

Higher-order instruction by professional driving instructors: A Naturalistic Pilot Study

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Abstract

Purpose: Whilst instructors must meet specific qualification competencies, little is known regarding how competencies are operationalised during instruction. Of particular importance is higher-order instruction, in which key learnings specific to driving events are transferred more generally to both current and future driving. Recent research examining in-vehicle instruction to learners by parents revealed infrequent (6%) use of higher-order instruction (Goodwin et al., 2014), but no studies have examined the extent to which higher order instruction is provided by professional driving instructors. The aim of this pilot study was to explore the feasibility of replicating the Goodwin et al study with professional instructors and to report preliminary findings. *Methods:* Learner lessons taught by six professional instructors over a one-week period were video-recorded. One camera captured verbal and non-verbal in-cabin communications between the instructor and learner; one camera recorded the driving scene. Professional instruction, including learner-initiated interactions, was coded for 10 lessons (5 male learners) according to thematic content. *Results:* The study was successfully conducted with minor technical difficulties able to be overcome. The instructor's verbal driving-related communication consisted of five themes: introductory instruction (eg., adjusting seat; 26%); navigation (12.5%); warnings (15%); positive feedback (10.5%); and higher-order instruction (35%), with approximately 44% of the identified higher-order instruction given during lessons with male learners (1% remainder: negative comments). *Conclusions and Implications:* This pilot study provides support for a larger investigation of in-vehicle instruction to learners by professional instructors and suggests they might provide more higher-order instruction than parents. Research exploring the nature of professional and nonprofessional driving instruction alike is an important avenue for identifying ways that interventions can be improved or developed to increase novice driver safety.

Introduction

Road crash injury is the most common cause of death, and the second most common cause of disability-adjusted life years lost, for male and female adolescents alike (World Health Organization, 2014). In Australia, the over-representation of young people in road trauma is largely attributable to commencing independent driving during the teenage years. In Queensland, for example, where the current research was conducted, 15.3% of fatalities for the year to date to 31 May 2014 involved a driver aged 17-20 years (Transport and Main Roads (TMR), 2014), who represented only 6.2% of the licensed driving population (TMR, 2013a). In the 2013 calendar year, young drivers were involved in 18.4% of hospitalised casualties in Queensland (TMR, 2014), and young drivers are at greatest risk when they transition from supervised driving practice as a learner, to independent driving as a provisional (intermediate/restricted) driver (e.g., Kloeden, 2008; McCartt, Shabanova, & Leaf, 2003).

In July 2007 Queensland's graduated driver licensing (GDL) program was considerably revised (see Scott-Parker, Bates, Watson & King, 2011). Recognising the increased risk during the earliest phases of independent driving, numerous driving conditions for the young provisional driver were introduced. These include the implementation of a multi-stage licence

period (Provisional 1 (P1) minimum 12 months' duration; Provisional 2 (P2) of 24 months' duration), with a hazard perception test required for progression from P1 to P2. In addition, a breadth of learner conditions and restrictions were also introduced. Young learner drivers must now record 100 hours of supervised practice (10 hours must be at night), certified in a logbook that is examined for accuracy and completeness prior to undertaking the practical driving assessment. Evaluations regarding longer learner periods (such as the increase from 6 months to 12 months in Queensland) in which more driving practice can be undertaken, and thus in some instances novices may be older before independent driving is allowed, is supported by evaluations of GDL programs (e.g., McCartt, Teoh, Fields, Braitman, & Hellinga, 2010; Masten, Foss, & Marshall, 2013; Sagberg, 2002; Trempel, 2009).

It is noteworthy that, similar to New South Wales which currently mandates a 120-hour logbook minimum practice requirement (Roads and Maritime Services (RMS), 2014), Queensland learner drivers who utilise the services of professional driving instructors can obtain 'bonus' hours for instruction. That is, one hour of professional driving instruction can be certified in the logbook as three hours of supervised driving practice, to a maximum of 10 tuition hours (30 logbook hours, TMR, 2013b). In addition, Learner drivers in both states can obtain one free professional driving instructor lesson under the *Keys2 Drive* program (see <https://keys2drive.com.au/lesson.aspx>). Indeed, the Queensland licensing authority promotes the benefits associated with using professional driving instruction services with statements like "*a properly trained teacher realises that you are an individual*" and "*the trainer has the ability to develop a teaching plan to suit your needs*" (TMR, 2013b).

Whilst instructors must meet specific competencies to be qualified in Australia, such as the unit of competency *TLIM4001A Develop safe car driving behaviours in others* (Department of Employment, Education and Workplace Relations, 2012), little is known regarding how competencies are operationalised during instruction. There is evidence (e.g., Lynam & Twisk, 1995; Mayhew & Simpson, 1996; Mayhew, Simpson, Williams, & Ferguson, 1998) that professional instruction, combined with adequate amounts of supervised practice facilitate the development of vehicle management and other driving skills, leading to high success on driving tests and high rates of licensure. However, it is not clear that driving instruction and supervised practice adequately prepare novices for independent, unsupervised driving. Hence, novices have high crash during the first year of licensure as they develop the judgment required for safe independent driving.

Best practice is GDE, the Goals of Driver Education model (Engstrom, Gregersen, Hernetkiski, Keskinen, & Nyberg, 2003), which is a hierarchical model of the driving behaviour (and thus, the training, education and skill requirements of the young driver) which would be expected of a *safe* young driver derived from the Michon Model of driver behaviour. Young driver instruction can be conceptualised as progressing through a hierarchy, with skills and abilities at lower levels which are initially taught (Level 1: Vehicle manoeuvring; Level 2: Mastery of traffic situations) influence the skills and abilities at higher levels (Level 3: Driving goals and context; Level 4: Goals for life and skills for living). Essential learning and teaching curriculum are categorised as *knowledge and skills* (fundamental to the driving tasks at each level of the hierarchy), *risk-increasing factors* (which derive from a combination of the various behaviour levels, knowledge and skills, and self-evaluation), and *self-evaluation* (particularly, self-calibration). Interestingly, research has demonstrated that the instruction focus differs between professional and lay instructors, with learner drivers reporting that lay instructors employed risk-avoidance strategies like speed adjustment, whilst professional instructors providing more general instruction including

hazard detection, an essential skill for higher-order instruction (e.g., Tronsmoen, 2011). Notwithstanding that driving instructors appear to be aware that such higher-order driving skills are fundamental to safe driving, in a Victorian survey of professional instructors, *car control skills*, *confident but not overconfident*, and *knowledge of the road rules* ranked 1st and 2nd in a list of characteristics that learners must demonstrate before the driving instructor recommends that the learner attempts the practical driving assessment, with *hazard perception skills* ranking 8th and *anticipating skills* ranking 11th out of the 12 rankings (Fitzgerald & Harrison, 1999).

Theoretically, higher-order skills training would facilitate the generalisation of learning to broader driving situations, which would assist novices in their efforts to learn what situations are dangerous, how they are dangerous, and in what conditions they are dangerous. Higher order instruction could enhance current driving instruction. For example, hazard perception (or recognition) training focuses on skills for identifying potential road hazards, like a child riding a bicycle on the roadside or a pedestrian about to enter the roadway from behind a large vehicle, with research indicating that higher-order skills such as hazard detection and situation awareness can be taught through visual scanning training (e.g., Pradhan, Pollatsek, Knoedler, & Fisher, 2009; Underwood, 2007), hazard perception training via coaching-based teaching during commentary driving, video-based and on-road driving self-assessment, and focus group insight discussions (e.g., Isler, Starkey, & Sheppard, 2011; Isler, Starkey, & Williamson, 2009), and online training (Isler & Starkey, 2012). Higher-order instruction would extend this training by generalising particular potential hazards and cues to similar or related types of potential hazards.

Therefore during higher-order instruction, key learnings specific to driving events are transferred more generally to both current and future driving. Accordingly higher-order instruction may (1) generalise learning beyond the immediate to other related situations (e.g., driving at night is dangerous because it is more difficult to see objects and movement); (2) provide context describing what makes the situation potentially hazardous (e.g., a pedestrian crossing is partially obstructed); (3) emphasises underlying principles (the higher a vehicle's speed the longer it takes to stop); and (4) includes estimates of prevalence and risk (e.g., the risk of a crash doubles when a driver's eyes are off the forward roadway for 2 seconds or longer) (Klauer, Dingus, Neale, Sudweeks, & Ramsey, 2006). For example, rather than simply driving through built-up environments, and instructing the learner driver "Stop the vehicle" if a pedestrian has right of way at a marked pedestrian crossing (including one with traffic lights), higher-order instruction as evidenced by the GDE matrix would encourage the learner driver to maintain vigilance and establish safe long-term driving behaviours through guidance in the form of "Look ahead at both sides of the road in case pedestrians are trying to cross the road, and be aware that inattention which might be because you are feeling tired, you are distracted because you are chatting with your passengers, and the behaviour of other road users may mean you mightn't see a pedestrian".

Furthermore, driving instruction is a somewhat artificial environment in which learners do not have full responsibility for their driving behaviours, which is in stark contrast to when they are independent drivers. Hence there is a need to establish higher-order skills during this training phase that will better transfer to the independent driving phase. The longer learner licence phase evident in many jurisdictions with a GDL program thus appears to be the ideal context for more higher-order instruction. The nature of learner instruction, whether by parents or professional instructors, has received scant attention in the research literature. As noted in Goodwin et al. (2014), some self-report research has explored differences in

instruction between lay and professional instruction (e.g., Tronsmoen, 2011), parental perspectives regarding essential skills for teens (e.g., Mirman & Kay, 2012), and parent-learner interactions (Goodwin, Waller, Foss, & Margolis, 2006). Recent research examining learner instruction by parents revealed infrequent use of higher-order instruction (Goodwin et al., 2014), with analysis of the in-vehicle recordings of the driving-related conversation (61% of all recorded conversation) during the first four months of learner driving supervision for 50 families in the American state of North Carolina revealed that most instruction focused upon *vehicle handling/ operation* (e.g., “You need to slow down”, 53% of driving-related in-car conversation). This was followed equally by *pointing out roadway characteristics* and *negative comments* regarding the learner’s driving (e.g., “The light is red”, 23% and “You took that turn too fast”, 22% respectively); *navigation* (e.g., “Turn left at the next light”, 18%); *positive feedback* (e.g., “Nice job on that turn”, 10%); *asking driving-related questions* (e.g., “Did you see that car?”, 9%); *reassurance* (e.g., “You’re doing fine”, 7%); and *warning of immediate danger* (e.g., “Stop!”, 3%). *Higher-order instruction* was evident only in 6% (e.g., “Try to watch for brake lights a few cars ahead”) of driving-related conversations. Interestingly the prevalence of higher-order instruction over the four-month period remained relatively stable (7%, 5%, 6%, 4%, months one to four respectively).

Notwithstanding that some insight into the nature of learner driver instruction – and the infrequency of higher-order instruction in particular – has been gleaned at this time, there is a dearth of information regarding the nature of professional driving instruction. As such, this paper will explore the nature of the in-car communication of professional driving instructors, including identification of keywords and communication themes, with a particular focus upon understanding professional instructors’ higher-order instruction. In addition, it is noteworthy that this pilot study also serves as a proof of concept and hypothesis generating exercise, allowing testing of the recording protocol, online surveys (as part of the larger project and to be reported elsewhere), and trial application of the taxonomy developed by Goodwin et al. (2014) as part of a larger research project. As such, a number of hypotheses will be generated which will be used to guide the larger research project, in addition to a comparison of higher-order instruction undertaken by parents as reported by Goodwin et al. (2014) and professional driving instructors. Therefore the project has three aims: (1) test the recording and the online survey protocol; (2) classify the verbal communication during professional driving instruction; and (3) compare the classifications to the findings of Goodwin et al. (2014).

Method

Participants and design

As part of a larger naturalistic driving project in south-east Queensland (University of the Sunshine Coast Human Ethics Committee approval no. A/13/530), learner lessons taught by five (one female) professional instructors over a one-week pilot period in May 2014 were recorded via GoPro Hero 3 White Edition fitted with a BacPac battery for extended recording, using a SanDisk 64 GB memory card (transferred each night to a 1 TB external hard drive device). Cameras were affixed to the vehicle dashboard or windscreen. One camera with audio captured verbal and non-verbal in-cabin communications between the instructor and learner; one camera recorded the driving scene.

Procedure

During the one-week pilot, five instructors recorded between 1 and 22 learner lessons each,

Five themes emerged during the thematic analysis: introductory instruction; helping navigate; warning; positive comments; and higher-order instruction.

Theme 1: Introductory instruction

Perhaps unsurprisingly given that the learner and instructor are preparing to embark on a lesson, and that the learner has to adjust to the instructor's vehicle, introductory instruction featured prominently during the in-car verbal communication. Approximately 26% of the verbal communication related to introductory instruction. As can be seen in Table 1, introductory instruction related mainly to configuring the vehicle prior to on-road driving, including manoeuvres such as adjusting the mirrors and the seat.

Table 1. Sub-themes for introductory instruction in the professional driving instructor verbal communication

Sub-theme	Verbatim verbal communication
Seat	When you hop in a vehicle you should always adjust your seat and then put your seat belt on.
Steering	So that's the best position to drive in. If your hands are like that, you can indicate.
Mirror	Adjust your rear-view mirror from your driving position.
Brake	Push your foot on the brake you will feel that.
Clutch	Start bringing your clutch up, take your foot off the brake. Clutch up further.
Gear	Before you change down the gear use your brake.
Accelerator	Don't use the accelerator, just the clutch and brake.
Moving	Adding power and put the handbrake down and we'll go forward.

In addition the instructors appeared to generally follow a procedure, such that learner drivers were seated before placing their left foot on the clutch and pushing their right foot through to the floor to feel whether they are stretching too far or that the pedals may be too close, indicating that their seat requires adjustment to ensure driver stability whilst on the road. Hand placement on the steering wheel also featured consistently, with instructors advising that the learners should place their hands at 9 o'clock and 3 o'clock, rather than 10 o'clock and 2 o'clock, to help prevent the driver from becoming fatigued so they can "drive longer".

Theme 2: Help navigate

Verbal communication that centred around helping the learner navigate the driving environment focused upon four key areas, as depicted in Table 2: merging into the next lane, left and right (across oncoming traffic) turns, and negotiating roundabouts.

Table 2. Sub-themes for helping navigate in the professional driving instructor verbal communication

Sub-theme	Verbatim verbal communication
Lane merge	Get into the next lane before you actually cross the dotted line.
Left turn	Left indicator to tell anyone behind you what you're doing.
Right turn	Time to get into the right lane, so mirror, indicator, shoulder check, and merge as soon as you can where it's safe
Roundabout	Through the roundabout, as you're turning, make sure you stay close to the right side.

Approximately 12.5% of the in-car verbal communication related to helping navigate. As can

be seen in Table 2, instructors appeared to be clear in their directions.

Theme 3: Warning

As can be seen in Table 3, warnings – approximately 15% of the in-car verbal communication – related to negotiating traffic and performing complex and simple manoeuvres alike, ranging from travelling through roundabouts to changing lanes. Simple vehicle control techniques such as not using the clutch too early (and thus, not damaging the vehicle through incorrect operation, whilst maintaining vehicle control) were also evident.

Table 3. Sub-themes for warning in the professional driving instructor verbal communication

Sub-theme	Verbatim verbal communication
Blind spots	Always make sure to check your blind spot before you start going.
Shoulder check	When you go to take off, change lanes, turn, roundabout, you have to do that mirror, indicator and shoulder check.
Mirror	When you are moving to your right, check your right mirror. When you are moving to your left, check your left mirror.
Indicator	Indicate in good time.
Clutch	Don't put the clutch in that early.

Theme 4: Positive comments

Instructors appeared to provide supportive and encouraging feedback throughout the learner driving lessons (approximately 10.5% of the in-car verbal communication, Table 4, with 1% only of in-car verbal communication consisting of negative comments). This was evidenced as reinforcing safe and correct driving manoeuvres (e.g., turning, early braking), and safe and correct vehicle operation (e.g., smooth gear changes, merging with existing traffic flow).

Table 4. Sub-themes for positive comments in the professional driving instructor verbal communication

Sub-theme	Verbatim verbal communication
Acknowledging good turning	Very nice. Alright, no problem with that one. Right turn.
Acknowledging early braking	You brake plenty in advance if there's someone coming up behind you, right there is good.
Acknowledging speeding up during lane merging	You're going to merge, the speed of these oncoming cars, the better. Pick your speed up, nice early plan of attack.
Acknowledging smooth gear changing	That was a real good gear change.
Acknowledging good road positioning during u turn	Can you do a u turn up there and then come back. Your road position is good.

Theme 5: Higher-order instruction

Higher-order instruction was also evident during the learner driving lessons (see Table 5). Approximately 35% of the in-car verbal communication could be understood as higher-order instruction. Instructors reiterated the importance of remembering what street signs had been previously encountered, and the need to subsequently recall their importance, as an important part of safely negotiating the driving environment. Higher-order instruction was often

evidenced as ‘tips’ during which instructors gave learners general driving advice, and such tips frequently were prefaced with the keyword ‘always’. Appropriate responses to potential hazards were also suggested, such as removing the right foot from the accelerator in case urgent braking is needed. In addition, many *warnings* (see Table 3) also prompted higher-order instruction (eg., “Always make sure you check your blind spot”). It is noteworthy that Table 5 also summarises the elements of higher-order instruction, such that (1) = generalise; (2) = contextual learning; (3) = underlying principles; and (4) = estimates of prevalence or risk (not illustrated).

Table 5. Sub-themes for higher-order instruction in the professional driving instructor verbal communication

Sub-theme	Verbatim verbal communication
Reading signs	You might remember that the sign shows road swings very sharply up ahead, at the dead end.(1)
Considering all checks	Look into the street before you proceed. Always look at the street before you go in (1). While you are driving always keep your eye on centre of the lane, keep thinking ‘check’ so you can see who might be coming up behind you. (1, 2)
Watching front traffic movement	You need to always look in the direction you’re gonna go. (1) If you are looking at the upcoming traffic, you could drive that direction. (3)
Hazard perception	Figure out if you have to stop quick, you might come off the accelerator just in preparation. (1) This is a park, so you’re going to slow enough to brake quickly in case a kid or something ran. (2, 3)

Relationship between keywords and instructor verbal communication themes

The relationship between the keywords and the instructor verbal communication themes was also examined. As can be seen in the map depicted in Figure 2, there is a variety of interrelationships, such that only a handful of keywords pertain to one theme only (e.g., ‘forward’ was only evident in the *introductory instruction* theme; ‘blind’ was only evident in the *warning* theme; ‘people’ was only evident in the *help navigate* theme), whilst other keywords were captured within numerous themes (e.g., ‘always’, ‘change’, ‘check’, ‘behind’, ‘better’, and ‘close’ were represented differentially across the five themes). Of particular interest, keywords relevant to the higher-order instruction theme were commonly shared with the domains of *warning*, *positive comments*, and *helping navigate*, with only two shared keywords with the *introductory instruction* (‘always’, ‘drive’).

Additional analyses were also undertaken to explore the impact of learner gender. Interestingly approximately 44% of the identified higher-order instruction was given during lessons with male learners, with the remaining 56% given during lessons with female learners. In addition, common teachings were apparent across instructors, such that the same instructor provided similar and verbatim guidance with each of their learner drivers.

Discussion

The first aim of the pilot was to test the recording protocol and the online surveys (to be reported elsewhere). In this regard, the recording protocol was a success. The second aim of the project was to classify the verbal communication during a sample of learner lessons supervised by a professional driving instructor. In this regard, the thematic analysis revealed five categories of introductory instruction (26% of the verbal communication); helping

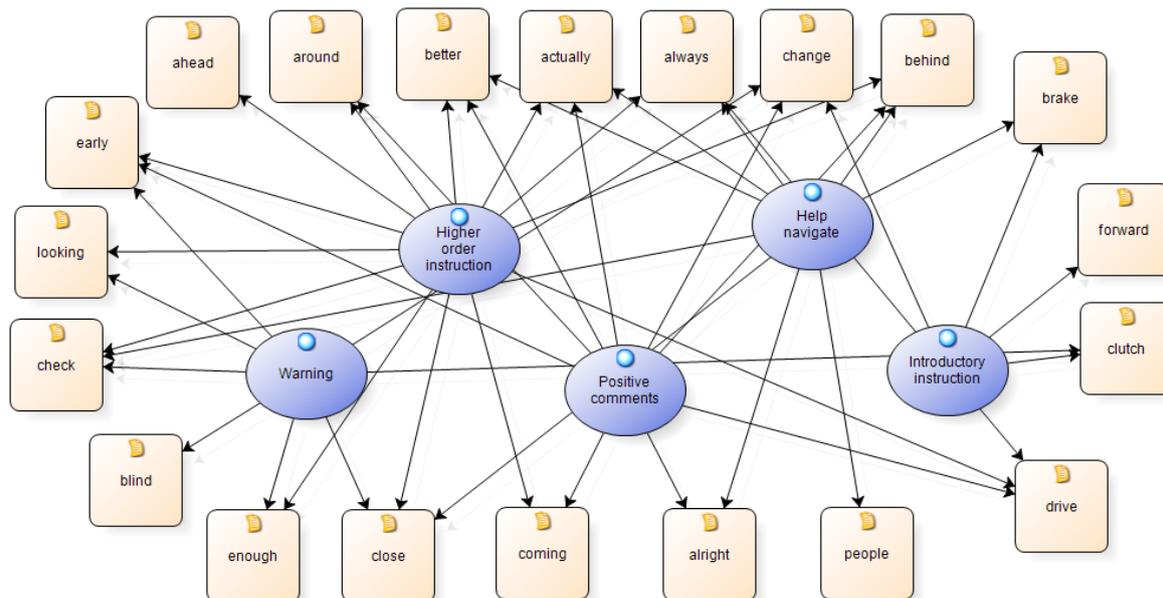


Figure 2. *The relationship between keywords (rounded squares) and the instructor's verbal communication themes (ovals)*

navigate (12.5%); warning (15%); positive comments (10.5%); and higher-order instruction (35%). Instructors gave a range of instruction in complex driving environments like roundabouts, with such instruction consistent with the findings of earlier research which has compared the instruction of professionals and lay instructors (e.g., Tronsmoen, 2011). Given the reticence of learners to negotiate roundabouts, and multilane roundabouts in particular, identified in earlier research (e.g., Scott-Parker, in press), instructors may be ideally placed to assist in gaining experience in such complex environments, assisting in confidence-building for the Learner. Perhaps most importantly, many verbal communications relating to 'warning' also pertained to hazard perception, indicating that the instruction could be extended and thus become higher-order instruction.

In general, the most common verbal communication by professional driving instructors during a supervised learner lesson related to higher-order instruction (35%). This finding is in stark contrast to that of Goodwin et al. (2014), who found that higher-order instruction by parents was infrequent (4%-7% of instruction). This finding may reflect the teaching competencies and qualifications required of professional driving instructors. It is noteworthy, however, that at this time the optimal amount and nature of professional driving instructor higher-order instruction remains unknown. In addition, higher order instruction appeared to generate from warnings, more broad hazard perception and navigational guidance; and further analysis of the verbal transcripts and on-road recordings are required to determine the number and variety of 'missed opportunities' for higher-order instruction. That is, the next step will be to clarify whether instructors are translating "teachable moments", such as critical driving events (eg., emergency braking in response to another driver's hazardous manoeuvre) in addition to general high-risk driving environments (eg., school zones), into higher learnings that the novice driver can translate into the driving context beyond the supervised learning licence phase.

Perhaps unsurprisingly, the next most common (26%) communication related to introductory comments, including configuring the car and fundamental safety checks prior to driving on

the road. Again, this is in stark contrast to Goodwin et al. (2014) (such communication was not specifically identified, and may be captured to some extent within the authors' category 'instruction – vehicle handling or operation'). This verbal communication appears to reflect the novel environment of the driving instruction vehicle. In addition, this verbal communication may reflect to some extent the new relationship which develops between the driving instructor and the learner themselves throughout the professional driving instruction lesson.

Warnings (15%), helping to navigate (12.5%), and positive comments (10.5%) also featured throughout the professional driving lessons, with very few negative comments. Whilst similar proportions of positive comments were apparent in both the pilot instructor study and Goodwin et al. (2014) (parents: 10%), less navigation guidance (parents: 18%) and substantially more warnings (parents: 3%) were evident in the professional learner driving lesson. These findings merit further investigation, particularly as parents may (mistakenly) believe that they should focus upon navigating throughout the journey. Moreover, parents may not realise that the learner requires instruction regarding actual and potential hazards and other driving risks, and that this guidance requires not only verbalisation, but ideally higher-order instruction. Furthermore, virtually no negative comments were apparent in the professional driving lesson, in stark contrast to Goodwin et al. (2014) (parents: 22%). This finding may reflect the idiosyncrasies of familial life, and the pre-existing relationship between parents and their children.

Notwithstanding this discussion, the in-car verbal communication between 50 supervising parents and learners was captured over a four-month period in the Goodwin et al. study and the current snapshot of the driving lessons captured over a one-week period amongst five professional instructors and ten learners may therefore have captured less variability and not be comparable. Of particular interest for future research is identifying whether the proportion of higher-order instruction increases over the learner licence phase (as it should as indicated by the GDE model), to maximise learnings for the independent driving phase); the variability among instructors; the variability among students within instructors; and the nature of maximum higher-order instruction from a 'model' professional driving instructor. Such information can also inform the higher-order instruction proffered by parents during the learner phase. Only through higher-order instruction can learners begin to generalise learning as they will need to as independent drivers.

The pilot project had a number of strengths and limitations. Strengths included a highly-innovative and novel naturalistic study that incorporated verbatim transcription of professional driving instructors' in-car verbal communication. Limitations included a small voluntary sample (professional instructors, learners) of thus unknown representativeness; and limited sampling timeframe (one week). However, this study was a pilot study and was successful in demonstrating that the recruitment process and the overall research protocol were feasible. Apart from the few technical issues (noted below), such pilot studies are essential for the development of larger projects, and are essential for testing protocols and troubleshooting problems prior to large-scale application. As noted earlier, due to constraints the coding was undertaken by one individual only; however the taxonomy used by Goodwin et al., (2014) was operationalised. The larger project will operationalise a taxonomy that appears relevant to the GDE matrix. In addition, consistent with the nature of pilot projects, a number of technical issues were identified, including difficulties coordinating charging of recording equipment and uploading of recorded lessons; and transcription difficulties (loud vehicle sounds eg., engine; quiet conversation; lengthy transcription duration).

Notwithstanding this, the GoPro devices captured clear images and all sounds in the environment. Finally, the nature and structure of the coding taxonomy, coding reliability, and protocol for adjudication of coding differences will need to be resolved in the larger project.

Conclusions

Over time, new drivers eventually develop the judgment that allows them to drive generally crash free. However, this can take years for many young novice drivers (McCartt, Mayhew, Braitman, Ferguson, & Simpson, 2009). A goal of higher-order instruction is to reduce the amount of independent driving required before novices become safe drivers by providing the type of instruction learners need for safe independent driving, consistent with the GDE model. As part of a larger project, this pilot study confirmed the efficacy and suitability of the recording protocol, allowed an application of the Goodwin et al. (2014) taxonomy, and allowed unique insight into professional driving instruction, and higher-order instruction in particular. The instructors' verbal driving-related communication consisted of introductory instruction, navigation, warnings, positive feedback, and higher order instruction. In a small, volunteer sample we found that 35% of instruction was higher order, higher than the 5-7% found in one study for supervising parents. Further investigation is required to identify the nature and breadth of missed opportunities to translate key learnings through higher-order instruction. In addition, further research can identify whether the proportion of higher-order instruction increases over the learner licence phase (as it should, to maximise learnings for the independent driving phase); explore the variability among instructors and the variability among students within instructors; and the nature of optimal higher-order instruction from a 'model' professional driving instructor. Such information will reveal heretofore unrealised avenues of intervention during the learner phase, for both professional and parental supervised driving.

As a proof of concept and hypothesis generating study, a number of questions are posed by the findings, including

1. How much variability in higher-order instruction is there among and within instructors?
2. Does higher-order instruction increase over time throughout the learner period? This is particularly important as it would be reasonable to conclude that learners would benefit from more higher-order instruction as they become more experienced drivers.
3. Is higher-order instruction related to the learner's subjective evaluation of the lesson and/or the instructor?
4. Is higher-order instruction related to independent driving performance?
5. How do parents and professional instructors differ in their higher-order instruction (content and processes)?
6. What are the attitudes and perceptions of professional instructors and the learner students?
7. What is the relative satisfaction and eventual driving performance of young drivers who receive more or less higher-order instruction?
8. Can parents be trained in higher-order instruction by professional driving instructors?
9. What is the eventual driving performance of young drivers who receive more or less higher-order instruction from parents and professional driving instructors?

These and other questions will be addressed in the larger research project which will operate the same recording methodology.

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