

Subjectivity in Road Safety and Traffic Engineering

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Key Findings

- Subjectivity is infrequently discussed within road design guidelines
- Subjectivity is inherent within traffic and road safety engineering decision-making

Introduction

This paper discusses subjectivity in road design guidelines, and examples of it within practice from the perspective of a professional road safety auditor.

Background

Subjectivity was alluded to when linking crash interventions and contributing factors within a recent study (Doecke et al, 2020). This paper acknowledged that subjectivity was present even amongst a panel of experts advising on a link derived from an ‘evidence base’. This inspired an examination of subjectivity within road safety and traffic engineering, how it is discussed in common road guidelines, and how it manifests within a practitioner’s assessment.

Definition

‘Subjective’ refers to personal feelings, tastes, ideas and opinions, and is often described as the opposite of ‘objective’; clear-cut with a universal truth.

Guidelines

The word ‘subjective’ appears 47 times within Austroads’ Guides to Traffic Management, Road Design and Road Safety (all parts and series combined). As a comparison, another non-empirical term, ‘judgement’, appears 169 times. Of the 47 appearances of ‘subjective’, approximately half (23) did not refer to road design/road safety engineers, but described ‘local community opinions’ (AGTM 8) and ‘driver subjective risk’ (AGRS8). The majority of the remaining 24 described designer considerations:

- Path widths in AGRD6A S4.3;
- Modelling categories in AGTM3 S8.0;
- Safety treatment options in AGRD6 S5.3;
- Scores for likelihood and severity in AGTM6 S3.3.3;
- The extent of the normal design domain in AGRD2 S2.2;
- Crash data quality and use in AGRS7 S5.5.

Practice

Road designers, traffic and road safety engineers are humans that walk, ride and drive on roads and paths, accumulating experiences, feelings and opinions over many years. They are also potentially influenced by the views and experiences of friends, family and industry professionals. Furthermore, practitioners are rarely experts in more than one area, often having a focus or strength in specific areas such as:

- Human behaviour;
- A specific road user group;
- Emerging practices, treatments, or paradigms such as safe system;
- Standards and guidelines or road rules;
- Historic practices and jurisdictional differences;
- Technical areas e.g. signs, line marking, safety barriers, drainage, geometry, lighting, traffic signals.

Therefore, although an experienced practitioner requires strong technical and industrial knowledge, it is likely that subjectivity plays a strong role in identifying an issue and assigning risk.

Examples

Existing Condition

As the audit team approached an unfamiliar intersection at night (Figure 1) and daytime (Figure 2), they had some difficulty understanding where the road actually goes: *left* or *right*. This was due to the geometric layout, dirt tracks on the road, minimal intersection delineation, and tree shadowing.

Here, the ‘subjective’ response of the drivers to the road and the relationship with human factors was more relevant than ‘experience’ and ‘judgement’.



Figure 1. Night approach to intersection (Source: P. Harris)



Figure 2. Day approach to intersection (Source: P. Harris)



Figure 3. Road Design Drawing
(Source: VicRoads drawing number 77558, Issue 0, Contract 9912: Sheet 50 of 52)



Figure 4. Day approach to the curve (Source: P. Harris)



Figure 5. Night approach to the curve (Source: P. Harris)

Contemporary Design – Post Opening

The dashed median line marking was installed as per the plans (Figure 3).

However, the auditors determined that in this environment, the dashed line marking eroded delineation at this critical curved approach to the high-speed intersection (Figure 4 and 5). Also, it was not required by the road rules (to make the turns legal). Finally, the guidelines of the relevant road authority show the dashes as a possible treatment type, but do not require them.

The relevance of subjectivity:

- ‘Experience’ was required to consider the potential issue relating to road readability / delineation.
- ‘Judgement’ was required to understand that the relevant design guidance on this treatment is not strong or prescriptive, and offers the dashed line treatment as a guide only (VicRoads Supplement to AS1742.2 Section 5.3.6 (a) dot-point (4), and section 5.5.5.1 and Figure 64).
- Ultimately however, whether to raise this type of delineation / road readability issue and how to rate the risk is largely ‘subjective’.

Design – Safe System

A current major project is replacing a footpath with a shared path (Figure 6 - left).

Although this is a welcome facility, the existing on-road bicycle lane (Figure 7) is being removed, leaving two lanes of traffic, no on-road bicycle lane, and no shoulder.

The auditors firmly believed that ‘on road-only’ cyclists will stay on the road rather than depart the road and join a shared path with pedestrians, dogs, speed reduction, waits at multiple road crossing points, and travelling in front of driveways with a compromised user envelope (Figure 6 - right). And, this project will leave the relatively high volume of ‘on road-only’ recreational cyclists sharing a traffic lane, which is a reduction in safety to that user group. The relevance of subjectivity is as follows:



Figure 6. Proposed Design: Shared path with on-road bicycle lane removed
(Source: Arcadis Road Design Plan NWA_C1042A and P. Harris)

The Safe System Assessment undertaken for this design had the difficult task of determining the change in ‘likelihood’ of cyclist crashes overall. In doing so, the assessors would have needed to consider issues such as: all bicycle user group types; future volumes and patterns; user behaviour; and all cyclist design improvements and deteriorations across the project.

The assessment determined that the likelihood of crashes would be reduced, which consequently reduced the cyclist risk score from 27 out of 64 to 18 out of 64 (as per Table 3 of Safe System Assessment Matrix – Austroads AP-509-16).

It is expected that experience and judgement were important in this decision, but decisions such as these are highly subjective due to their sheer nature. Indeed, another set of experienced practitioners could have just as easily *increased* the likelihood based on the ‘on road-only’ volumes and travel patterns.

Discussion

Most road design / intervention guidance is driven by an evidence-base. Data driven studies help form a consensus which eventually feeds into guidelines, and give practitioners something to anchor their decisions to.



Figure 7. Existing Condition: On-road bicycle lane (Source: P. Harris)

Conversely, subjectivity is routinely part of design and road safety but is unempirical, unscientific, seldom discussed in guidelines and in general practice (in the experience of the author).

It is unlikely to be possible or desirable to remove subjectivity from human decision making. However, the extent to which subjectivity can influence the identification of an issue or the risk assigned to it might vary considerably.

Conclusions

The influence of subjectivity within decision making is a valid question for future analysis and consideration.

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References

- Austroads Guide to Road Design, Traffic Management and Road Safety Sets, viewed 5 June 2020 at <https://austroads.com.au/publications/>
- Austroads (2016). Safe System Assessment Framework AP-509-16
- Doecke, S., Thompson, J. and Stokes, C. (2020). “How do we prevent and mitigate crashes? Evidence from Australian at-scene in-depth crash investigations”. *Journal of Road Safety*, 31(2), 35-43. <https://doi.org/10.33492/JRS-D-19-00254>
- Vicroads Supplement to AS1742.2 2009 Manual of Uniform Traffic Control Devices: Traffic Control Devices for General Use, Section 5.3.6 (a) dot-point (4), and section 5.5.5.1 and Figure 64).