

## Assessing cycling skills in Switzerland

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### 1 INTRODUCTION

For many people, safety concerns are a major barrier to ride a bicycle. Indeed, cyclists bear a higher risk than most other types of road users. Parallel to the increase in cycling an increase in accidents involving cyclists can be observed. In Zurich, the number of accidents involving cyclists increased from 250 to 450 between 2010 and 2019. In the same period, a decrease in the number of accidents involving motorized vehicles and pedestrians was registered.

Improving cycling infrastructure is the most obvious and effective way to increase cycling safety. However, at the same time it is likely that the uptake of cycling can be attributed to a generation 'becoming urban cyclists' [3] and that cycling skills and competences are not aligned with the cycling infrastructure at hand. In parallel, other participants in traffic might not be aware of the presence of cyclists and lack knowledge of specific cycling characteristics (e.g. driving speed, lateral movement at different speeds, acceleration / deceleration, route and lane preferences).

Cycling requires a set of competences that include bodily fitness, steering and balancing skills, and knowledge of local traffic systems [4]. In addition, in many cities, cyclists are expected to perform in the same way as motorists, do not have dedicated infrastructure and are expected to share road space with motorists [3], [5]. These circumstances require more than just balancing skills and knowledge of pedalling and breaking. Rather, cyclists are required to weave and merge with vehicular traffic, pay attention to pedestrians and other cyclists, and navigate at the same time.

This paper sets out to identify skills required by cyclists to navigate safely through an urban environment in Switzerland. We set out to identify situations that might result in accidents and require specific competences. Three study studies were conducted. First, workshops with experts were conducted to identify required cyclists' skills. Second, accident statistics were analysed to determine in which type of situations accidents occur. Finally, a survey was conducted among Swiss cyclists to assess which skills were present and which skills were lacking. The remainder of this extended abstract describes the three studies in some detail and continues with an outlook for the final paper.

### 2 STUDY 1: EXPERT INTERVIEWS - IDENTIFYING RELEVANT SKILLS

#### 2.1 Methodology, Materials and Sample

To identify cycling skills, focus groups discussions were organized. Nine experts from the fields of traffic planning, bicycle training, driving instruction, traffic safety and traffic instruction were recruited to participate.

Prior to the focus group discussions, an overview of cycling skills was gathered from (1) academic research [6] (2) applied research [7] and (3) directly from experts prior to the discussions. In total, almost 60 cycling skills were identified. Experts were asked to discuss and evaluate this exhaustive set of cycling skills with regard to their ability and relevance to prevent cycling accidents.

## 2.2 Results

Skills were prioritized on the basis of the evaluation of experts and categorized into higher-level abstract skills, situation-related concrete competencies and practical motor skills. In total 16 cycling skills to prevent accidents were identified. The experts rated higher-level, strategic, skills, such as 'anticipatory cycling', 'identifying risks', and 'keeping alert', as central to avoiding accidents. The following situation-related, concrete competencies were given particularly high priority: dealing with blind spots, mastering roundabouts, recognizing right of way, looking over one's shoulder and maintaining a safe distance from dangers such as parked cars. Practical motor skills, such as being able to respond quickly, use the brakes correctly, and maintain balance, were also rated as highly relevant. Practical motor skills (operational driving skills), such as being able to respond quickly, using brakes correctly and maintaining balance, were also rated as highly relevant.

## 3 STUDY 2: ACCIDENT STATISTICS: IDENTIFYING RELEVANT SITUATIONS

### 3.1 Methodology

We set out to analyse reported accidents involving cyclists in Switzerland in the period 2011 - 2021.

### 3.2 Results

Almost 40% of cycling accidents involves a single object; i.e. do not directly involve other traffic participants. We also see that in the remaining accidents, approximately 40% cyclists are the party at fault, with the remaining accidents being caused by another party. A word of caution is appropriate here: the reporting methodology as well as legal requirements require to define a party at fault.

In most cases, the cause of the accident is attributed to 'priority': 24% of the accidents can be attributed to different types of ignoring priority (excl. traffic lights); another 23% can be specifically attributed to ignoring priority signs (excl. traffic lights).

## 4 STUDY 3: IDENTIFYING CYCLING SKILLS

### 4.1 Methodology, Materials and Sample

To assess whether cyclists possessed certain skills a survey was developed. The survey was designed as a two-stage survey. The first stage served as a screening survey to ensure that quota met.. In the second stage of the survey (main survey), participants were asked to state their behaviour in a series of situations.

The first part of the main survey showed participants 6 situations. Participants were asked whether they would look left, right, forward, backwards, whether they would adjust their speed, what their preferred position on the road was and whether they use their cycling bell. The second part showed participants a series of situations where participants were asked to state their preferred position on road in blind spot situations, on a roundabout and when turning left. The third part focused on priority rules. Within the first 3 parts of the survey, situations were randomized between subjects. In total participants were shown 14 situations.

Parallel to the survey experts were asked to fill out the survey. These experts consisted of cycling instructors. To assess whether respondents' behaviour in the different situations was correct, respondents' answers were compared to answers provided by experts. participants were asked to state their behaviour in a series of situations.

## 4.2 Results

### *Evaluating specific competences*

In this abstract we will highlight the analysis of cycling skills for two situations.



Figure 1 Turning left with priority

| Kompetenz                  | ExpertInnen | Abweichung |
|----------------------------|-------------|------------|
| Ich schaue nach hinten     | 4           | 47%        |
| Ich schaue weit nach vorne | 5           | 45%        |
| Ich schaue nach rechts     | 4           | 43%        |
| Ich schaue nach links      | 4           | 37%        |
| Ich gebe ein Handzeichen   | 4           | 36%        |
| Ich bin bremsbereit        | 4           | 27%        |

Figure 1 depicts the answers for the situation in which a cyclist turns left, but has right of way. Experts consider it important that cyclists look over their shoulder ('Ich schaue nach hinten') and that they look far ahead. Almost 47% of the survey participants indicated that they might not look over their shoulder.



Figure 2 Turning left with priority

| Kompetenz                  | ExpertInnen | Abweichung |
|----------------------------|-------------|------------|
| Ich schaue nach hinten     | 5           | 44%        |
| Ich schaue nach links      | 4           | 41%        |
| Ich gebe ein Handzeichen   | 5           | 41%        |
| Ich bin bremsbereit        | 4           | 38%        |
| Ich schaue weit nach vorne | 4           | 36%        |

Figure 2 depicts the answers for the situation in which a cyclist continues straight at a branching, but has to mind turning. Experts consider it important that cyclists look over their shoulder ('Ich schaue nach hinten') and that they glance left. Almost 44% of the survey participants indicated that they might not look over their shoulder.

### *Evaluating specific situations*

When looking at specific situations, it becomes apparent that cyclists not always recognize right-of-way correctly on residential streets (Figure 3) and choose not to use the middle of the lane on roundabouts (Figure 4), as recommended in Switzerland. Cyclists do choose the correct position when turning left and deal with blind spots as recommended by experts.



Figure 3 Right-of-way



Figure 4 Roundabouts

## 5 CONCLUSION & OUTLOOK

This research has shown that there is potential to further develop cyclists' skills. Rather than focusing on motoric skills or presenting simple situations, we advise that skills should be trained based on more complex situations. These situations include turning, branching, maintaining distance from parked cars and recognising right of way in residential areas.

In addition to the presented analyses, we evaluated differences in answers between age groups, gender and cycling frequency. In the presentation we will discuss the results. Furthermore, we aim to calculate a single score per situation and skill type to be able to assess whether statistically significant differences between groups exist. Finally, we will comment on the differences between the stated subjective safety of survey participants, and the stated safety by experts. We are looking into ways to disseminate the survey further to obtain a broader audience and are especially interested in showing participants a wider range of slightly similar situations to determine whether specific elements in pictures play a role.

The results of this research inform the development of digital cycling training program for adults and have helped to prioritize the contents of such an educational program.

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