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Abstract:

Although the vehicle horn is a minimal audible unit for communication, we will show that its uses are impressively varied. Drawing upon a corpus of video recordings from dash-cams, we show how drivers use the horn for creating awareness; how they target particular vehicles; how they use it for warnings, for complaints and in instructing the seeing of an aspect of an ambiguous traffic object. The driver's use of the horn involves, firstly, their sounding it in recognisable relations to past, current and projected configurations of traffic on the road. Secondly, it involves drivers manipulating the vehicle horn in order to create sounds of shorter and longer durations which can then produce hearably distinct actions. Thirdly, and finally, the driver can use the horn as an initiating or responsive action in relation to the actions of other members of traffic. The data are from road users in Chennai, India.

A Horn with a Car Attached

Chennai drivers' generous use of their car horns is one of the first things foreign visitors to the city notice. Their regular sounding of their horn echoes cultures of noisy driving found elsewhere in India and many other densely populated cities around the world. By the horn's frequency alone, one gets a sense that it is being used routinely for more and noticeably different purposes than the horn in, what we can gloss as, "quieter places". Although only a minimal communicative entity, the "beep" plays a central part in the interactive organisation of road traffic, just as the beeping, ringing, and twirping of audible technologies, such as phones, does in all manner of other settings. For the field of mobile interaction, horns are a a novel technology to consider because existing studies have tended to concentrate on the visual aspects of traffic, such as signs, traffic lights, indicators, queues and trajectories while overlooking the part played by sound in producing traffic's witnessable order.

Drivers, passengers and other road users make sense of beeps in relation to actions within traffic gestalts (such as a queue at a junction or lanes merging on a motorway). Traffic gestalts, in turn, are assembled out of relevant features such as vehicle orientation, speed, inter-vehicle adjacency pairings, lane position, queue position, row position, junction configuration etc. (Deppermann et al., 2018; Livingston, 2008) The explicit signalling through the horn is, then, only one part of the sense-making practices of members of road traffic. As we shall describe in this article, how drivers use their horns is understandable by its reflexive relation to each current and emerging gestalt.

By comparison with drivers activating indicators or hazard lights, the horn's sounding can be precisely timed and the horn can be sounded as singles or doubles, as well as, in repetitions of singles and doubles. By comparison, indicators and hazard lights are designed as repeating

(or prolonged) signals. If a driver wishes to communicate instantly with another vehicle or pedestrian, they use the horn or the headlights. Headlights have similar communicative properties to the horn, though require that the headlights are already in the visual perspective of their target and that their target is ahead of the flashing vehicle. A beeping vehicle, however, can be heard by other vehicles and other users of the road in all directions. A driver can hold the horn in order to increase its duration and loudness; or repeat it in distinct rhythms. The lowly beep, then, is a surprisingly malleable communicative resource when local norms allow its regular use.

Although in "quieter places", drivers sound the vehicle horn most commonly for reprimanding other members of traffic, as we noted earlier, we found it regularly being used for an array of actions: *approaching vehicles; producing offers; hurrying other vehicles; requesting other vehicles to move; appreciating the actions of other vehicles* and so on. It is not that the horn cannot and is not used for these purposes in hushed, rumbling road cultures but, we would argue, it isn't common, nor expected. It is, for instance, special vehicles such as emergency services that are category entitled to make those uses of the horn. What we will describe and analyse in this paper is, then, how the beeping of a horn is produced recognisably and accountably as part of courses of action.

Mobile interaction

The organisation of traffic as a collective accomplishment reaches back into the early studies in ethnomethodology, membership categorisation and conversation analysis and interest in it continues in recent EMCA studies of mobility (Haddington, Mondada, & Neville, 2013). In the influential early investigations by Lee and Watson (1993) of public space, the movement

of pedestrians was treated as a context-renewing and context-sensitive practice (ibid, p1). Pedestrians organise themselves through category-flow and category-articulation, so that a pedestrian in a market could flow through the categories of "passer-by" to "browser" to "customer". In Lee and Watson's (1993) studies they distilled minimal analyses of spatial phenomena, not least from the varied forms of queues and lines produced by members of public spaces, members that were found in motion and at rest. Queues produced categories of "1st", "2nd", etc. and "last", and made intelligible, and accountable, moral features, such as queue-jumping. Lee and Watson underlined the routine use of adjacency-paired actions by pedestrians to organise their conduct, an adjacency that was based as much on the adjacent spacing between pedestrians as it was on the adjacent timing of one action in relation to another. Watson (2005) underlined that public space is a *visible* social order that is locally assembled.

Recent EMCA studies have turned toward how members of traffic use the infrastructure of lanes, pavements, traffic lights and road markings to organise which vehicle should progress and where particular parties ought to be at any time (Haddington et al., 2013) and how vehicles produce traffic orders in its absence (Liberman, 2019). As Smith (2017b) summarised it, spatial categories are bound to vehicles' rights to progress in those spaces. Consequently, the "cycle lane" is then seen as bound to "cyclist" and "pavement" to "pedestrian". Traffic infrastructures are central not only to producing and recognising the positioning and the progression of vehicles while moving, but also in the emergence and settling of disputes around which party had the right to be where they were and to progress ahead of other vehicles. As we shall see later, one of the "cultural" aspects of driving in unfamiliar traffic cultures is discovering other rules of the road for positioning and progression in relation to infrastructures and another is encountering novel categories of vehicle with unfamiliar local expectations of speed and maneuverability. The novel vehicles

are usually coupled with distinctive sets of rights. In our case, in Chennai, the autorickshaw (AKA "tuk-tuk") is just such an unfamiliar category of vehicle. Equally, as we noted above, the road lanes themselves are used and seen differently in terms of where categories of vehicle are expected to travel, and entitled to sit within.

As we will argue, *paired actions* are spatially tied to, and generated via, traffic infrastructures and vehicle trajectories, acceleration, deceleration, positioning within queues, convoys, lanes, boxes etc. An example of a common and expected adjacency pairing of moves, drawing upon the spatial arrangement of vehicles, is an *offer* in the form of a gap in a queue produced ahead of a vehicle and an *acceptance* by the other vehicle by moving into the gap (Deppermann 2019; Haddington & Rauniomaa, 2014; Laurier, 2019). In another common action sequence, the adjacency pairing produced by a vehicle behind *overtaking* a vehicle (or vehicles) ahead leaves open how the other party responds to the action. The "overtaken" could make apparent *assistance* or *resistance* by either slowing to let the overtaking party past or accelerating to block them (Deppermann et al., 2018). In our analyses we look at the horn's placement in these gestalts and action sequences as expected and relevant in traffic.

Mobile formations such as queues, constellations, parades, clumps, flotillas, flocks etc. are 'accomplished interactionally and attended to by participants as a constitutive part of those practices while mobile or on the move' (McIlvenny, Broth, & Haddington, 2014, p. 104-105). Traffic is itself a sprawling and loose formation of vehicles travelling together. In each local circumstance of movement by vehicles, in particular infrastructures, there are varying mobile formations. We have already mentioned the traffic queue and we shall see later vehicles moving to join a queue. Vehicles can move position within mobile formations, for example,

they can ‘go in front’; ‘drop back’ ‘tuck in’ etc. (McIlvenny, 2014). In meeting looser clumps of vehicles travelling at the same speed on multi-lane roads, vehicles approaching can orient toward them as a collective, or, they can single out individual members of the clump. The relative timing and positioning of vehicles within mobile formations is significant in drivers using the horn to beheard in relation to: positioning within or outside the formation; selecting the entire formation; picking out members of the formation.

One key focus of studies of the categorial organisation of traffic has been junctions. Junctions are are where rights to progress are displayed, accepted, resisted, disputed and, in other ways, locally produced by members of traffic (Smith, 2017a; Liberman, 2013, 2019). The junction studies have shown how the negotation between individuals is displaced in favour of traffic’s devices, where the central device being used, made sense of and rendered intelligible by the members of traffic is the junction itself. The cohorts crossing one another’s path at a junction is distinctive from the problems and visibility arrangements relevant to members of traffic journeying onwards such as on motorways. There are then distinct problems and visibility arrangements that emerge for the driver: in moving through traffic-light controlled junctions; in passing through roundabouts; in driving through shared spaces (Smith 2017a) in moving with, overtaking and departing from others as members of traffic (Deppermann et al., 2018). What is predominant across the studies of mobility in public space, be they for traffic at a junction or vehicles travelling in traffic, have been their basis in visibility arrangements. In the organisation of traffic, vehicles’ audibility and hearability in screeching brakes, revving engines and beeping horns is subordinate to its visibility and see-ability. Subordinate, as we argued at the outset, because what is heard is made sense of in relation to what is seen. Yet, just as it is with gestures and gaze relying on talk, they nevertheless shape how that talk is to be heard, who it is directed toward, pre-figure actions etc. so it is with the making of

mechanical sounds. The mechanical sounds of traffic, then, are a significant members' resource worthy of further consideration.

Using mechanical audio devices

In investigating the mechanical audio of the horn as an organisational thing in local orders of traffic, a promising place to begin is with the EMCA studies of the "summoning phone". The phone's ring is situated in distinct and significant work in both ethnomethodology and conversation analysis: in conversation analysis it is the first action in a summons-answer sequence in Schegloff's (1968, 1979) studies of the beginnings of phone calls; and in ethnomethodology it is part of Garfinkel's (2002) student tutorials as an exercise of recording phones summoning different kinds of answerer. As Bjelič (2019) argues, these studies were at different purposes: Schegloff's analyses were built around "hearership" and Garfinkel's around "hearability". For Schegloff, treating the ringing as itself an action in talk, he seeks "to prove that a telephone ring has the character of a summons for an answer" (Bjelič 2019, NYP) and, in so doing, set aside other qualities of the ringing phone. Garfinkel's exercise was concerned with re-finding what escapes the recording and the transcription of the recording. Even though the telephone's ring is the same sound, the called parties heard the ring as "hearably summoning someone" and "hearably summoning me" (or, "hearably summoning the owner who is not here" or, "hearably summoning my neighbor," etc.) (Bjelič 2019). The ring of the phone is relevant to understanding the beep of the car, as both are mechanical sounds whose use is woven into settings where it is hearable by members as part of those settings and might be and/or ought to be responded to by members

of those settings. Missing from Schegloff's recording and account was how those in the room look to see who, when and whether it will be answered. Using video recordings of call centres, Mondada (2008) revisited the ringing of the phone to show the seeable multi-activities around its ring and those actions which precede it and may require closing, interruption or suspension. The beep of the vehicle horn presents a similar question: who is this for?

In the classic inquiries into the summoning phone, there is a concern with the 'called party' hearing the phone ring as a summons-answer sequence, rather than the actions leading up to the caller making the phone ring and what more the caller might be doing. Our orientation in this article shifts away from the hearing of mechanical sounds toward the perspective of the parties *making* the mechanical sounds to be hearable as: for, or at, particular members of traffic and as traffic-relevant actions. As Bjelič (2019: NYP) mentions in passing '[b]y making a phone call, the caller targets another phone and produces a summons in a particular setting, which in turn activates the setting's internal constellation of occasioned hearings.' The drivers' expectation is that while other aspects of their driving-actions might be accidentally missed, or deliberately ignored, the horn is unavoidably hearable, even as it remains ignorable. Our concern is with the procedures that drivers use to direct their horn at multiple or singular others in traffic, so that it is hearably directed at them. As Bjelič (2019) notes of calling out 'John' in a crowd where there are multiple Johns, most of those Johns can hear 'John' as not directed at them. Yet, of course, the caller of 'John' produces their calling in ways that make it hearable as: John is nearer or further, has been seen or remains unseen, is in trouble or is not.

For the driver, their sounding of the horn is tied to the visibility of other road users' actions that either the horn is a relevant *response* to, or, that monitor for responses when the horn seeks to *initiate* action sequences. As Liberman (2019, p. 7) notes, driving practices are not just an execution, but an exhibition of such practices. This witnessable character makes certain actions potential targets for horn sounding and, as we shall see, drivers draw on the witnessable order of traffic to make the horn hearable as directed at someone. In addition, vehicles have directional qualities of facing/moving forward which make it possible for a driver to project the sound of the horn as directed at a specific road user. Proximity and relative positioning of vehicles can also operate as a resource for the driver to target the horn at another road user. Finally, as we hinted earlier, particular mobile configurations – such the nose-to-tail position – can function as a way for the driver to target the horn.

While we will not focus in what follows on the intra-vehicle responses to the vehicle horn, given it is also heard by passenger, we can note that studies have been done on the car's intra-vehicle audio – listening to music (Bull, 2014) and, from a conversation analytic perspective, turning down music (Heinemann & Rauniomaa, 2016). Nor are we looking at the use of the unattended vehicle horn as an alarm system, though audible alarms have been studied elsewhere (for example Heath et al., 2002; Licoppe, 2010). Nor, finally, are we studying summoning as an action, even though there are circumstances, such as where a vehicle, blocked by an empty vehicle ahead, the horn is used to summon the driver to return and shift their vehicle out of the way.

Data Collection

The video data used for studying horn use were originally collected as a corpus by Chandrika Cycil for her doctoral research on family car travel and mobile media (see table 1) where consent was given for the use of its data in future research projects. For more details of the earlier project 'AutoMedia' see: https://familylifecarsandmedia.wordpress.com. Cycil gave written permission for her video corpus to be re-used as part of a later project on cross-cultural driving practices,. In that project, we examined approximately 18 hours of recordings of driving from the Chennai data (see table 1). Sub-clips were created, tagged and assembled as collections. Horn use emerged as a perspicuous case of a culturally variable driving practice and we enlarged our collection of events featuring vehicle horns.

The existing corpus from Chennai was recorded with an early model dashcam, with dual lenses providing interior and exterior views in SD resolution. It had an unshielded low-quality microphone which provided challenges in hearing details of talk and other audio. Fortunately, the horn is itself designed to be heard through background noise, although car horns, from outside of the interior of the vehicle being recorded, are almost impossible to hear (with the exception of emergency vehicles).

Table 1. Chennai Data – about here

Findings: What beeping does

To provide illuminating comparisons we will describe different occasions of horn sounding and the gestalt of traffic that shapes, and is shaped by, the driver's sounding of the horn. Not only are these different occasions but we found differences in the sounding of the horn itself. It is produced not just as a "beep", but as a "bip", a "beep beep" and a "beeep" each which is

then locally and singularly sensitive to the trajectories, speeds and configurations of other members of traffic. In other words, the variety of horn formats allows the driver to utilise their duration, repetition ("bip bip") and non-repetition ("bip beep") in initiating and responding to what is happening. Left out of Garfinkel's exercise, callers on the phone use very short rings to signal different actions without requiring the called to pick-up (used in low income situations to avoid charges), extended rings (e.g. to show suspicion that the called is not picking-up) or repeated short rings (used to e.g. make hearable on a landline that the caller is not a marketing call). As we have argued,the driver's intelligible use of the horn is reflexively tied to the unfolding action on the road through both its timing and its spacing. Each beep is timed and spaced by the analysis of visible courses of actions in traffic, themselves produced through the resources of the road infrastructure and the relative orientation and current and projected positioning of road users. The events we will examine show the sounding of the horn as involved in initiating, pursuing, offering and acknowledging movement in, and through, traffic. We will show the horn's role as a resource in: producing awareness of a vehicle's approach; as part of requesting an obstructing vehicle to move; alerting another road user of a potential collision course; and, finally, as part of making and clarifying an offer.

Approaching a mobile formation and >bip bip<

From reviewing the video course it became evident to us that vehicles in mobile formations in Chennai regularly position themselves on multi-lane roads to allow for vehicles overtaking in the middle. They maintain, when possible, a gap to their side of the standard size of a car or anything smaller (e.g. a motorbike overtaking ahead of a car). There is, then, in the

collective assembly, a permeable structure. In other busier and slower-moving traffic situations, the "free-flowing" formation alters and the side-gaps are closed by tighter vehicle positioning though even then these narrower gaps remain permeable to motorbikes and pedestrians. In moving through these mobile formations, drivers use the horn to make one or more vehicles ahead aware of the approach of a car from behind. With the use of their horn, the driver behind seeks the attention of the driver, or drivers, in front, thereby establishing a "passing relationship" with them. Transcript 1 shows how a driver uses their horn use for awareness (this extract takes place on a dual carriageway) and intimating a passing relationship.

Transcript 1 about here

Our car (equipped with the camera) is approaching vehicles ahead in a mobile formation (McIlvenny et al., 2014) and it is in the left lane, having just overtaken a car in the right lane (see transcript 1, panel 1). The mobile formation, when it first appears ahead of our car, is constituted out of two motorbikes side-by-side in the left lane, one overtaking the other, with two cars nose-to-tail in the right lane (panel 2). The cars in the right lane are initially positioned behind the two motorbikes in the left lane. Our driver is on a rightwards trajectory from the left lane, he maintains a steady speed (e.g. no noticeable acceleration or deceleration). As our driver closes in on the first black car, he beeps his horn (panel 3). The beep is double and short (e.g. >bip-bip<). He proceeds to pass the black car and then the red car, that are on the right side of the right lane (panels 5 & 6). During the passing, our driver is roughly in the middle of the two lanes, although due to the passenger-side positioning of the camera, the view appears to situate our vehicle further to the left than it is. Continuing in the middle, our car passes a motorbike on the left lane, positioned to the left of that lane. The

other motorbike, that was beside the first motorbike when he began the manoeuvre, has moved ahead at a fast speed (panel 6). As the fragment finishes the driver is moving into the right lane.

As we noted earlier, the horn is used to make the mobile formation ahead aware of our driver's approach, thereby establishing them as collective recipients for the driver's next action of moving through them. The horn here is both directed at the mobile formation and seeks to create awareness of approach, rather than, say, a reprimand. The horn is produced in a shortened form: "bip bip". Shortened bips are produced by the driver to be hearable as distinct from a problem marker. A longer duration horn - "Beep beep" – is regularly produced as part of marking a mobility-progression problem. It is a form so familiar that when pedestrians find someone blocking their way, they often say "beep beep". Our driver also only sounds the double-bip once. Looking back at panel 3, there are no vehicles directly ahead of our car when the bip-bip is sounded and so our car's positioning is seeable, by other members of the local traffic cohort, as not obstructed by another vehicle. There is a nearest vehicle in the formation: the black car, but it is in another lane. In these senses, the relative spatial arrangement is part of the gestalt that the driver uses to establish their sounding of the horn for awareness of approach rather than clearing a way through. The driver's use of the bip bip on approach has the action implication, then, that other vehicles should maintain their position.

In transcript 1 and in the transcripts that follow there are two methods by which horns are made hearable by drivers as directed *at*. Drivers draw on the qualities of vehicles as oriented-objects (Garfinkel, 2002), with a front and a back, with a preference to be driven forwards and expectations around what ought to be easily visible to them and what is peripheral, or in a

blind spot. Given the directional qualities of the vehicle, what the driver is pointing their vehicle at, or moving toward, provides them with an analysable direction of their beep. Moreover, when two vehicles are nose-to-tail in a traffic file their arrangement creates a standardised relational pairing in terms of their adjacency as a *vehicle ahead* and *vehicle behind* (Watson, 2005; Deppermann et al., 2018) or here a cluster of vehicles ahead and a vehicle behind. On the basis of this pairing, when the horn is used by a driver, where they are the vehicle behind, then they generate a hearable forward orientation.

The driver's double bip is a pre-manouevre marker of a routine approach that, for the vehicles ahead, makes the maintenance of their position in the mobile configuration accountable. Any shift in their position ought then to be oriented toward the progression of our vehicle. As we shall hear later, beeping is produced by drivers in different formats, formats which would attune drivers ahead toward what its sounder is doing, yet how they are heard is always analysed in relation to the sequentially emerging visibility arrangements of local vehicles. In the absence of first actions that are beep-able, the driver can produce the horn as a first action that raises the accountable awareness of the arrival of a vehicle from behind. To paraphrase Bjelič (2019) the driver uses their analysis of the configuration ahead to produce the horn as hearable as emerging out of an absence of 'hornable actions'. Members of the mobile formation are seen by the driver as *not* doing actions that carry relevant next actions of reprimand or caution (e.g. swerving, rapidly decelerating). When using the horn as a *response,* the driver pairs its sounding to an immediately preceding, spatially adjacent morally questionable or high risk action. We do also need to keep in mind, that just as with all action sequences, there could be incongruities in the format of horn selected by the driver, not least because it was by accident or that they are mistaken, or incompetent or mismatched or up to something else. We can imagine, for instance, for our driver in transcript 1, instead

of bip bip, producing an extended BEEEP as a first action. It would provide not only awareness but also a sense of urgency to their progression through the configuration. As actually happens, then, the driver is using the horn in stabilising the potential gap they have found, to progress through at an average speed. In the next section we shall see what happens when there is no gap to progress through.

Beep-beep, bip-bip, bip – Targetting one vehicle

Transcript 2a about here

While the events in the previous section helped us establish how sounding the horn can be used by a driver as part of pursuing progression through a mobile formation, what we now turn to is the targeting of a vehicle that is obstructing the driver's progression. It is in this situation where we have a more substantial passing relationship between two vehicles given that they mutually monitor one another's manoeuvres and organise these movements in relation to one another (see also Deppermann 2019). Our parallel interest in this section will be on the driver beeping in a series.

The road setting (in transcript 2a) is a dual carriageway and our car is in the left lane. Ahead is an autorickshaw, on the right side of the left lane (panel 2). In the right lane, further ahead, is a silver car, positioned to the far right. Further ahead again, by the kerb, is a slow-moving bicycle. Our driver initially positions his car to the left of the left lane, where there is a side-gap (panel 3). He then changes direction to drive to the right side. When he is nose-to-tail with the autorickshaw, he produces a double-beep (panel 4).

The first sounding of the horn is produced in a way that is distinct from the clipped character of the routine awareness-beep of our first case. It is a beep-beep rather than a bip-bip. The quality of the beep as *beep*, is in keeping with the driver producing its hearability as a request for a vehicle ahead to move out of the way (rather than remain where it is, as was the case earlier). Not only is the beep less brief, but it is sounded in sync with our car being significantly closer to the vehicle ahead than was the previous case. Moreover, it is sounded just when our car's trajectory carries it into a nose-to-tail position. The proximity and position of the two vehicles thereby selects the vehicle ahead of our car as its target.

Our driver continues rightward until his car is more in the right lane than the left (panel 5), he remains, however, on top of the lane-dividing-dashes.

Transcript 2b about here

He produces a second double sound of the horn, this one hearably shorter in duration, a bip-bip (panel 7). The autorickshaw, having overtaken a bicycle successfully (panel 6), begins to move leftwards (panel 8). By doing so, it opens up the middle of the lanes. Our driver then swings slightly back to the left. While narrowing the gap with the autorickshaw and thereby increasing the pressure to overtake, our driver sounds a third bip-bip. Our driver also moves toward the centre of the lane-dividing-line and the side-gap. At the same time, from the nearside door of the autorickshaw, the driver's hand appears, waving our driver onward while steering the autorickshaw toward the left, thereby opening up a clear gap (panel 9). While our driver begins to pass the autorickshaw (panel 10), he makes a final single bip as part of the acknowledgement of the autorickshaw's offer (Laurier, 2019). To provide a sense of how

using a bip produces an acknowledgement, we can imagine our driver making an extended bee::p instead. To beep extendedly could be hearable as a complaint, by an analysis of the autorickshaw's delay in moving out of the way. One where it is then equally imaginable that the autorickshaw would make a different kind of hand gesture in response.

Given that the first beep-beep selects a particular vehicle, what it provides for is the initiation of a sequence, with an ongoing recipient for immediately next beepings. Of course, one complication here is that there is, initially, an absence of response from the target vehicle. A response which would have demonstrated that it had understood that it is the target of the beep-beep (indeed, not providing responses is often used to tactical advantage in traffic encounters (see Smith, 2017a on "doing oblivious"). Given the second horn is produced to be heard in relation to the first horn, it is to be heard as *persisting* by its reduction to a bip-bip, not escalating. In its gentle audible nudging, rather than shoving, it provides a contrast with expressions of anger in other road communications (Katz, 2001).

Our driver's next sounding of the horn appears to be timed to the autorickshaw successfully passing the bicycle. If so, it shows how our driver is monitoring the autorickshaw's overtaking, and using the horn to mark just when they see the overtaking as completed and the autorickshaw should be able to move out of the way. Indeed, that the horn is tied to what the driver sees is evidenced by what happens next: the autorickshaw edges toward the left but it does not open up a full gap on time. Consequently, our driver sounds the horn for a third time, though note that it is produced again in the "calm", bip-bip form. Meantime, in overlap, the autorickshaw-driver's hand waves our car onward. The hand gesture would seem to be designed to attend to the ambiguity of the autorickshaw's minor change in trajectory. The gesture makes clear that the second horn was heard, that the leftward movement should be

seen as complying with the request and so establishing that the autorickshaw will not close the gap. In fact, after gesturing, the autorickshaw then moves further to the left.

For the fourth and final bip from our car, by producing just one beep, the final use of the horn is then heard as different from the previous three double beeps. In terms of the relevant next-pair-part, where an offer has been made, it fills the slot of an appreciation (Laurier, 2019). The timing-spacing of the bip is while our car is still just behind the autorickshaw - overtaking has been committed to, but not yet completed (Deppermann et al., 2018). Given the forward orientation of car horns, its spacing may then be in relation to continuing to target the autorickshaw and not the silver car (which, as our car moves closer, could take itself to be the recipient of the horn).

Horns responding to collision courses

The vehicle horn was, of course, designed as a warning device to capture the attention of the inattentive road users that have strayed, or more purposefully moved, into the trajectory of another vehicle. The horn is used not merely on the basis of the ballistics of collision. Sounding the horn by the driver can be produced to be hearable as the category-entitlement and expectation of its user to progress (Smith, 2017b). In the next fragment the driver uses the horn to, in one sense, warn of the possibility of collision and, in another, to assert its right to continue on its way and the others lack of such rights of way. The horn's production as hearably a warning and assertion is as a single extended "beEEeep" in a gestalt of emerging pedestrian trajectories through its category-entitled and trajectory-projected road ahead (Smith, 2017b). The events take place on a multi-lane road which has no lane markings and what might best be described as patchy raised pavement provision. Our car is moving slowly,

approaching the queued traffic, while gradually shifting left in relation to an upcoming bifurcation of the lane. Ahead are a blue car and a motorbike. There are several pedestrians on the road.

Transcript 3 about here

The first pedestrian (PDN 1) in the fragment has visual access to our car and shows his intended trajectory and minimisation of himself as an obstruction, by torquing his shoulders away from our car's projected pathway (panel 2). As our car moves forward, pedestrian 2 (PDN 2), the carrier in an adult-child pedestrian pair, comes into view on the raised pavement and then steps off on to the road (panel 3, marked by the red ellipse). Pedestrian 2, carrying the child, does not look rearward toward our car (panel 4) and his trajectory will cross into the path of our car. Meantime, ahead, there are two men walking as a "together" (McIlvenny et al., 2014) towards our car in the middle of the traffic (panel 4 marked by the yellow rectangle). Our driver can see that the third group of pedestrians (PDNs 3), like pedestrian 1, have visual access to our car's trajectory. Our driver beeps extendedly while braking sharply (panel 5). In response, pedestrian 2 looks over his shoulder and then alters his trajectory away from the path of our car (panel 6). The two men also look up but continue on their existing path (heading out of shot).

In the car-nose-to-human-face arrangement, which we have for pedestrian 1, and for the two men walking between the cars, each could be seen by the driver as on collision courses with our car. Pedestrian 1 deals with that inference by torquing his body to show that he has seen our car's trajectory and is accommodating its path past him (see similar adjustments in Smith, 2017a). Yet, while the two men (PDNs 3 in panels 4 & 5) do attend to our car when the driver

sounds their horn, there is no change in their walking trajectory (panels 5 to 6). Their continuation of trajectory is indicative of them finding themselves not to be its target and they, of course, have visual access to the proximity and collision course of the car and pedestrian 2. It is pedestrian 2 that is facing away from the car and almost out of camera shot, that, as we and PDNs 3 have noted already, is witnessably and hearably then the target. By contrast an early difficulty for us in analysing the recording was that the camera angle here is topicalising, the two men rather than the adult-child pedestrians (Mondada, 2014). For the driver, pedestrian 2 has crossed a category relevant part of the infrastructure e.g. from pavement to road where cars rather than pedestrians have rights of way (Smith, 2017a, b). They have not done a shoulder check when shifting into the road, nor do they show any further awareness of our approaching car. Progressing without showing awareness can be tactical – which takes the horn into the domain of rights –, or genuine – which frames the horn as oriented toward moral order and accountability surrounding attentiveness in traffic (see Haddington & Laurier, 2017). We see further elements of the hearability of the horn as a warning of imminent collision in the driver witnessably applying their brakes to halt suddenly. In response, the pedestrian looks back at our car and shifts to a leftward trajectory taking them out of its way. There is no apology or other acknowledgement (e.g. hand-up or nod) unlike the autorickshaw in the previous section. Equally, there is no further response from our driver such as a complaint or emotional outburst of swearing (Katz, 2001).

Building on the sense of the extended horn as a reprimand which will help the inattentive pedestrian discover the error of their ways, here we describe a response to a vehicle moving into the path of our vehicle which our driver accompanies with a series of rapid beeps. The beeps are hearable as what becomes a rejection, or resistance to, another vehicle's manouevre while that manouevre is under-way. Our car is on a two lane highway and in its lane there is a

white van ahead. The van pulls away revealing motorbikes and a coach-bus. The coach is indicating to pull out into our lane. Our car driver maintains his distance behind the white van ahead. The driver doesn't narrow the gap ahead, an action which would pre-emptively show the coach our car's resistance to the indicator as a request to lane change using our car's gap. Meantime, the coach is slowly pulling away, slower than the van, or our car, but the coach, in pulling away, then angles its trajectory into our car's lane (panel 2). When the coach continues on its convergent course, our driver double-beeps three times in quick succession and finishes with a slightly truncated beep (panels 3-4). On completing the beeps, our driver says aloud "oh come on" with an annoyed tone (panel 5) (which is in the midst of the mother and daughter talking about an unrelated topic (not transcribed)). With no change of direction from the coach, our car slows, opening up a gap for the coach to change lanes (panel 6).

Transcript 4 about here

A first thing we noticed about this encounter between a car driver and a coach is that it is one of the few cases of a driver showing annoyance with another road user's actions in the Chennai driving data. shifting our attention to the use of the horn, the beeping from our driver is rapid in pace and produced as a salvo. The salvo of beeps is sounded in the face of the coach's witnessable movement toward the neighbouring lane that is then hearably refused by our car as occupant of that space (panel 3) and then persists, despite our car's ongoing audible protest. The succession of beeps is hearable, then, as an extended and high-grade rejection of the bus's pursuit of the small gap ahead of our vehicle. We will show a fragment below where a beep is used in response to a vehicle not moving and thus not taking the gap. When we take into account the vehicle category that is pursuing a lane change we can also see that by dint of its pairing as a large vehicle relative to our small one, that this category

disparity indexes the bus's sheer size as part of its method for taking a position in the lane. It is perhaps this very use of size to take a position ahead of a smaller vehicle that leads to our driver's repeated use of the horn in a morally charged action sequence. It is a contrasting gestalt with the second event in transcript 2 where a car driver is using their horn to repeatedly pursue an autorickshaw to move. Here, the coach makes no such request with its horn, it simply moves toward the gap in the traffic which it seeks to take. There are shared coordination elements with smaller entities. For the pedestrian in the previous example, the pedestrian has lesser rights once on the road, yet for another car they could also force their way in front of our vehicle. Our analysis here remains then somewhat speculative given our driver does not formulate their complaint any more explicitly than 'aw come on' rather than for example 'you big bully'.

Bip, bip-bip - Clarifying an ambiguous space

When drivers generously give up their rights to progress and make an offer for another road user to go ahead of them, there can then be confusion from the recipient about whether that is in fact what is happening (e.g. has the driver accidentally left a gap rather than made a gap as an offer?). The driver can use sounding the horn to resolve the ambiguity of a gap ahead of a vehicle as an offer. One way of putting this is that the horn is clarifying for the other member of traffic with what the gap should be seeable as, or here within our focus of the horn, it is the horn being hearable as a clarification. The two are, of course, reflexively tied.

In the video fragment, our car is on the right-hand lane on a two lane road, heading toward a junction in a built-up area. After the junction, our car needs to be positioned in the left lane.

Ahead, there is a car trying to enter the main road from a minor road, on the left (panel 2). The entering car is positioned toward the far left side of the junction and indicating to the right. The entering car is thereby indicating that its planned trajectory will be toward our car's lane. Ahead of our car, however, is a queue of traffic blocking the entering car.

Transcript 5 about here

Our car produces one bip (panel 3) when the car on the minor road is rolling forward shifting its trajectory into the left lane (e.g. not its target lane). Our driver's spacing and timing of the bip seems to be slightly too early, given our car's gap is both not yet visible as a take-able gap nor is it ahead of the entering car. Though that spatial non-alignment and preliminary dimensions of the gap may also be what provides the occasion for our driver's use of the horn – to draw the attention to the future appearance of a gap-as-offer. The bip here then satisfies a bare minimum of hearability but the driver has failed to find the gestalt that would produce it to be hearable as what it is and by the party that ought to hear it. Indeed, the entering car tightens its turning angle displaying that instead of targeting our driver's gap it will take the left lane (panel 4). Our car, meantime, begins to open up a gap ahead of it in the queue (panels 4 -5). The entering car then moves slightly rightward in the direction of the gap ahead of our car. Our car sounds a double-bip in time with the gap opening up ahead of the entering car. Our car decelerates further while the entering car then moves across and into the gap (panel 6), after which our car turns more sharply to the left.

We have earlier witnessed the use of the single bip in acknowledgement and the double bip in awareness. The single bip, in relation to the emerging action formations, can be used to initiate or respond to actions in traffic. As we noted,in terms of making sense of what our car

is doing with its single bip, and who should identify themselves as its recipient, in this traffic gestalt it is not obvious. It is only later in the course of action that we, and the entering car, realise that this single bip has been made early in the service of having another driver attend to it. At first, there is not a gap to clarify what the horn is calling attention to. In addition, the directionality of the bip is also ambiguous given there is a non-target car in the nose-to-tail position and most proximate position (e.g. the white car in panel 3). That the target car seems not to hear the bip as directed toward it and accept the offer is, then, not surprising. Instead it steers away from the gap (e.g. tightening its cornering to the left rather than right). The single bip as a horn format used by the driver seems shaped to avoid hearing it as other possible actions. A double beep could be heard by the vehicle ahead as treating it as an obstacle, or an extended single beep as potentially a warning or complaint. The timing and spacing of the second, double bip is in relation to a brief window when the full-sized gap is adjacent to the incoming vehicle. The second double bip both attracts the attention of the other driver and helps them see that gap ahead of our car as an offer. The coordination problem with gaps ahead of vehicles is that, as we noted, they are equally opened up as offers and non-offers for other vehicles to move into. Vehicles that move into them risk being seen as pushing-in (as in our previous case) and immoral actors on the road, liable to sanction (such as Katz's, 2001 tailgating examples in California). The bip bip accompanies the gap, as "after you" accompanies a pause in a pedestrian's trajectory, in each case the other is able to proceed on the basis of the generosity of the first party. Central to our driver's use of the horn is the problem of a gap that can be seen as two different things, like the famous duck-rabbit image of perception experiments and seeing aspects. The horn deals both with 'see it as this and not that' as a traffic members' problem while also being responsive to an absence of a move by other vehicle to take the space (which would exhibit an understanding of the gap as an offer).

A gap is clarified as an offer, and that offer is accepted and the horn is hearable as that clarification.

Conclusion: Hearing how you should see this, seeing how you should hear this

In seeking to describe drivers' uses of vehicle horns in Chennai we have brought the studies of the hearing and hearability of mechanical audio into connection with EMCA's ventures into the visual organisation of traffic, and mobility more generally. Where Licoppe's (2010) study traced the transformation of the ring of the telephone from a standardised 'drring' to an assortment of beeps, rings and tunes, and from *summons* to *informing* and *warning*, we have documented the driver's artful manipulation of the horn in the indexical production of an array of actions in traffic. While drawing upon Bjelič's (2019) account of the hearability of the ring of a phone, we departed from his studies of *hearing* the ring in concentrating on *sounding* the beep.

Drivers' manipulation of the beep are produced to be hearable as one thing, or another, by other hearers in traffic. Even though it is a stripped-down version of a horn compared to a trumpet, the experienced Chennai driver can "play" the car horn in its duration and intensity, can create rhythms and draw upon the resources of sequence. They play their sequences of beeps in relation to previous and future beeps and by pairing them as initiating or responding to the actions of their and/or other members of traffic. As we have examined in the traffic events in this article, the driver's manipulations of the horn are intelligible in their concrete particulars through their analysis of the gestalt of the emerging visibility arrangements in

road traffic and in the passing relationships of coordination, conflict or generosity with individual members or mobile formations of traffic cohorts.

We began our investigation with a driver sounding their horn to produce awareness of their car's approach to a mobile formation of vehicles. The driver used 'bip bip' to initiate the coordination of their progression, with the expected response was that other drivers would maintain their position (e.g. hearable as "stay where you are"). The second event we described was how a driver was hearably targeting a specific vehicle. The driver used their relative positioning and proximity to the other car to produce a beep beep hearable as a request to clear the way and followed up the lack of movement with further bips. We then analysed two cases where the driver used the horn in two different formats to be hearable as response to a road user on a collision course; one in which the horn was heard and acknowledged by a pedestrian, and one in which the horn was ignored by a bus merging into our car's lane. Crucially, whereas the pedestrian reacted promptly to our car's beep, the bus did not, thus provoking a hearable pursuit of response in further beeping and ultimately closing with and becoming a complaint. Finally, we described an event where a bip was produced ineffectively to indicate the appearance of a gap-as-offer. Remaining apparently unrecognised by the target vehicle, the driver through a precisely timed and spaced second bip bip produced a hearable clarification of a gap that was then in turn to be understandable as an offer. In this first analysis of the manipulation of the horn's audible qualities we can note that its production can be compared to voice prosody and there could be fruitful comparisons to be made between them in future studies.

As we have shown, it is not that the driver produces the horn's intelligibility only in its sounding. The action and target of a horn is produced by the category-bound or category-

relevant visually available activity that proximate vehicles or mobile formations have done, are doing or just about to do (Watson, 2005; Smith, 2017a, b). If a road user is engaged in an action that can be potentially subjected to caution or reprimand, the horn can be produced as directed to them, as was the case in our example of a coach pushing-in to a traffic queue or the pedestrian stepping off the pavement. Or, in the absence of actions that are horn-able, the horn can be heard as initiating a course of action by the vehicle that sounds it. The driver draws upon the members' sense-making device that the horn will be hearable through what is seen to be happening by the surrounding traffic; at the same time, how the driver's visually available movement in traffic should be understood is shaped through the driver's manipulation of the sound of their horn.

Bringing a geographical sensitivity to this study what we hope is apparent is that attending to the details of the spacing of actions are as much part of the members' analyses as attending to the details of timing of actions (Due and Lange 2018). Both are resources for members' production and recognition of the witnessable orders of road traffic (Deppermann, 2019; Lee & Watson, 1993; Watson, 2005; Smith, 2017a). Indeed, speaking only of visibility arrangements risks missing how traffic is organised by its members in spatial arrangements. "Just where" someone beeps is interwoven and inseparable from "just when" they do. Selecting a particular car as a target ahead for the horn, as we have described, was accomplished by drivers through spatially aligning and making proximate their vehicles with the others.

Driving as a member of traffic remains fascinating for being ancient yet utterly contemporary, for being locally variable and yet orderly at all points. It is regulated by laws, yet open to improvisation; a site for recognising and disputing rights; accountable yet with

restricted means for seeking and giving reasons to one another for one's actions. While we would perhaps not think of a horn as an important form of communication, we have shown how in traffic it has become valuable in its own right. This value comes not from variation in the sound itself, but from the setting of traffic that it is part of producing. In doing so, horns help to produce perhaps the worlds most massive prevalent, global – and at times troubling – site of endogenous noisy human organisation - traffic.

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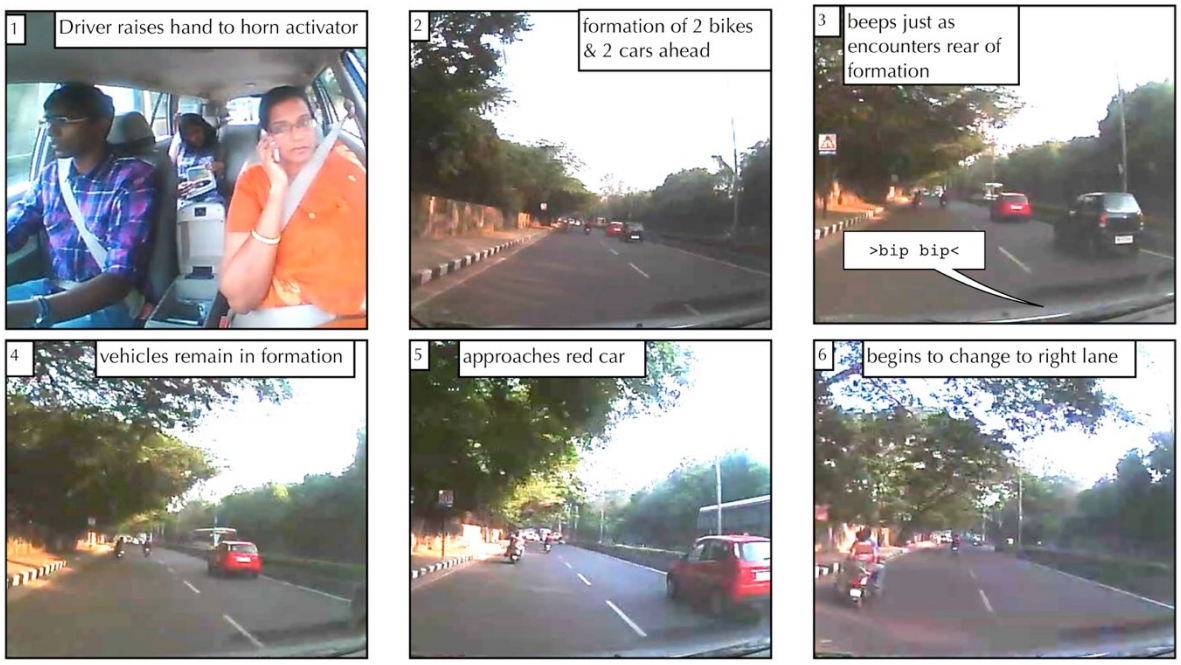
Vehicle	Clips	Total Length	Date Recorded	Format
A	7	44 mins	Dec 2012	AVI 480
K	5	180 mins	Jan 13	AVI 480
M	16	210 mins	Dec 2012	AVI 480
R	14	296 mins	Jan 2013	AVI 480
T	13	334mins	Dec 2012	AVI 480

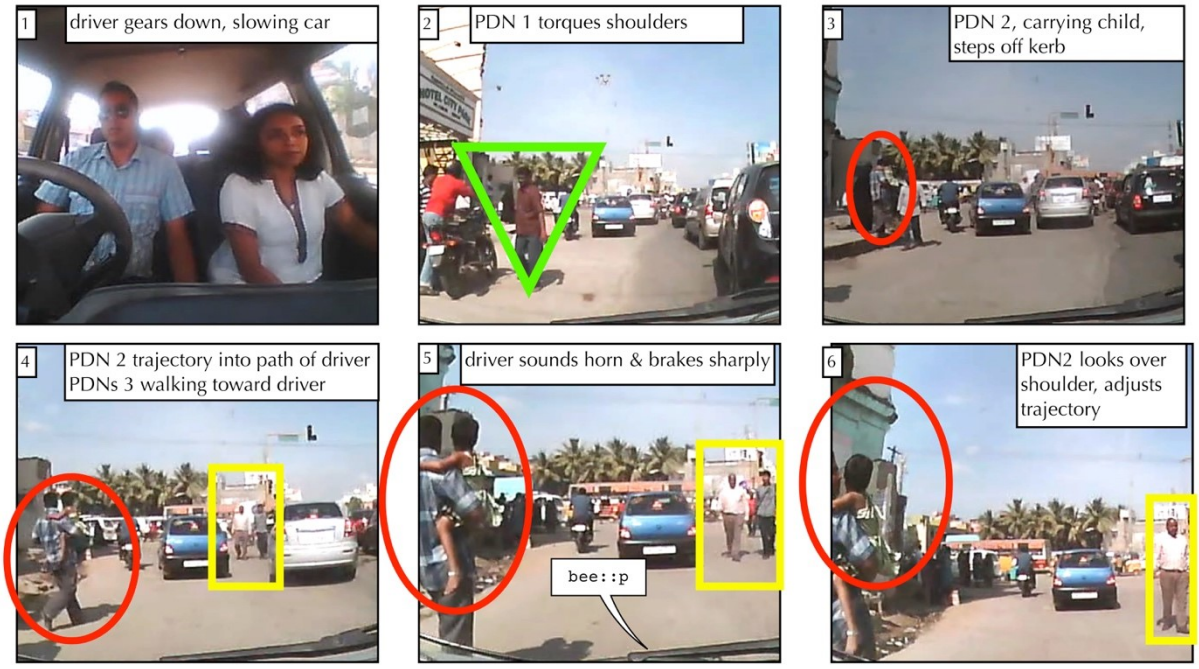
Table 1. Chennai Data



Transcript 1: Sounding horn while approaching mobile formation

Transcript 2a Directing the horn at one vehicle

Transcript 2b: Repeating the horn and a single "bip"



Transcript 3: Warning of potential collision

Transcript 4: Complaining about pushing in

Transcript 5: Clarifying a gap as an offer

List of captions: