

Instruction or distraction in the driving school?

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ABSTRACT

In this paper we report an ongoing study of driving school practice. We recorded several hours of driving lessons in different environments, which we analyze with the Interaction Analysis method. Our initial analysis suggests that looking at how teachers make use of different communicative resources to instruct students in driving, can provide insights for the development of technologies that support drivers in managing distractions.

Categories and Subject Descriptors

J.4 [Social and behavioral sciences]: Sociology; K.6.1 [Project and people management] training.

Keywords

Driving schools, distractions, instructions, distraction management, driving.

1. INTRODUCTION

The theme of distraction is of great relevance in the design of automotive interfaces [2] [4]. Especially when designing supportive technologies for driving, great attention is dedicated to providing the right balance of information or entertainment, and avoiding disrupting the driver's attention from the road and the traffic environment. Recently, social scientists have contributed to the research on this theme, pointing out how most studies focus exclusively on interactions between drivers and technologies in isolation, with less attention to the contextual and equally important aspects of social interactions both as supportive of the driving task, but also as a source of distraction [3]. Acknowledging this point of view, we can provocatively think of social interaction as a prototype of an infotainment system, where car passengers actively participate in driving, (for example noticing aspects of the road and the traffic environment), or "provide entertainment", but are also a source of distractions that the driver is more or less compelled to attend to. But how do drivers learn to receive and respond to different stimuli? And how can these stimuli be provided? To investigate this, we undertook a study of a driving school practice, and analyzed how the interactions between learner and teacher evolve. With this, our intention is to better understand how experts skillfully provide information, and direct drivers attention to relevant features of the environment or the car, which could possibly inform the design of in-car information and entertainment systems.

2. THREE CAMERA SETUP

In our study, we followed a student learning to drive, from the very first lesson to the final test. The student (female, age 18) had never driven a car before. She was supervised by an instructor with 14 years of experience (Figure 1).

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For documentation we used a set up of three miniature cameras



Figure 1. Driving instructor and student seen from front camera (Cam2).

(GoPro) placed inside the car to capture (1) the student actions, (2) the interactions between instructor and student and (3) the street view as seen from the driver, Figure 2. The lessons took place in two different environments and were recorded with two slightly different camera set-ups:

Closed driving range – Student alone in car: The first three lessons of driving are located in a closed driving range. The student is alone in the car, driving test paths under radio guidance provided by the instructor. In this case, the instructor is also supervising other students, and follows the students' performance from an observatory area in the center of the driving range. The student can hear everything the instructor says, both to her and to other students, but can't talk to the instructor. The car is equipped with two indicator lights on the roof: Orange when the student is touching the clutch, and red when the student is braking. The activities were recorded with 3 cameras inside the car and one tripod-mounted HD camera following the car from outside. Towards the end of the driving course the student returned to the driving range for additional lessons of skid training on prepared surface.

Traffic environment – Student with instructor: For the traffic training lessons the instructor sits next to the student to practice

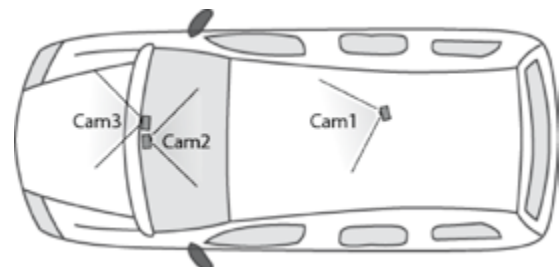


Figure 2. The placement of the 3 mini-cameras inside the car: Cam1 records student and teacher interactions with the car; Cam2 observes gaze and facial expressions; Cam3 registers the traffic environment.



Figure 3. Split-screen video allows analysis of movements and interactions from different points of view.

driving on urban and rural roads. The student drives according to the guidance provided verbally by the instructor. The lessons are individual, and the student and teacher talk freely. In this case, the set up of cameras was the same as in the closed driving range environment, but without the external view the car.

3. VIDEO ANALYSIS ON SPLIT SCREEN

In total, we collected 20 hours of footage covering 6 lessons each of 1,5 hour duration, over a span of 4 months. Of these lessons, 2 were from the closed driving range environment. To facilitate a detailed analysis of the data, we synchronized the videos into one split screen sequence to allow direct comparison of the three views, Figure 3. Greater priority was given to footage from Cam1, which best captured the interactions with the car and between student and instructor. The analysis is carried out with the Interaction Analysis approach [1]. Interaction analysis is a qualitative method with roots in ethnography and ethnomethodology, which makes use of video recordings as a basis for analysis of how people interact with each other, objects and the environment around them in everyday, naturally occurring interactions. Interaction Analysis focuses on looking at particular events in detail, and builds generalizations from the body of evidence that those particular events provide. The analysis is carried out by looking repeatedly at video recordings, without any preconceived theory about the data and its content. With recurring observations, the researchers can then identify foci of analysis, such as for example structures of events, temporal organization of activities, or the role of artefacts in interaction, which are then investigated further, with the help of accurate transcriptions.

4. INSTRUCTORS AS DISTRACTORS?

Based on an initial analysis, we identified two main foci of analysis that seem relevant for examining distraction and how to address it in car environments. Our main point of attention relates to the instructor. We observe that the instructor provides information to the student on multiple levels: (1) Body posture ('put your hand on the gear shift') (2) Car functions ('break now') (3) Car in context ('place the car towards the center of the street') (4) General driving practice ('It's important that you find a swift flow...'). Beyond teaching, the instructor also engages with the student in conversations that are unrelated to the driving task. Information is provided with different resources (talk, body posture, voice pitch) and with different timings. For example, the teacher might forewarn the rules necessary to approach a roundabout in advance, while providing instructions on the use of pedals during the action itself. In other instances, she might discuss general driving matters while pointing at elements of the environment, or directly intervening in the students' driving performance (Figure 4).



Figure 4. In a roundabout, the instructor provides information on several levels, while at the same time intervening to correct the student's path (Cam1).

A second focus relates to the student; how she coordinates the different actions required to drive the car and how she gives attention to the instructor. This aspect is interesting for analysis in relation to the interventions of the teacher. An example is how, when the teacher perceives that the student is apparently too concentrated on the gear stick, she attracts her attention (distracts her) on other aspects of the environment such as the back-mirror, or other cars at the side of the road. A full analysis is still in progress, but our preliminary hypotheses are that 1) We might be able to distinguish between different ways in which the instructor supports or intervenes in the driver's performance, and what kind of information is related to these interventions. 2) We might be able to observe a development in how the student responds to the different requests given by the instructor. These observations can possibly be a resource to understand how drivers deal with external stimuli and how to support them, and also to learn from "experts" about different ways, timings and techniques to provide informational content to drivers.

5. SUPPORTING ACTIVE MANAGEMENT OF DISTRACTIONS

The aim of this study is to think of distractions as interactions that evolve over time, influenced by drivers responses in an active ongoing process, rather than think about "distractions" as identifiable episodes possibly occurring during a car drive. While it is true that the driving school case is peculiar in that the student has the duty to attend the instructor (and therefore does not need to evaluate whether or not the information she receives is relevant), the study should help us understand how people acquire the skill to manage interruptions. By uncovering the ways in which skilled trainers actively distract (and instruct) drivers, and how the latter develop skills for managing distractions, we hope to draw implication for the design of new user interfaces and car environments that – instead of aiming at eliminating sources of distraction – facilitate coordination and management of different source of distractions.

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