptual failures, i.e., insufficient perceptions of surroundings. Regardless of this fact, most safety campaigns have placed special emphases on speeding and drunk driving. As a result, Japanese drivers have a biased concept of accidents in that the Accident Cause Concept (ACC) of drivers is not factual. It is of crucial importance that drivers have an unbiased ACC because human behaviour is influenced by his/her cognition (concept) of the situation where he/she lives.

The writer thinks it important to take notice of problem behaviours that evoke collisions, i.e., direct human causes. The importance of looking and attending to see should be strongly emphasized in order to eliminate improper lookout (Shinar, 1978, 2007), and therefore the writer conducted a "Temporary stop to see" (TSTS) campaign. The purpose of the campaign was to ensure looking and attending on the part of drivers by converting drivers' biased ACC into an unbiased (factual) ACC. A unique characteristic of our campaign is to pursue a new method of pondering, not one of indoctrination. We cause drivers to ponder why several traffic matters are necessary. It was hypothesized that it was important for drivers to form a factual ACC to motivate them to perform a temporary stop, which was considered an essential prerequisite to a successful perception of surroundings. Based on the campaign activities, a factual ACC was formed, and desirable driving behaviour developed. As a result, accidents have been reduced in several transportation companies.

key words: perceptual failure, ACC, temporary stop to see (TSTS) campaign

PROBLEM

Statistically, the most frequent causes of accidents in Japan are perceptual failures, such as looking aside while driving and failure to observe surrounding traffic movement. Regardless of this state of affairs, Japanese drivers have long held an incorrect accident cause concept (ACC), believing traffic accidents are primarily caused by speeding and/or drunken driving. Accordingly, Japanese drivers tended to focus on avoiding speeding and/or drunken driving, without paying attention to perceptual failure, resulting in a remarkable increase of accidents caused by perceptual failure.

We must motivate drivers to change their ACC to one that recognizes that perceptual failure is the most frequent cause of accidents in Japan, not speeding or drunken driving. The writer considered that, to change driver behaviour, we must first of all change their ACC because human behaviour is influenced by the situational concept, i.e., "behavioural environment" as advocated by Koffka (1935).

As an effective way of ensuring driver's proper lookout, the writer proposed a "temporary stop to see" (TSTS) campaign in 1991 (Nagatsuka, 1991). This was a major campaign to motivate drivers to take every opportunity to participate, experience and

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practice making a firm and temporary stop at every intersection to ensure proper observation. The writer thought it important to focus on problem behaviour on the road that evokes collisions (i.e., direct human causes; behaviour that immediately preceded the accident).

The importance of getting information needed for safe driving and looking and attending to see should be strongly emphasized in order to eliminate improper lookout (Shinar, 1978) (the error of "looked but failed to see" (LBFTS) or "failed to look") and/or perceptual failure (Nagatsuka, 1991) which has been the worst behavioural cause of accidents in Japan.

How can we attain this? The writer considered that a major campaign would be necessary to change public consciousness of the accident cause. Keeping this factual ACC in mind, drivers could make every effort to avoid perceptual failures and improper lookout, resulting in proper lookout.

The present study was conducted on the proposition that it is crucially important to make drivers form an "unbiased" accident cause concept (ACC) in order to successfully motivate them to perform a temporary stop. In other words, drivers must recognize that the problem behaviour most affiliated with accidents and, therefore, that must be eliminated is perceptual failure and failure to stop temporarily.

In order for drivers to develop a desirable ACC, it is important for us to provide drivers unbiased, factual information because an unbiased ACC is the key to successfully motivating drivers to make a temporary stop. The writer first informed the drivers of the facts of the frequent occurrence of accidents and then made them ponder the causes of accidents, in other words, the kind of worst violations to be removed from the road.

METHOD

Subjects: A total of 494 subjects participated in the campaign. Most of them were professional drivers, administrators of transportation companies, and staff members of

related companies and official organizations.

Procedure: The writer conducted the TSTS campaign in accordance with the syllabus in Table 1. We sought to form a factual ACC to motivate drivers to perform a temporary stop, which was considered an essential prerequisite to a successful perception of the surroundings. Changes of ACC were surveyed by a questionnaire listing fifteen road violations before and after the TSTS campaign.

RESULTS

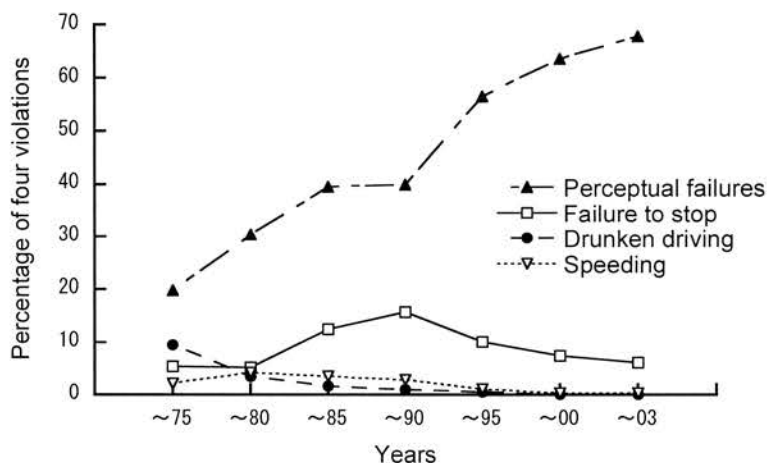
Subjects were instructed to select three violations in the order of seriousness. Weighted scores were averaged and violations were ranked as indicated in Tables 2, 3 and 4. In Tables 1, 2 and 3, speeding and drunken driving were selected as the worst violations before training; after the campaign, the order was reversed. Failure to stop, failure to confirm safety, and disregarding signals were ranked high. From these changed evaluations of the seriousness of violations, we may assume that the TSTS campaign conducted following the syllabus in Table 1 converted the biased ACC into an unbiased one and thus is considered to have been carried out effectively.

Several evaluations of the TSTS campaign are provided in four categories. It may safely be pointed out that most of them were favourable and evaluated the campaign as being effective.

- (1) Comments of surprise at learning that so many accidents in Japan were caused by perceptual failures and failure to stop temporarily.
- (2) Reflections on the misunderstanding that most traffic accidents were caused by speeding and drunken driving.
- (3) Understanding on the effectiveness of the "temporary stop to see" strategy.
- (4) General impressions that the content and method of training (pondering method) in the campaign were totally different from what the participants had ever experienced (indoctrination method). Drivers remarked, "That's it!

Table 1 Syllabus of the TSTS campaign. Some factual information and materials for making *drivers ponder and discuss* were provided.

1. The writer informed drivers of the facts of accidents, i.e., "numbers" of accidents and casualties by figures and tables.
2. Drivers were asked, "What do you think are the most frequent causes of these accidents?"
3. First enforcement of ACC questionnaire before TSTS campaign. Subjects were instructed to select three worst violations in the order of seriousness and to fill out a questionnaire listing 15 road violations. They were asked to answer by raising their hand. It was found that they thought "speeding" and "drunk driving" to be the most frequent causes of accidents.
4. Drivers were shown several photographs of flags and signboards found in urban roads with catchphrases such as "Promote traffic safety," "Don't speed" and "Don't drive while intoxicated."
5. Drivers were asked if these catchphrases on flags and signboards were effective in suppressing accidents. Drivers were made to ponder the effectiveness of the present measures.
6. Drivers were shown a graph (Fig. 1) and informed that, although accidents caused by speeding and drunk driving decreased remarkably due to severe control by police and government, accidents were frequently caused by perceptual failure.
7. Drivers were encouraged to ponder the causes of accidents in their own routine driving.
8. The most frequent cause of accidents in either case was perceptual failure.
9. Drivers were asked, "What do you think is the most effective method of suppressing perceptual failure?"
Drivers answered that looking carefully and observing precisely were effective measures.
10. Drivers were asked what they meant by "carefully" and "precisely" and were instructed to answer more concretely.
11. Drivers were informed about the limit of human perception with reference to the figures of illusion, as well as misperception under instantaneous perception (tachistoscopic vision) and peripheral vision. Drivers were then told that we often experience looking but not seeing. To see, drivers must both look and attend (Shinar, 1987, 2007).
12. The importance of taking sufficient time to look and be attentive was explained.
13. Drivers were then asked how to achieve this.
14. One replied, "By making a temporary stop, we can look and attend." Thus the right answer was given by the drivers themselves.
15. Drivers were presented a graph (Fig. 2) and told that successful results were achieved after the TSTS campaign was introduced in 1989. They were informed of the effectiveness of the campaign.
16. Second enforcement of ACC questionnaire after TSTS campaign. Drivers were instructed to select the three worst violations in the order of seriousness and to fill out a questionnaire containing the *fifteen road violations described in the beginning of this campaign.*

**Figure 1** Changes in accident rates of problematic violations on the road.

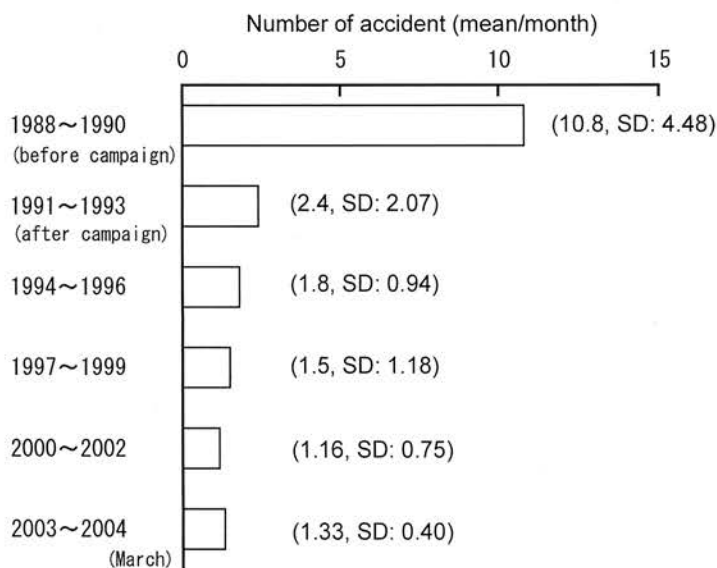


Figure 2 Number of traffic accidents as a first party in Dai-ichi taxi company. After the "temporary stop" campaign started in 1991, mean number of accidents in every month continued to decrease.

Table 2 Changes of ACC before and after the TSTS campaign

Ss: Safety administrators of small scale company ($n=36$)

Rank	Before training	Score (mean)	After training	Score (mean)
1	Speeding	1.53	Failure to stop	2.19
2	Drunken driving	0.91	Failure to confirm safety	1.58
3	Failure to observe traffic movement	0.67	Failure to observe traffic movement	1.22
4	Failure to confirm safety	0.64	Driving while fatigued	0.72
5	Improper overtaking	0.50	Speeding	0.41

Table 3 Changes of ACC before and after the TSTS campaign

Ss: Administrators of transportation company ($n=172$)

Rank	Before training	Score (mean)	After training	Score (mean)
1	Speeding	1.29	Failure to stop	1.59
2	Drunken driving	1.24	Failure to confirm safety	1.57
3	Disregarding signal	1.23	Failure to observe traffic movement	1.03
4	Failure to confirm safety	0.52	Speeding	0.60
5	Failure to stop	0.48	Disregarding signal	0.33

(This is what I have been looking for.)"

CONSIDERATIONS

After our TSTS campaign, the violations of failure to stop, failure to confirm safety, and/or disregarding signals were ranked high as the worst problematic behaviour.

From these changes in evaluations of the seriousness of violations, we may assume that the TSTS campaign conducted following the syllabus in Table 1 effectively modified the biased ACC into an unbiased one. This change of ACC, i.e., improved safety consciousness, is expected to have useful

Table 4 Changes of ACC before and after the TSTS campaignSs: Truck drivers ($n=286$)

Rank	Before training	Score (mean)	After training	Score (mean)
1	Drunken driving	1.17	Failure to stop	1.35
2	Driving while fatigued	1.02	Disregarding signal	1.13
3	Failure to confirm safety	0.99	Speeding	1.05
4	Disregarding signal	0.63	Failure to confirm safety	0.77
5	Failure to stop	0.52	Drunken driving	0.74

effects for improving traffic behaviour and for contributing to the decrease of accidents as suggested by Koffka's proposition.

Brown (2003) wrote that in a UK on-the-spot survey of accident causation, "looked but failed to see" (LBFTS) ranked third in order of importance as a contributory factor, after lack of care and driving too fast. A re-analysis of these data indicated that LBFTS constituted almost half of all perceptual errors, being far more important than distraction, lack of attention or alertness, The problem is seen to be important and researchable. Shinar (1978, 2007) wrote that improper lookout was the most frequent cause of accidents identified by the Indiana University study. Most of these errors (74 percent) were at intersections. . . . Nearly one sixth of all the accidents studied were caused by drivers who pulled into a street . . . without checking properly for the presence of other traffic. A more detailed analysis revealed that drivers "looked but did not see" just as often as they failed to look. Thus, merely scanning the visual field does not guarantee seeing. To see, the drivers must both look and attend. These errors were described as LBFTS by Cairney and Catchpole (1996), Herslund and Jorgensen (2003) and Hills (1980). Brown (2003) reported a careful review of the LBFTS. Considering that LBFTS and improper lookout have a lot in

common with perceptual failures in that they demonstrate the importance of flawless observation, a temporary stop to see campaign could be a workable solution to them.

REFERENCES

- Brown, I. D. 2003 Review of the 'looked but failed to see' accident causation factor. "Road Safety Research: Compendium of research projects 2002/2003, DfT" pp. 53-55."
- Cairney, P. & Catchpole, J. 1996 Pattern of perceptual failures at intersections of arterial roads and local streets. A. G. Gale et al. (Eds.), *Vision and vehicles— V*, pp. 87-94.
- Herslund, M.-B. & Jorgensen, N. O. 2003 Looked-but-failed-to-see-errors in traffic. *Accident Analysis and Prevention*, **35**, 885-891.
- Hills, B. L. 1980 Vision, visibility, and perception in driving. *Perception*, **9**, 183-216.
- Koffka, K. 1935 Principles of gestalt psychology.
- Nagatsuka, Y. 1991 Effectiveness of model driving with a campaign sticker on the rear outside of the body of buses, trucks and taxis—An action research—Proceedings of the second international conference on New Ways for the Improved Road Safety and Quality of Life. 9-10.
- Shinar, D. 1978 *Psychology on the road. The human factor in traffic safety*. Wiley.
- Shinar, D. 2007 *Traffic safety and human behavior*. Elsevier.