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PARTNERSHIP FOR RESEARCH AND PROGRESS IN TRANSPORTATION

COMMUNICATION IN THE TRANSPORTATION SECTOR

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ABSTRACT

Communication is necessary when humans interact. A large number of people interact daily within the transportation sector, emphasising the need for effective communication. In order for a transportation system to function efficiently, communication must occur rapidly and effectively between many individuals who perform various roles. If communication in all areas of the transportation sector is functioning effectively, a solid foundation on which to build partnerships to aid in progress and research will be established. This essay discusses the current communication trends in transport, and outlines the problems faced by the transportation sector in South Africa. A study was conducted into the efficiency of communication using two methods. Using the test results, a conclusion was drawn concerning the effectiveness of communication in the transportation sector of South Africa.

1. INTRODUCTION

A partnership that will aid in research and progress in the transportation sector of South Africa indicates that many individuals and institutions will be involved in finding innovative solutions for problems faced by this sector. For any partnership to be effective, communication between partners is paramount. In a sector such as transportation, which has been operating for an extensive time, the communication that currently occurs must be understood before progress can occur. If communication in all areas of the transportation sector is functioning effectively, a solid foundation on which to build partnerships to aid in progress and research will be established.

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The objective of this essay is to discuss current communication trends in transport, and outlines the problems faced by the transportation sector in South Africa.

2. CURRENT COMMUNICATION TRENDS

Communication is necessary when humans interact. A large number of people interact daily within the transportation sector, emphasising the need for effective communication. In order for a transportation system to function efficiently, communication must occur rapidly and effectively between many individuals who perform various roles. This communication does not occur between commuters alone, but also between commuters and transportation engineers, governmental transport services, municipal traffic departments and traffic officers, to name a few. In the field of transportation, interaction between commuters and these groups is often indirect and communication is limited to a few universal signals or traffic signs.

As the users of the transportation system, commuters are central to communication issues. Trends regarding the communication between commuters and the other entities in transportation must be studied to determine the health of communication systems in the transportation sector.

2.1 Commuter to commuter communication

When discussing communication between commuters, it is the communication between drivers that is the most critical. Driver to driver communication is more direct than communication between other groups within the transport sector, because drivers have visual contact with each other. However, in most circumstances, the communication between drivers is still limited to signals, most commonly by using vehicle tail lights (left/right indicator and brake lights). This simple communication between drivers is effective only if followed consistently by all drivers at all times. However, when used effectively, this system of signals is uncomplicated and easy to understand, making it a successful way of communicating basic actions.

2.2 Commuter to transport controller communication

The transportation system must be controlled by qualified individuals who are typically transportation engineers and traffic control personnel at traffic departments (this group will be referred to “transport controllers” in the remainder of this report). Transportation engineers design the road networks and stipulate speed limits and safety regulations. Traffic departments ensure that these regulations are adhered to by commuters. These regulations must be communicated to drivers if commuters are to abide to them.

The speed limits and safety regulations stipulated by engineers when a highway is designed are communicated to drivers by way of visual information. The South African Road Traffic Signs Manual (Bain, D; Burrough, B.L; Grosskopf, S.E; Hind, A.W; 1993) describes this visual information in terms of the “Positive Guidance” road safety philosophy. This philosophy states that a road environment should provide commuters with adequate visual information which is:

- limited to useful information that is
- prioritized according to importance for human reaction and is
- uniform to avoid unexpected circumstances and
- is easily visible under all conditions.

According to the Manual, this visual information can be categorized according to formal and informal information. Formal information sources include road signs, road markings

and traffic signals. Informal information incorporates road geometry and roadside furniture and vegetation (D Bain, *et al*, 1993). This visual information must be adequate to protect drivers from all hazards in the road environment. In order for this visual information to be used effectively, the signals must convey traffic laws successfully and must be understood and adhered to by all drivers. These traffic laws must be enforced adequately to ensure continued application of regulations.

With the large variation in visual information that can be conveyed to drivers, it is obvious that this system of communication can become complex. The complexity of this system, as well as the indirect means by which communication occurs between drivers and transport controllers (transport system designers and law enforcement agencies), can lead to problems in this system. The problems associated specifically with commuter to transport controller communication are discussed in the following section.

3. PROBLEMS WITH COMMUNICATION

As discussed in the previous section, for visual information to be effective, the traffic laws that are communicated by means of visual information must be understood by road users and adequately enforced by transport controllers. Compliance to these laws can only be expected when the laws are adequately communicated. In this section, problems associated with compliance and enforcement of traffic laws are reviewed.

3.1 Non-compliance to regulations

Traffic offences are instances where regulations set by transport controllers are not adhered to by drivers. A traffic offence survey was conducted in 2003, and found that:

- The percentage of speed offences increased from 28% to 39% between 2002 and 2003;
- During 55% of red light phases, the red light was skipped by at least one driver;
- 4.5% of drivers did not have a valid license. (Stander, HJ, Bester, CJ, 2005)

The number of traffic offences indicates a high level of disregard for regulations set by transport controllers, which could be contributed to by unsuccessful law enforcement in the transportation sector. Unsuccessful law enforcement can in turn be attributed to the severe lack of skilled traffic officers in South Africa. In developed countries, the number of traffic officers is approximately one officer for every 100 vehicles. In South Africa this ratio is closer to one traffic officer for every 1000 vehicles. (Stander *et al*, 2005)

3.2 Miscommunication in the transportation sector

Miscommunications within the transport control groups (transport system designers and law enforcement agencies) could be a contributing factor not only to the high number of traffic offences, but also to the number of vehicle crashes on South African roads. These miscommunications typically occur when the various groups of professionals in charge of controlling the transportation system do not agree or act consistently as a unit, each making independent decisions.

An example of these independent, conflicting actions can found on most rural two-lane, two-way roads in South Africa. The majority of these roads are designed by transport engineers to carry traffic travelling at 100km/h. Contradictorily, a large number of these roads are marked by traffic signs as having a speed limit of 120km/h, (Stander *et al*, 2005).

3.3 Variation in meaning of visual information

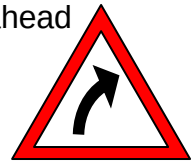
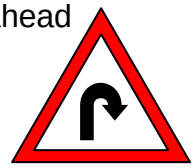
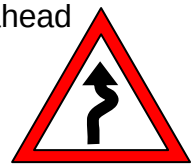
Another situation where miscommunications occur within the transportation sector, relates to the meanings of visual information that are used to communicate traffic regulations to commuters. For this report, the focus will be placed on understanding miscommunications that are applicable to the formal information category of visual information. As described in section 2.2, this category includes road signs, road markings and traffic signals. These signs and markings are used by traffic controllers to control the movements of commuters and influence their decisions regarding speed, overtaking, braking and turning.

It is assumed that there are discrepancies between the meanings of some of these signals. To demonstrate this hypothesis, irregularities in the meanings of particular warning signs will be considered. The actions to be taken when these signs are encountered as defined by The South African Road Traffic Signs Manual (D Bain, *et al*, 1993) and a popular book used to train individuals before writing a learners license test, Pass Your Learner's Easily (Gibson, C, Hoole, G, Passchier, B, 2003), are considered. The actions suggested by each source are compared in Table 1.

Table 1 indicates that there is a discrepancy in the meanings of these road signs. Although the basic description for the application of the signs is the same, the Road Traffic Signs Manual clearly defines a specific decrease in speed that is not indicated in the training manual, Pass Your Learner's Easily. Engineers make use of the Road Traffic Signs Manual when designing roads and transport control agencies would make use of the same manual when placing signs along highways. The general public, who make up the majority of commuters are however only exposed to books such as "Pass Your Learner's Easily".

A potentially dangerous situation is created because commuters and transport controllers make use of different sets of information. Roads are designed with speeds as indicated in the Road Traffic Signs Manual, while the general public are not made aware of what these recommended speed reductions are. Without a known standard speed reduction, drivers will react in a multitude of ways, causing confusion. Drivers may be over-cautious or may not slow down enough to reach the (unknown) recommended speed. If a driver enters a bend at a speed much higher than the speed for which the bend was designed, forces acting on the vehicle would exceed limits assumed by the transport engineer and the vehicle could slide off the roadway or overturn (Papacostas, C.S, Prevedouros, P.D, 2001). The following sub section (chapter 3.4) considers in detail the varied actions of drivers when confronted with the signs indicated in Table 1.

Table 1 Comparison of meanings of road signs from two sources

Warning Sign	Identification code	Suggested action: South African Road Traffic Signs Manual	Suggested action: Pass Your Learner's Easily
Sharp curve ahead 	Curve to right: W204 Curve to left: W205	... curve that can only be negotiated comfortably by reducing speed by more than one third of the operating speed…on preceding straight.	Slow down substantially and comply with any speed advisory plates.
Gentle curve ahead 	Curve to right: W202 Curve to left: W203	… curve that can only be negotiated comfortably by reducing speed by one tenth to one third of the operating speed…on preceding straight.	Approach with caution and look out for approaching vehicles that may be overtaking.
Hairpin bend ahead 	Curve to right: W206 Curve to left: W207	…sharp u-shaped bend that can only be negotiated by reducing speed by more than half of the operating speed of traffic travelling on preceding straight.	Slow down substantially and comply with any speed recommendations and regulatory signs. Ensure a firm control of the steering.
Winding road ahead 	Curve to right: W208 Curve to left: W209	Speed should be reduced by one tenth to one third of the operating speed of traffic travelling on the preceding straight.	Slow down and drive carefully.

3.4 Variation in reactions to visual information

The variation in definition of traffic warning signs, as discussed in the previous section, leads to confusion regarding the meaning of visual information. It is hypothesised that this variation in meaning also leads to a variation in the reactions of drivers to visual information. An experiment was conducted to determine the extent of this confusion by determining how many varied reactions are indicated for the same signs by a test group.

The method used in this test was to give each member of a sample group (37 fourth year civil engineering students) a survey sheet with which they could evaluate four road signs (the four signs presented in Table 1). The questionnaire asked the student to state if he would decrease his speed should he see the sign and if so, by what percent of his preceding speed.

The results of the survey are summarised in figures 1 to 4. For the signs for "sharp curve ahead" and "hairpin bend ahead" a large degree of variation in speed reduction is evident, between 5% and 60% for the "sharp curve" and 10% and 65% for the "hairpin bend". Variation was slightly less for both the "gentle curve" and the "winding road" sign, with reduction percentages of between 0% and 20%, and 0% and 40% respectively.

For the "sharp curve" sign, a speed reduction of 20% was indicated to be the most common, with an average reduction of 24%. The group indicated that no speed reduction was necessary for the "gentle curve". The most common speed reduction for the "hairpin

bend" sign was indicated as 50% of original speed, while the average decrease is lower at 40%. Speed decreases for the "winding road" are distributed evenly between 0% and 20%.

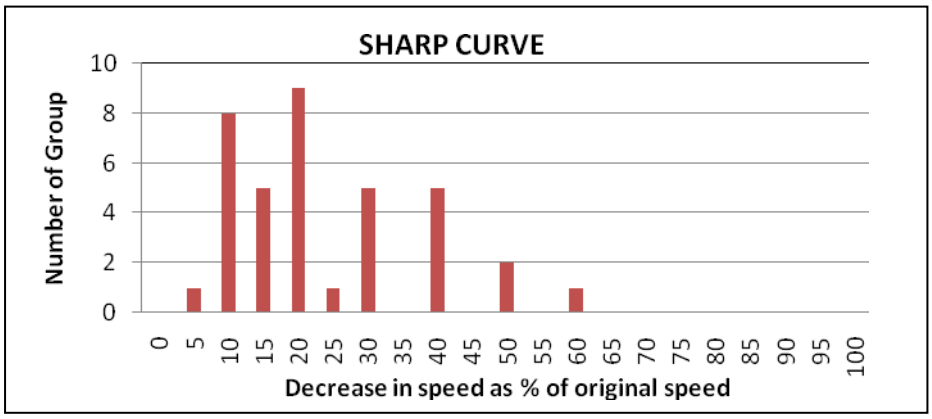


Figure 1 Decrease in speed for a sharp curve

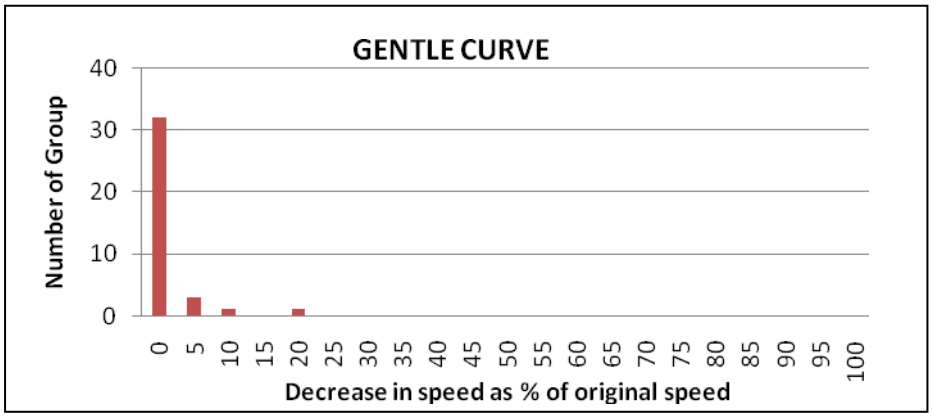


Figure 2 Decrease in speed for a gentle curve

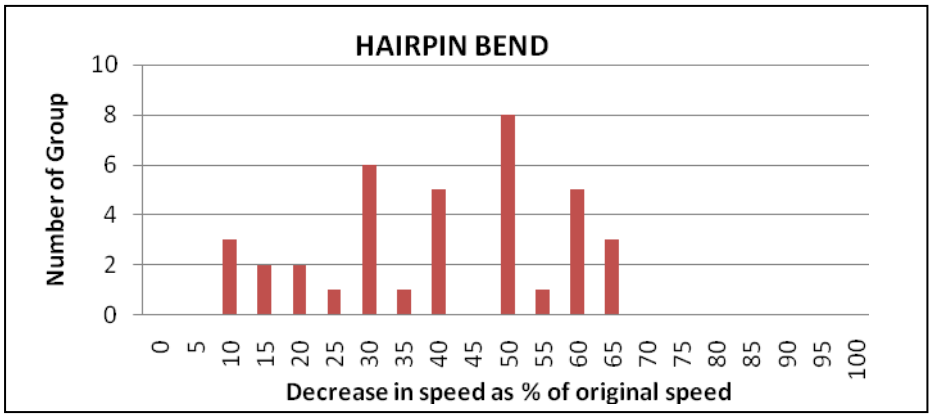


Figure 3 Decrease in speed for a hairpin bend

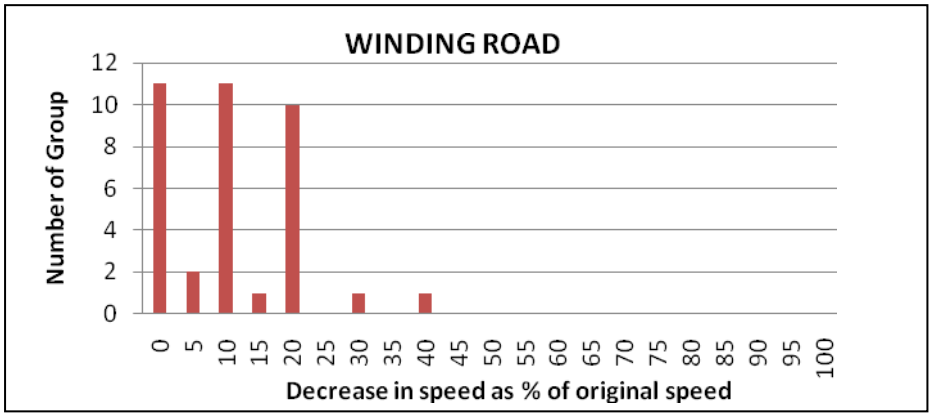


Figure 4 Decrease in speed for winding road

The following conclusions can be drawn using the results from this survey:

1. When drivers are confronted with a “sharp bend” sign, the average decrease indicated by the test group (24%) is lower than the recommended value of one third (33%) and only 35% of the study group would have slowed down by 30% or more;
2. When a sign indicates a gentle curve most drivers would not slow down, which does not comply with the 10% decrease stipulated in the Road Traffic Signs Manual;
3. Although the most popular reaction of the test group would be to slow down by 50% if confronted by a “hairpin bend” sign, the average value of 40% is still lower than the value recommended (50%), and indicates a larger number of test subjects would slow down by less than 50%;
4. Most people would slow down adequately when observing a “winding road sign”, the general tendency to slow down by more than 10%;
5. Large variations exist in the reactions of drivers to these warning signs.

This variation in reaction to a warning sign is not a desired trait of drivers. This experiment has highlighted the need for a more uniform understanding of visual information. This understanding by all commuters would allow transport controllers to effectively communicate their desires for how the transport network should be used. Most drivers would not slow down adequately before these bends, and it would seem that this is due to inadequate communication.

4. CONCLUSION

Communication in the transportation sector is complex and especially complicated when communication can occur only indirectly by way of visual information between drivers and transport controllers (transport system designers and law enforcement agencies). This complexity of communication leads to many problems such as a misunderstanding of visual information and a consequent variation in reactions of drivers to visual information.

This misinterpretation of visual information, as well as a lack of law enforcement within the transportation sector of South Africa, compound to create a safety hazard on our roads. It can be concluded that the state of communication and as such information transfer is not at acceptable levels in this country. This was proven in the experiment of section 3.4, where it was evident that a large variation in the understanding and implementation of speed control for various warning signs exists. It appears that drivers do not know what the actual meanings of these signs are, as described in South African Road Traffic Signs Manual (D Bain, *et al*, 1993).

The information that is available to drivers in South Africa should be normalised and comply with the standard set by the South African Road Traffic Signs Manual. Law enforcement should be improved and research is required in communication in the transportation sector.

5. BIBLIOGRAPHY

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