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A longitudinal study of driving instructor guidance from an activity-oriented perspective

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ABSTRACT

The aim of this study was to provide a better understanding of the scaffolding activity of instructors during driving lessons in a French urban traffic context. It focuses on three common and risky tasks: turning right, turning left and overtaking. Data were based on fine-grained longitudinal analyses of the records of five driving lessons involving four student-instructor dyads. The instructor scaffolding activity was analyzed throughout training – an original approach in the sphere of driving. The results show that the instructors implemented the learning process using an integrative approach based on 'cutting' and 'decoupling' the driving task rather than the step-by-step method recommended in the curriculum. They transferred the responsibility of the driving components to the students in a similar order: 1) technical maneuvers, 2) situation identification and 3) goals focusing on other road-users. As expected, student autonomy and efficiency in driving increased as the training progressed. However, at the end of training, uncertainties remained with regard to the execution of basic sub-goals in complex situation; moreover, the instructors were still in charge of the navigational task. The results were discussed and suggestions were made to improve instructor training with a view to increasing their efficiency in teaching students.

1. Introduction

In this article, we present one component of a research program[1] relating to both the development of learner drivers' skills and the activity of professional instructors in the context of initial training in France (Boccara, 2011; Boccara, Delhomme, Vidal-Gomel, & Rogalski, 2011a, 2011b). The present paper aims to contribute to a better understanding of instructor scaffolding activity in the dominant context of training in French urban areas (Boccara, 2011).

Few studies examine trainers' scaffolding activity, despite the fact that trainers are recognized as a determinant of student drivers' learning (Groeger, 2000; MERIT, 2005; Twisk et al., 2006; Bealand et al., 2013). In their literature review, Bealand, Goode, Salmon and Lenné (2013) emphasized for example the positive effects of driver training provided by professional trainers, but how these professionals proceed remains unknown. Studies by Groeger and Cleg (2000, 2007) showed that the total number of trainer interventions decreases throughout initial training. Rismark and Solvberg (2007) identified two decisive stages in instructor mediation: the selection of driving situations proposed to the learner and the clarification of learning objectives. In line with this research, we investigate more closely how instructors mediate the students' learning and how this mediation progresses during driver training. Several questions are then considered: how do instructors structure and organize the learning process to support the development of students' driving-skills? What are the driving goals they assigned to the students during lessons? How do these evolve throughout the driver training?

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[1] This research program was awarded a PHD grant by the French Ministry of Transportation via the intermediary of the INRETS (now IFSTTAR). The purpose was to provide a better understanding of teaching and learning processes involved in the French context of driver training (Boccara, 2011).

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1.1. Understanding instructors' scaffolding activity vis-à-vis students learning to drive

We consider that activity (and learning) is situated and depends on the characteristics of situations and the content and goals of the tasks given (Leplat, 1990, 1997; Hacker, 1985). This approach belongs to the *"French-speaking framework"* current which primarily focuses on the analysis of human activity in situations (Daniellou and Rabardel, 2005; Daniellou, 2005).

In the context of driver training, instructors support students' skills development through a scaffolding process[2] that *"enables a [child or]* novice to solve a problem, carry out a task or achieve a goal which would be beyond his unassisted efforts. This scaffolding consists essentially of *the [adult] 'controlling' those elements of the task that are initially beyond the learner's capacity, thus permitting him to concentrate on and complete only those elements that are within his range of competence*." (Wood et al., 1976, p. 90).

First, trainers' activity is oriented toward their action to improve the trainees' skills (didactical dimension) and to satisfy professional requirements (Rogalski, 2003, 2005). The didactic activity involves selecting driving situations corresponding to the development of the trainees' skills and providing guidance in a more or less direct form, ranging from taking control of the vehicle to merely commenting on the driving situation (Vidal-Gomel et al., 2012). More particularly, trainers must ensure that trainees perform driving tasks which are encountered on a regular basis (depending on the type of area). The level of difficulty is then ensured by the trainer through the choice of traffic conditions (when possible) and his taking control of part of the driving activity (when adapting to actual traffic situations).

Driving instructors organize the learning progress in order to take account of the actual traffic flow conditions during each lesson, implying the simultaneous management of various driving goals (Weill-Fassina, 2005). In fact, they mediate between the current state of student drivers' skills and the driving situation through their tutoring activity, requiring them to assume responsibility for part of the task by acting directly on the vehicle commands, "cutting" and/or "decoupling" task goals, such as those identified above when considering the three focus tasks of driver training. "Cutting" and "decoupling" task goals are means used by trainers to control skill progression in training situations (Samurçay and Rogalski, 1998). In driver training, "cutting" goals is for example achieved by choosing "off-traffic" learning exercises, while "decoupling" occurs when trainers take charge of a driving task component.

Finally, instructors are involved in an organizational system. Instructors must apply common training instructions and progress. Furthermore, professional instructors in France guarantee the safety of the vehicle, its passengers and other road-users during driver training. In other words, they are legally responsible for the vehicle and could lose their trainer accreditation in the event of driving offences. Thus, the absence of physical and/or verbal intervention on the part of the instructor in relation to the student's driving performance could be considered an indicator that the student can manage the driving task at hand in a safe and adequate manner.

1.2. Goals of driver training: the contents of instructors' scaffolding activity?

Over the past decade, research based on the so-called GDE model (Goals of Driving Education, Siegrist, 1999) has focused on which driving skills student drivers should acquire (ADVANCED, 2002; INSERR, 2008; MERIT, 2005; NOVEV, 2004). It is expressed as a matrix organized into four hierarchical levels of goals: (1) vehicle maneuvering, (2) mastering driving situations, (3) goals and the context of driving (trip-related goals) and (4) goals for life and competencies for living (general goals); and three main axes: (1) knowledge and skills, (2) risk-increasing factors and (3) self-assessment (Hatakka et al., 2002; Siegrist, 1999). This matrix has influenced the driver training curriculum in several European countries. In France, the curriculum is a step-by-step learning progress with four steps (divided into a total of 180 specific objectives, DSCR, 2005): controlling the car at low or moderate speed, with little or no traffic (step 1); choosing the car's position on the road and crossing an intersection or turn (step 2); driving in normal traffic conditions on roads or in built-up areas (step 3); and being familiar with situations involving particular difficulties (step 4). In principle, instructors should transpose each of the 180 objectives into a learning situation, in a "cutting" process. However, this is not possible in the French context where training takes place in real traffic conditions in which goals must be combined (Vidal-Gomel and Rogalsky, 2007; Weill-Fassina, 2005).[3] GDEs, such as the French curriculum, therefore constitute the instructors' prescribed tasks defining the training contents and the objectives that must be achieved at various granularity levels. However, these tasks are not modeling the driving activity, while the instructors' scaffolding activity is oriented towards supporting students learning. This calls for a driving activity framework which could guide the analysis of the trainers' scaffolding activity.

1.3. A driving framework in an oriented activity perspective

In line with the hierarchical model of driving, Lefebvre (2001) put forward a driving framework with four integrative components. (a) "*Piloting the vehicle*" (the "controlling" level) refers to using controls, controlling the vehicle and anticipating the effects of physical laws (inertia, trajectories, etc.). (b) "*Traffic management*" relates to the identification of driving situations and operational communication with other road-users. (c) "*Navigation*" refers to navigation in situation (short-term) and journey preparation (long-term). (d) A *"meta-knowledge"* component concerns self-awareness about driving and knowledge of one's own skills (Valot and Amalberti, 1992): it is related to each of the other three components. This framework assumes that the components are in constant interaction during driving and that they involve three dynamics: 1) the *physical laws*, integrated into the "*piloting the vehicle*" component, 2) the *traffic*, included in the "*traffic management*" and "*Navigation*" components, and 3) the *driver's cognitive and psychical processes*, concerning the two previous components.

The instructors' scaffolding activity should therefore support the students' learning process in order to integrate the following three goals and the first two dynamics involved in driving: 1) "technical" goals (TE) referring to vehicle management (trajectory, speed, etc.) organized into appropriate "maneuvers"; 2) "situation

[2] "Scaffolding" is related to the concept of *zone of proximal development* (Vygotski, 1934/1986) defined by the "space" between what the learner is capable of doing with the help of others and what the learner can do or solve autonomously.

[3] Moreover, the need to train such a combination was even identified for the highly proceduralized and technically-constrained pilot training, with the concept of "Line Oriented Flight Training" (LOFT).