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Martin Aranguren

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Nonverbal interaction patterns in the Delhi Metro: interrogative looks and play-faces in the management of interpersonal distance

Abstract. *The aim of the article is to describe the nonverbal communication patterns that passengers of the Delhi Metro use to manage density-induced territorial intrusions, and to identify some of the contextual variables that affect their deployment. After introducing the notion of "interrogative look" and the dataset, the following section depicts the techniques that passengers were observed to employ in order to solve the problem of territorial intrusion without breaking anonymity. The bulk of the analysis deals with the structure and function of "interrogative looks", an objectively defined pattern of nonverbal behavior that the touched uses to signal her discontent to the toucher. The rest of the section describes a less frequent pattern whereby passengers contagiously signal the playful character of their mischiefs. Next is examined if and how density, i.e. the number of individuals per surface unit, influences as a contextual variable the occurrence of interrogative looks. The closing discussion considers the main findings from the standpoint of their local specificity.*

1 Introduction

*"*Don't talk to strangers" is a maxim learnt in childhood that adults rigorously observe in public places such as the subway. However, incentives for breaching the prohibition are continuously created by one of the most enduring and characteristic facets of day-to-day interaction in big cities, namely crowding[i].

One can define crowding in purely physical terms as the number of individuals that at a point in time happen to occupy a given surface unit. Under this physical definition, crowding routinely creates opportunities for verbal exchanges between strangers in urban transportation when the number of individuals per surface unit is such that physical contact becomes very likely, if not totally unavoidable.

Of course, there are varieties of physical contacts and not all can successfully pass as inevitable, a rough short jostle involving contact of the shoulders or the upper back looking much more inevitable than a gently repeated rub of the other's rear. In what follows, the rough short jostle is taken as the prototype of inevitable physical contact in crowded subways[ii].

In its simplest form, physical contact in such circumstances involves two participants, namely the toucher and the touched[iii]. From the commonly accepted premise that ours is a territorial species (Hall, 1966) one can deduce that at least some of these physical contacts will be experienced as personal space instrusions that the toucher inflicts and that the touched undergoes. This theoretical possibility, which can be tested by any mass transportation user, has been previously confirmed for the Paris subway through an observational study of passengers' behavior (Aranguren & Tonnelat, 2014). The present replication of that protocol in the Delhi Metro suggests that experiencing physical contact between strangers in public places as a territorial encroachment is not an *exception française*.

Crowded entrances, corridors, platforms and cars make physical contact inevitable. In this context, the subway passenger's interactional problem, in Paris and Delhi alike, is to reconcile the taboo against talking to strangers with the aspiration to keep intact the ultimate form of personal territory, namely the surface of the body. Any subway rider knows from personal experience that these opposite demands can be reconciled by simply sacrificing one of them. In the role of the victim, for example, one may indulge in a more or less friendly conversational opening ("Hey! What do you think

you're doing?"). Alternatively, in contrast, one may silently endure the discomfiture in the belief that nothing really serious is at stake. However, the Delhi and Paris studies (Aranguren & Tonnelat, 2014) suggest that territorial encroachments are often forestalled or resolved with behaviors less aggressive than verbal admonitions but certainly more aggressive than stoic patience.

The aim of this article is to describe the nonverbal communication patterns that passengers of the Delhi Metro use to manage density-induced territorial intrusions, and to identify some of the contextual variables that affect their deployment. After introducing the notion of "interrogative look" and the dataset, the following section depicts the techniques that Delhi Metro passengers were observed to employ in order to solve the problem of territorial intrusion without initiating "focused interaction" (Goffman, 1966). The bulk of the analysis deals with the structure and function of the interrogative look, an objectively defined pattern of nonverbal behavior that the touched uses to signal her discontent to the toucher. The rest of the section describes a less frequent pattern whereby passengers contagiously signal the playful character of their mischiefs, thus inducing the formation of transient "playful mobs", as I propose to call them. While interrogative looks are the initiative of the touched and seek to repair the damage already caused by the unwelcome touch, play-faces are the initiative of the toucher and aim to "prevent" or attenuate the offensiveness of physical contact that has not happened yet but is felt to be imminent.

Next is examined if and how density, i.e. the number of individuals per surface unit, influences as a contextual variable the occurrence of interrogative looks. An analysis of the probability of such looks at different density levels suggests that passengers' use of this signal is indeed sensitive to the size of the surrounding crowd. The closing discussion considers the main findings from the standpoint of their local specificity.

2 The interrogative look

Some of the nonverbal behaviors employed to resolve territorial encroachments in the subway appear to operate as the molecular or lower-level components of molar or higher-level interaction patterns also known as "interchanges" (Goffman, 1967; 2010), "negotiations" (Hinde, 1985) or "strategies" (Eibl-Eibesfeldt 2007). Every such pattern involves at least two individuals and a series of gestures that act as "moves" or "signals" with the power to influence the other participant's subsequent

behavior. By virtue of their conformity to a sequencial order or structure, the successive coordinated behaviors produce an interactional outcome.

At this preliminary stage, the nonverbal moves or signals that subway passengers use to regulate interpersonal distance can be usefully approached in terms of the interaction pattern that Erving Goffman (1967) called "corrective interchange". This pattern starts with an act experienced as an offense by a victim who then draws the attention of the presumed offender to the problematic event. If the offender subsequently makes an apology (or more abstractly, an "offer"), and the victim does not reject it, the resulting sequence of distributed and mutually influential moves is said to have "repaired" the relationship disrupted by the offensive event. There are of course more complete versions involving, for example, the victim's explicit acceptance of the apology and the offender's explicit appreciation of the acceptance. There are also deviations of this sequence such as the offender's refusing to apologize or even provoking the victim, eventually leading to aggressive escalation or resented retreat of one of the contestants.

Goffman summarizes with the words "challenge" (1967) or "interrogation" (1971) the set of behaviors that the victim uses to call the offender's attention to the annoying event. The category "interrogation" therefore includes all the behaviors that produce this result, whatever their phenomenal appearance. That is, as a particular class of behaviors, interrogations are described functionally or "by consequence", as opposed to formal or "physical descriptions" (cf. Hinde, 1982). The latter descriptions do not define a behavior item with relation to what it tends to achieve, but instead on the basis of the muscular contractions of which it is made[iv]. In the field of human behavior, physical descriptions have been used among others in naturalistic studies of facial expressions of emotions (Camras, 1992; Fernández-Dols, Carrera & Crivelli, 2011; Fernández-Dols & Ruiz-Belda, 1995; Mehu & Dunbar, 2008; Messinger, Fogel & Dickson, 2001; Ruiz-Belda et al., 2003; Scherer & Ceschi, 2000).

Combining the focus on interaction patterns with the physical description of nonverbal behavior, I argue that in the Delhi Metro the "interrogations" that victims issue following a perceived territorial offense often involve a specific sequence of objectively describable expressive movements. This hypothesis is demonstrated in section 4.

3 Method

The dataset is composed of 130 "riders exchange" units recorded on video on the Yellow line of the Delhi Metro in December 2013. The Delhi Metro Rail Corporation allowed me to videotape in its premises. Yellow line trains are composed of either six or eight cars, of which one is a women's only compartment. Except for seven units, all the riders exchanges were videotaped in the general compartment, which is mostly but not exclusively used by male passengers.

The study's unit of observation is the riders exchange, which starts when the train's doors open after the train has stopped at the station and finishes as the doors close before the train resumes its route. This time window usually lodges the "exchange" between the riders that get off and those that board the train (Aranguren & Tonnelat, 2014).

As crowdedness (or more technically, density, i.e. individuals per square meter) increases, physical contact between contiguous riders becomes more and more likely. In order to videotape the behaviors with which passengers reacted to density-induced physical contact with strangers, I used a small camera fixed on top of a pair of headphones. Measuring nearly 4x6x2 cm and weighing less than 40g, the device records in 1080P video quality at 30 frames per second. No arrangements were made to hide the camera, although its uncommon shape and size, as well as its unusual placement, probably helped in making it relatively unconspicuous.

Riders exchange units were videotaped from within one of the central cars of the train. I held to the vertical bar placed in front of the doors and tried to aim at the middle of the door opening in order to maximize visibility of the frontally approaching passengers. This technique maximized the frontal visibility of boarding passengers' faces but unfortunately minimized that of deboarding passengers, which are therefore not taken into consideration in the analyses presented below[v]. Preliminary observations in the Delhi Metro had suggested that sticking to the central bar as other passengers got on was a defensible line of conduct, and as a matter of fact I was never aware of being the target of verbal or nonverbal admonitions because of that[vi]. While the technique may be reminiscent of a subjective camera (or "subcam"), the focus was not on the activity of the passenger carrying the camera but on that of the passengers getting on. The "subcam" is particularly appropriate for studying a variety of processes regarding the interaction between the carrier of the device and the

surrounding world. In contrast, ours is a regular "obcam", a good-old objective camera with an interest on the thing immediately recorded and not on the reflexive process of recording.

The footage routine consisted in boarding at Patel Chowk, the station immediately before Rajiv Chowk, holding to the central bar, capturing the riders exchange at the Rajiv Chowk stop, and finally getting off at New Delhi, the next station after Rajiv Chowk. I then repeated the steps in the opposite direction, and so on (see Figure 1). Footage sessions took place during the morning (10am to 11:30am) and evening rush hours (6pm to 7:30pm) and yielded an average of seven riders exchange units each.

Insert Figure 1 about here

4 Interaction strategies in the Delhi Metro

4.1 Physical description of interrogative looks

The pattern of nonverbal behavior that appears to function in Delhi as an "interrogation" following a personal space intrusion can be analyzed as the addition of two components, namely a set of facial changes plus head and eye "orientation movements", to put it in ethological terms. However, in response to an event interpretable as a territorial breach, an individual may display the facial component in isolation, or in combination with a functional equivalent to head and eye movements, that is a behavior equally able to draw the attention of the toucher on the offensive touch.

In order to associate brute events of physical contact with specific facial movements supposed to express rejection of that event, it is useful to start with obvious cases of territorial encroachment and then examine whether the changes observed on the face also appear in less obvious instances. Figure 2 shows a rather short woman who happens to be prevented from getting off by a crowd of boarding passengers relentlessly pushing her back inside the car. Her facial movements accompany verbal protest, a maximally explicit way of signalling rejection of the touch.

Insert figure 2 about here

For the physical description of facial movement the present study relies on the Facial

Action Coding System (FACS, Ekman & Friesen, 1978), an anatomically-based method for measuring objectively the movements of the face[vii]. Following Hörtsjö's (1969) rationale, FACS decomposes "expressions" into single facial action units arbitrarily identified with numbers that correspond each to a definite set of appearance changes as compared to the "neutral" face. FACS has a code for any visible facial movement. When the objectively defined changes in appearance characteristic of a specific Action Unit (AU) are observable on the face (e.g. exposure of more "white" sclera around the iris), the specific AU is scored (e.g. AU 5, upper eyelid raise).

In addition to AU5, the woman in Figure 2 also displays changes characteristic of the combination of AUs 1 (Inner Brow Raiser), 2 (Outer Brow Raiser) and 4 (Brow Lowerer). These are: bulges at the inner corner of the brows, a downward curve between the inner corners and the middle portion of the brow, an oblique bunching running from the medial part of the forehead to the inner corners of the brow, and exposure of the outer portion of the upper eyelid. FACS notation presents complex facial events as an addition of single components, which in this particular case gives the formula "1+2+4+5".

This combination of action units produces the "expression" that I would like to consider as the facial component of a nonverbal behavior pattern used for regulating interpersonal distance not only in Paris (Aranguren & Tonnelat, 2014) but also in Delhi. Figure 3 provides more examples of the same facial configuration after less blatant but still offensive instances of physical contact, in particular, in response to being roughly jostled from behind.

Insert figure 3 about here

In their field study on the emotions elicited by personal territory breaches in the Paris subway, Aranguren and Tonnelat (2014) found that the facial configuration 1+2+4+5 often follows physical contact interpretable as offensive. In most instances, AU 5 (Upper Lid Raiser) appears to be of shorter duration than the other action units. Sometimes the touched looks at the presumed toucher briefly after the onset of the facial expression, accomplishing a nonverbal "interrogation" that the putative offender may be able to perceive. The authors found that contact responded with this expression and followed by a look at the toucher act together as the first part of a behavior sequence. Depending on its specific subsequent development, this sequence

may accomplish repair of the disrupted relationship or alternatively disapproval of the toucher.

The pattern that begins with physical contact, continues with the touched diplaying the expression 1+2+4+5, and ends with the touched looking at the toucher, is also observable in the Delhi Metro in the context of train boarding. Figure 4 condenses this sequential pattern in a single image in which the three successive events are simultaneously visible. The same image is reproduced thrice but on each picture the emphasis is put on a different component of the sequence.

Insert figure 4 about here

The sequence takes place at the end of the riders exchange. It begins with the passenger on the left resting his closed hand on the right upper back of the other passenger. Subsequently, appearance changes characteristic of 1+2+4+5 become visible on the touched's face: increased exposure of sclera, bulges around the inner corners of the brows, a slighly upward curved wrinkle in the middle of the forehead, horizontal wrinkles in the outer portion of the forehead, increased exposure of the outer part of the upper eyelid[viii]. Finally, the touched orients his head and eyes toward the face and in particular the gaze of the toucher.

I shall call this sequence "interrogative look" and proceed in the following sections to examine its possible integration in longer behavior patterns, as well as its relationship to crowding. Across the 130 riders exchange units under examination I observed a total of 204 interrogative looks so defined.

4.2 Dyadic interactions beginning with interrogative looks

In order to identify the interaction patterns that interrogative looks initiate, I built a subsample with the instances that were followed by a fourth event after the three-components sequence defined by the triggering touch, the ensuing expression, and the final orientation movements. To qualify as such the fourth event had to be a behavior by either toucher or touched interpretable as bearing some relationship to the touch, which could include obvious signals such as facial expressions but also non communicative behaviors such as moving away, and even apparently random actions such as fixing a point with an unexpressive stare. 69 interrogative looks satisfied this

criterion, out of which 63 instances additionally unfolded as dyadic interactions between the toucher and the touched.

The 69 sequences with a fourth component were scrutinized regarding the type of touch, the dynamics of gaze interaction, the gender of the participants, the presence of verbal behaviors or other facial expressions, and the territorial outcome of the process.

4.2.1 Standard and non standard physical contact: jostle and hand-touch

I grouped instances of physical contact according to the body parts of toucher and touched that appeared to be involved in the touch. A useful way of summarizing the resulting analysis is to distribute the instances into "standard" and "non standard". Standard physical contacts are the most frequent (41/69) and typically take the shape of a brief rough pressure involving the shoulders or the upper back of toucher and touched. In contrast, a lesser amount of pressure, a longer duration and not the shoulders or back but the hand of the toucher characterize the paradigmatic non standard physical contact. In what follows, for the sake of simplicity I shall call the fomer "jostles" and the latter "hand-touch". Hand touch admits distinct forms and performs various functions. The toucher may place her hand palm on the touched's shoulder to rest or keep balance, grab the touched's arm to pull herself inside the car, use her hand dorsum to gently cause the touched to move in the direction of the pressure, etc. (see Figure 5).

Insert figure 5 about here

4.2.2 The toucher looks away, down or back in reply to the touched's interrogative look

Regarding gaze interaction, the toucher may reply to the interrogative look by looking away (22 instances), down (8), or back (9) to the touched. In 10 cases the look away functions as a move in a curious interaction pattern that I shall call the "frozen gaze sequence" (see Figure 6), in which the toucher, in response to the interrogation, looks away and fixes a point until the annoyed touched withdraws the look. With an average delay of 0.25 s, as soon as the touched ends the interrogation the toucher terminates the fixed look away. In some cases the toucher keeps the upper eyelids raised (AU 5)

for the whole duration of the impervious stare.

Insert figure 6 about here

I detected four additional interactions that can be regarded as variations of the frozen gaze sequence. In these the toucher does not change the orientation of her look in response to the touched's interrogation, but simply "freezes" her look in the position in which it was when the touched displayed the annoyed look, in some cases adding the action of the Upper Lid Raiser (AU 5). Not the look away itself but its "frozen" quality represents in this case the specific reaction to the interrogative look. Like in the prototypical frozen gaze sequence, the interaction ends with the toucher relaxing the fixed stare as soon as the touched withdraws the interrogative look.

Looking down after being interrogated can be regarded as a submissive display whereby the toucher seeks to appease the annoyed touched . In the context of the riders exchange in the Delhi Metro this gesture acts as the functional equivalent of a verbal apology. More precisely, it completes a nonverbal version of the "corrective interchange" described by Goffman (1967). Assuming that all apologies establish an interaction sequence that *must* be taken up in somme manner (e.g. by accepting or rejecting the apology), the postulated functional alignment with the dowcast gaze is obviously implausible. How can a gesture such as looking down, which avoids further interaction, be taken up at all?[ix] But probably there is a problem with this assumption.

A hint of this can be found in Goffman's classical analysis of the "remedial interchange", a variety of which is the repair sequence under examination. He first postulates that the full-fledged interchange involves four moves after the reprehensible act, namely "remedy" (Offender: Sorry), "relief" (Victim: That's okay), "appreciation" (O: Thanks), and "minimization" (V: No problem). But he then observes that any ritual move in the sequence puts the mover in a sort of jeopardy that generates the need for a saving response from the other parties. Hence, "[i]f each succeeding move were not attenuated quickly, ritual would come to take all of everyone's time. Each occasion on which a remedy was provided would lock the provider and recipient into an interminable 'After you, Alphonse' routine." (Goffman, 2010, pp. 143-4) What Goffman points at here is that the remedial interchange has to stop somewhere if participants are to resume the other business at hand. Which immediately means that while every apology *may* be taken up in some manner, there

is no good reason to assume that it *must*. Where the remedial sequence stops is therefore an empirical question that calls for detailed observation of the management of concrete offenses in real-life behavior settings.

The present analysis is not suggesting that *all* apologies in *any* conceivable social contexts could be replaced by functionally equivalent downcast gazes. The present analysis does suggest, however, that in the *specific* setting of the riders exchange in the metro looking down functions as an apology. The fact that verbal apologies ("Sorry") or downcast gazes are rarely, if at all, followed by a "relief" ("That's okay") shows that passengers often consider the "remedy" enough for repairing the deleterious consequences of unwanted touch in this particular setting. Which sequential step of the remedial sequence (remedy, relief, appreciation, minimization) will be considered sufficient is not a matter that can be settled *a priori* once for all, but one that requires looking at specific offenses in specific situations. Since the "remedy" is all that is necessary for repairing the offense created by touch in the context of boarding a metro coach, in general looking down can be considered a valid functional equivalent of making an apology. As much as nothing else has to be said after the apology, nothing else has to be done after the dowcast gaze.

Similarly, 5/9 instances of the toucher looking back at the toucher appear to perform the same appeasing function but with the aid of specific facial movements. In three cases the toucher smiles at the touched, whereas in the other two cases the toucher displays the facial components of the prototypical expression of embarrassment (Keltner, 1995; see Figure 7).

Insert figure 7 about here

In the remaining 4 sequences in which the toucher looks back at the touched the former does not display any discernible facial expression. In two cases the next move consists not in the toucher but in the touched looking down, as though the accused had interrogated the accuser in return.

4.2.3 Interrogative looks are more effective to cope with hand-touch

The analysis of territorial outcomes suggests that passengers view hand-touch as a more severe offense than the jostle. While half of the interrogative looks that react to

hand-touch result in immediate termination of the contact and either toucher or touched moving away, the same effect is achieved by less than one third of the interrogative looks that respond to jostles. Moreover, the only two sequences in which I could observe that the touched roughly removed the toucher's invasive body part were motivated by hand-touch and not by jostles. As much as the interrogative looks that follow hand-touch have a 50% chance of terminating the intrusive contact, those that are followed by the toucher's looking away (including frozen gazes) have a 77% chance of being ineffective.

This analysis also reveals that the toucher's willingness to terminate the intrusive contact may not be doubled by signals of appeasement. In only one out of the eleven instances in which the toucher ceases the intrusion after the interrogative look the toucher additionally looks down. This could be indicating that "ritual" constraints for the expression of respect and "substantial" constraints for the protection of territory may follow parallel paths.

4.2.4 Disapproval sequences

Regarding additional facial expressions, I found 9 instances of inward tightening of the lip corners (AU 14, see Figure 8), one of the facial movements that has been considered as the signal of contempt in the psychological literature (Ekman & Friesen, 1986; Izard & Haynes, 1988; Ekman & Heider, 1988). In 4 cases the facial action closes the interaction pattern that Aranguren and Tonnelat (2014) called "disapproval", in which the toucher, in response to the interrogative look coming from the touched, repeats the intrusive touch instead of conveying a sign of appeasement. In Delhi, like in Paris, the touched displays the "contempt expression" when repair breaks down and the offense gets repeated[x].

Insert figure 8 about here

4.2.5 Man-woman dyads: more submissive displays in both directions

13 dyads involve a man and a woman, of which the man is the toucher in 5 and the woman in 8. Interestingly, man-woman exchanges regard half of the instances in which the interrogative look opens a sequence that closes with a look down, a

characteristic submissive signal that may be used to appease the interaction partner. In three cases, the touched interrogates the toucher and the latter looks down in response. Two women and one man were observed to be in the position of the toucher and to display this submissive gesture to an annoyed touched of the other gender. In the fourth instance the toucher is a woman visibly senior to the touched, a male teenage. He looks at her interrogatively after being touched, but instead of apologizing the woman stares at him straight in the eyes, in response to which the teenager finally lowers the gaze[xi].

In other respects, in the course of this analysis I found no instance of unequivocal sexual harrassment.

4.3 Playful mobs in the Delhi Metro

Erving Goffman (1963) coined the term "body gloss" to make reference to the movements that inviduals perform in order to signal by nonverbal means their adherence to the norms governing a social situation, especially when events call into question the sincerity of that adherence. A participant in a conference that, in the course of a colleague's presentation, receives a noisy call on her cell phone might signal to the others present that she acknowledges the breach with an exaggerated expression of surprise followed by a visibly resolute push on the "reject" button, probably after an ostensibly rapid search in a bag. By analogy, Aranguren and Tonnelat (2014) named "face gloss" specific facial displays that passengers of the Paris subway use when they are in the unconfortable position of the toucher, as a way of letting others know that they understand the improper character of their conduct. The embarrassment display on Figure 7 constitutes an example of face gloss.

Insert figure 7 about here

In the previous section it was pointed out that passengers of the Delhi Metro, as much as those of the Paris subway (Aranguren & Tonnelat, 2014), may display appeasing signals such as looking down or expressing embarrassment in response to the touched's interrogative look. We can now call these "face glosses". It is important to note that touchers make face glosses not only reactively, after being interrogated by the touched, but also preemptively when they sense the imminence of a touch. In the

Delhi Metro, however, the preemptive use of face glosses is not restricted to the prototypical expression of embarrassment. As an alternative, passengers occasionally display what anthropologist Gregory Bateson (1972) called "play-faces".

Mouth opening (AU 25) and relaxation of the jaw (AU 26) are characteristic of this expression in humans and non human primates, to which humans in particular also typically add the smile (Lip Corner Raise, AU 12). The facial component of the interrogative look *follows* intrusive touch and, when displayed to the toucher, tends to elicit a *different* facial reply (e.g. a submissive display). In constrast, the play-face anticipates the occurrence of physical contact and, if perceived by others, tends to instigate the same movements on their faces. In Delhi, interaction in the subway seems to be no exception to the familiar fact that smiles are "contagious" (cf. Parkinson, Fischer, & Manstead, 2004, p. 170–2).

In order to examine the dynamics of this contagious play-face, I built a collection of "playful mob" sequences in which: 1) at least two immediately contiguous passengers displayed a play-face (simultaneously or successively) and 2) the play-face could not be interpreted as the response to a more distal verbal stimulus such as a humorous comment. Eight sequences satisfied these conditions across the dataset. The beginning was set at the onset of the first play-face, and the end at the offset (or disappearance from the screen) of the last play-face. I counted the surrounding moving passengers at the beginning and at the end of the sequence in order to measure density as a contextual variable. For every playful mob, I tried to determine the number of passengers that made the play-face, and the particular mischief that appeared to motivate the display. I admitted in that count not only complete play-faces, i.e. involving the three above mentioned facial action units, but also the incomplete ones that could be thought to result from some imitative "contagion" of the complete expression displayed by contiguous passengers. Table 1 summarizes the main results. On the basis of this collection, the aim of the following analysis is to construct a prototypical definition of "playful mob".

Insert table 1 about here

As for the context, the average number of surrounding moving individuals is equal to 8, which indicates that playful mobs tend to form at quite high density levels[xii]. The mischief is almost always deliberate bumping, occasionally embellished by cutting in

line. The number of passengers entrained ranges from 2 to 7, with most instances involving 4 or 5. In order to construct a prototype of "playful mob", I shall analyze one of these specimens in greater detail, namely the one with the highest number of participants (first on Table 1, from top).

Insert figure 9 about here

In scrutinizing the collection of playful mobs, one easily gets the impression that the first passengers that show the play-face are already part of a transient or durable group (e.g. friendly strangers who have been waiting in line together, close friends who have met outside the Metro premises, etc.), whereas the "followers" travel on their own. The selected instance of playful mob presents the advantage of starting with a hearable signal that is emitted simultaneously by three passengers. Together they make a sound akin to a rising siren, of which the culmination point is the energic jostle that suddenly brings them inside the car. The first picture in Figure 9 takes up the sequence at this point. The three members of the gang are in all likelihood the young men highlighted in the upper-left and upper-right frames and the young man on the left of the middle-left frame selection.

If one considers them as the "leaders", one can see that the "followers" may differ at least in two respects. First, while the leaders display the full play-face, not all followers do so. The incomplete expression suppresses most conspicuously the relaxed open mouth, limiting itself to the mere smile (the pure case of this simplication is visible on the lower-right frame[xiii]). Second, there appears to be an important age gap betweeen the young leaders and some of the the followers (see in particular the middle-right frame). Actually, not only in this sequence but in the whole collection it is only in the capacity of followers that senior passengers participate in these mischivous groups.

Taking the selected instance as the paradigm, one can construct the following ideal-type of playful mob: youngsters in a gang use the complete play-face to signal that they are not serious as they jostle or cut in line, and then other boarding passengers coming behind, including seniors, may join in with less complete play-faces. Although all instances of the collection to some extent conform to this description, a bigger sample would be necessary to achieve a more accurate picture of playful mobs in the Delhi Metro.

5 Density as a contextual factor of the interrogative look

It is a physical fact independent of the toucher's good or bad intentions that the probability of physical contact between contiguous individuals rises as the number of individuals per surface unit (in one word, density) increases. Sensitive to this predicament, does the touched reduce or cancel out the responsibility of the toucher when the surrounding crowd reaches a given size? Are touched passengers more inclined to "tolerate" the touch as the number of individuals per surface unit increases, all other things being equal?

This question can be addressed by examining the probability of interrogative looks at different density levels. If the use of interrogative looks is sensitive to this contextual variable, their probability should rise until a given density threshold and then stagnate or decline. On the assumption that more density necessarily implies more physical contact, stagnation or decrease after a given density threshold indicates a lower look/contact ratio, i.e. the same amount of contacts elicits less looks. This can be seen as evidence of the touched's greater willingness to attenuate the toucher's responsibility. In other words, phenomenally similar instances of touch may cause the touched to declare the toucher "guilty" at one density level but "innocent" at another. The two relevant variables are then the number of interrogative looks, on the one hand, and density level, on the other.

The section is structured as follows. First, a relevant measure of density is identified. Second, density measures are distributed across the sample. Third, the probability of interrogative looks is assessed for different density intervals. To anticipate the main result, the analysis shows that after a given density threshold the probability of an interrogative look decreases.

5.1 Most looks occur at about half of the riders exchange duration

A standard way of measuring density is to determine whether the individuals that occupy a given surface unit are standing or in movement, since each measure usually implies a different set of practical constraints. For example, while physical contact is nearly unavoidable at three moving individuals per m^2, it is barely possible when the three individuals per m^2 are just standing (Kittelson and Associates, Federal Transit

Administration, & Transit Development Corporation, 2003). Hence, the first task before deciding which measure of density would best describe the context of interrogative looks is to determine whether the latter tend to occur when boarding passengers are in the process of getting on or rather once they have come to a stop onboard.

The temporal location of interrogative looks within riders exchange units can provide valuable information in this regard. Passengers know that unless they find a stable position before the train leaves they risk losing balance as a result of abrupt acceleration. It is therefore safe to assume that they are not in movement but standing at the end of the riders exchange unit. Thus, the more interrogative looks concentrate toward the end of the unit, the more they can be assumed to occur in the context of standing passengers. Conversely, the more these looks cluster around the middle of the unit, the more they can be supposed to take place in the context of moving passengers.

Figure 10 shows the frequency distribution of interrogative looks across intervals referring to the temporal progression of the riders exchange. If a given riders exchange unit lasts for 40 seconds (i.e. doors open at 0 and close at 40 s), and an interrogative look is observed to begin at 20 seconds, the look is said to occur at 50% of the riders exchange's progression. If it is observed to begin at 30 seconds, it is said to occur at 75% of the unit's progression.

Insert figure 10 about here

The figure shows that nearly 70% of the recorded looks take place before the riders exchange reaches 66% of its temporal course, which roughly indicates that most looks occur when passengers are in movement. Moreover, the absolute majority of looks arise between 33% and 66% of the riders exchange's progression. Hence, counting the number of boarding passengers in movement at the middle of the riders exchange can provide a useful density measure for describing the elicitation context of most interrogative looks. Ultimate exhaustiveness would demand to measure density at *all* the progression intervals, but this is a disproportionately time-consuming task. Measuring moving density only in the middle of the time progression represents a reasonably costly procedure for describing the density context of the absolute majority of interrogative looks.

5.2 Most riders exchange units unfold at high density levels

For all the 130 riders exchange units that make up the dataset, I counted the number of individuals that, at ½ of the duration of a given unit, happened to be in movement and more precisely in the process of getting on the car. The surface reference are the nearly 2 m^2 of the car interior that the camera is able to capture from the chosen angle. I excluded from the count the moving passengers intending to board that were not inside the car (i.e. that were still on the platform) at 50% of the unit's progression. I also left aside the visible passengers that, in spite of being in the car at the relevant point in time, were not in the process of getting on, in particular passengers leaning on the vertical glass panels beside the doors[xiv].

Figure 11 shows the distribution of riders exchange units by number of moving passengers at 50% of the units's temporal progression. The values of the X axis do not designate density intervals directly but the absolute number of boarding passengers in movement inside the car. Density is the quotient of that absolute number and the surface reference of 2 m^2. The darker bar on the left specifies percentual frequencies for the total sample (n=130). The ligher bar on the right measures percentual frequencies for the subsample defined by all the riders exchange units containing at least one interrogative look temporally placed between 33% and 66% of the unit's progression (n=62). The interrogative looks observed to occur during this narrower time window amount to 108.

Insert figure 11 about here

As mentioned above, it is assumed that at a moving density higher than 2 individuals per m^2 physical contact between contiguous bodies becomes unavoidable. The graph shows that nearly all the sampled units of riders exchange fall above this density threshold, with the absolute majority concentrating between 3 and 4 moving individuals per m^2. The subsample differs from the wider sample in that measures of moving individuals are higher on average, with greater concentration on the central value of 7.

A note of caution is important at this stage[xv]. On the one hand, the sample is not sufficiently big for guaranteeing that the absolute majority of riders exchanges will

involve between 3 and 4 moving individuals per $m^{2.}$, namely an extremely high density level. Using Chebychev's inequality, the 95%-confidence interval for the proportion of riders exchanges in this density range is (0.83, 0.43), which means that in the actual population (vs. the sample considered in this study) this proportion may fall below the 51% threshold – or rise above 80%. On the other hand, however, there is little doubt that the sample faithfully captures the fact that most riders exchange units in the Delhi Metro involve moving density measures that make unwanted physical contact unavoidable.

5.3 Interrogative looks are more likely until a density threshold

In order to examine the probability of interrogative looks at different density levels, it is advisable to restrain the analysis to the 62 riders exchange units that contain the 108 interrogative looks occurring between 33% and 66% of the unit's time course, since the number of moving passengers counted at 50% of the unit's duration may not be representative before and after this particular time window. For this subsample, Figure 12 specifies the probability of at least one (left column) and at least two (right column) interrogative looks according to the amount of moving individuals in the middle of the riders exchance.

Insert figure 12 about here

The graph shows that both probabilities obey the same pattern. They rise sharply until 7 moving individuals ($3.5/m^2$), then they decrease at 8 and finally resume the way up at higher values. If one considers not only this subsample but the whole database the pattern remains essentially the same.

6 Discussion

In urban public places, and in the subway in particular, opportunities for physical contact between strangers arise when many individuals concentrate in a limited surface. Some of these physical contacts are experienced as territorial intrusions that a possibly embarrassed toucher inflicts on a certainly annoyed touched. In order to avoid the unpleasant experiences of embarrassment and annoyance, copresent

individuals may engage in what Goffman calls "remedial work" (2010), that is the activity of providing additional information on one's conduct so as to minimize or nullify its otherwise offensive character, including the victim's demand that the offender do so if the remedy is not spontaneously forthcoming. Now, in public places the remedial effort deployed in order to transform the meaning of unwanted physical contact is subjected to a peculiar constraint: toucher and touched must preserve anonymity and prevent acquaintance, or to put it otherwise, they must avoid creating a publicly recognizable precedent of a personal (or personalized) relationship. Since conversation is the prototype of this undesired precedent, the nonverbal channel may be preferred for the task of remedial communication.

In this regard, interrogative looks and play-faces can be integrated into a simple model of the territorial actor. In this model, the actor is motivated to preserve her own territory and not to intrude in that of others. In both cases, the cost of conducting oneself otherwise is mainly emotional: the annoyment of being intruded and the embarrassment of being an intruder. Play-faces act in advance, in that they seek to forestall the embarrassment of the touched and the annoyment of the touched. Interrogative looks, in contrast, act after the fact, insofar as their aim, probably through the expression of embarrassment that they may extract from the toucher, is to appease the already annoyed touched. While the embarrassment display assuages the annoyment of the touched, the play-face transforms the emotional significance of the situation, turning an action that could be seen as offensive into an excusable mischief.

An introspective report is not without relevance in this regard. When as a passenger of the Delhi Metro I witnessed play-faces and the mischivous mobs that they created by contagion, I could not help dropping the initial appraisal of the situation as challenging in favor of a reappraisal of the circumstances as rather funny. I also happened to participate in one of these mobs as a follower, and I vividly remember having displayed the complete play-face with the accompanying thought that the situation was funny because it was "too much": too much crowd, too much bumping, too much heat, etc., all of which made things appear as comic – as a grotesque replica of what the normal situation was supposed to be.

The present paper has attempted to describe the nonverbal techniques that passengers of the Delhi Metro employ to reduce the offensive character, and therefore the embarrassing or annoying quality, of density-induced physical contact. The following closing remarks deal with the results that appear to be specific to this setting[xvi].

1. Nonverbal communication oriented to remedy territorial intrusions may act preventively, in advance of the intrusion, or remedially after the fact. On the preventive front, Delhi Metro passengers sometimes use the play-face to attenuate the offensive character of otherwise reprehensible acts such as bumping with intent or cutting in line. The examined specimens of play-face involve not a sigle passenger but a whole collection of contiguous moving individuals that participate either as leaders or followers in a transient, locally formed group that I proposed to call playful mob. While the isolated play-face belongs in the nonverbal repertoire of Delhi and Paris (Aranguren & Tonnelat, 2014) subway riders alike, playful mobs were only observed to form in the Indian capital, which could be hinting that this way of coping with intrusive touch is specific to the Delhi Metro.

2. Moving from the response to the stimulus situation, Delhi Metro riders appear to discriminate between two broad classes of territorial violations. The jostle, a rough short-lasting pressure involving the shoulders or upper back of toucher and touched, seems to be the prototype of the less severe intrusion. At a higher level of severity stand the varieties of gentler but longer-lasting hand-touch[xvii].

3. The local proxemics finds expression not only in the scale of severity of different types of intrusive physical contact, but also in the contextual variables that affect the use of nonverbal remedial signals. It was pointed out that despite the fact that the probability of a physical contact is directly proportional to the number of individuals that occupy a given surface unit (i.e. density), the probability of an interrogative look obeys the same pattern only until a given density threshold. After this critical point, more physical contacts are necessary to elicit the same number of interrogative looks; in other words, their ratio decreases. This threshold is located at 3.5 moving individuals per square meter, which is a high density value considering that touch becomes nearly unavoidable at more than 2 moving individuals per m^2.

Interrogative looks are nonverbal signals that touched passengers use to end the annoyance created by unwanted touch through either “ritual” appeasement or “substantial” termination (or non repetition) of the offense. They therefore entail the implicit assumption that the toucher could have avoided the past occurrence and can avoid the future repetition of the annoying touch. This responsibility judgment, however, seems to be sensitive to the perceived size of the surrounding crowd as it can be captured through density measures. The interpretation here suggested is that after three moving individuals per m^2 touchers are excused of some of the

improprieties of which they are found guilty when density is lower. To put it differently, touched passengers appear to become more tolerant of unwanted physical contact after this critical density measure.

Conclusion

One of the problems of Delhi metro passengers during rush hours, and more generally of occupants of crowded places populated by strangers, is to reconcile the opposite demands of preserving personal territory of self and others, and avoiding verbal interaction. Physical contact between strangers threatens the preservation of the ultimate form of personal territory, namely the surface of the skin and the clothes that cover it. Touch becomes unavoidable when the number of persons that occupy a given area is sufficiently high. In this context, nonverbal behavior, including expressions of emotions, constitutes the priviledged solution to the dilemma of the crowded place occupant. In order to repair or prevent repetition of the disequilibrium created by unwanted physical contact, toucher and touched engage in structured interaction sequences entirely made of nonverbal signals.

This research demonstrates that combining the naturalistic collection of interaction specimens usual in the study of face-to-face communication and the physical description of expressive behavior common in experimental psychology constitutes a promising methodological avenue. It is hoped for that it will contribute to the description and conceptualization of that largely unexplored and ill-defined realm of day-to-day interaction that is nonverbal communication in public places.

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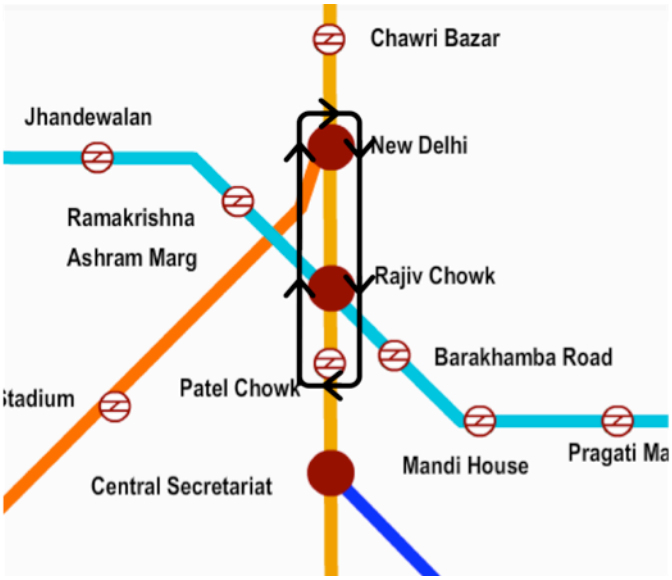


Figure 1: Itinerary of the footage routine in the Delhi Metro



Figure 2: Facial component of the interrogative look. The woman tries to get off but is pushed back in by the crowd.

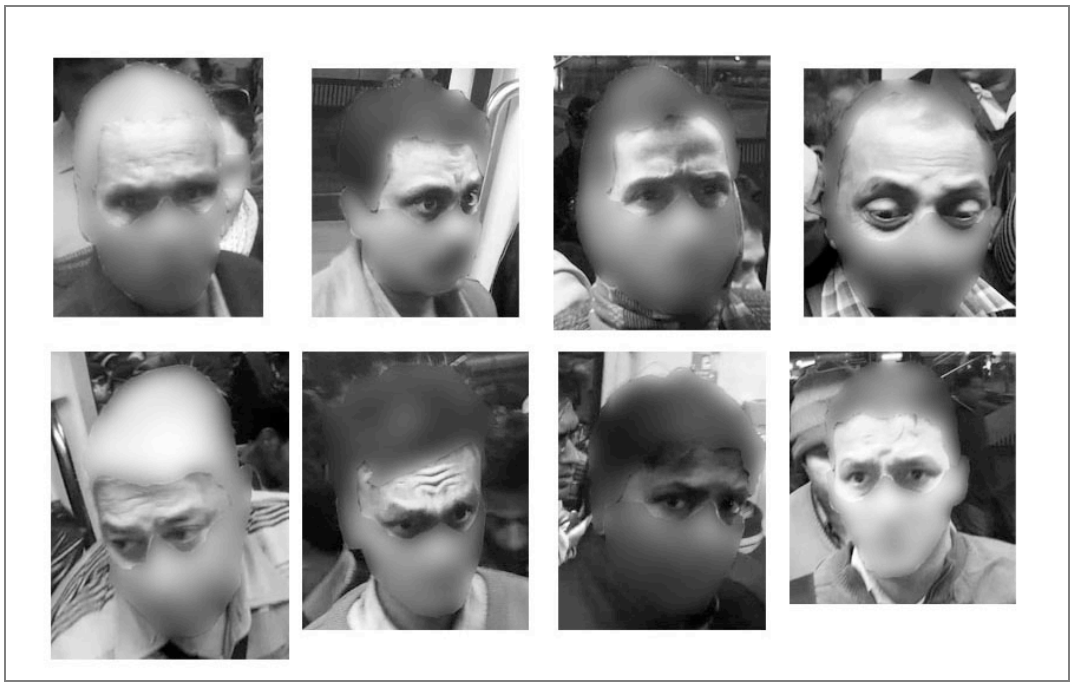


Figure 3: Passengers may raise and lower the brow (AUs 1+2+4) when they are touched. Upper eyelid raise (AU5) is also visible on most of the faces[xviii]



Figure 4: Components of the interrogative look. From left to right: touch, touched displays facial configuration 1+2+4+5, touched orients head and eyes toward toucher



Figure 5: Varieties of hand-touch

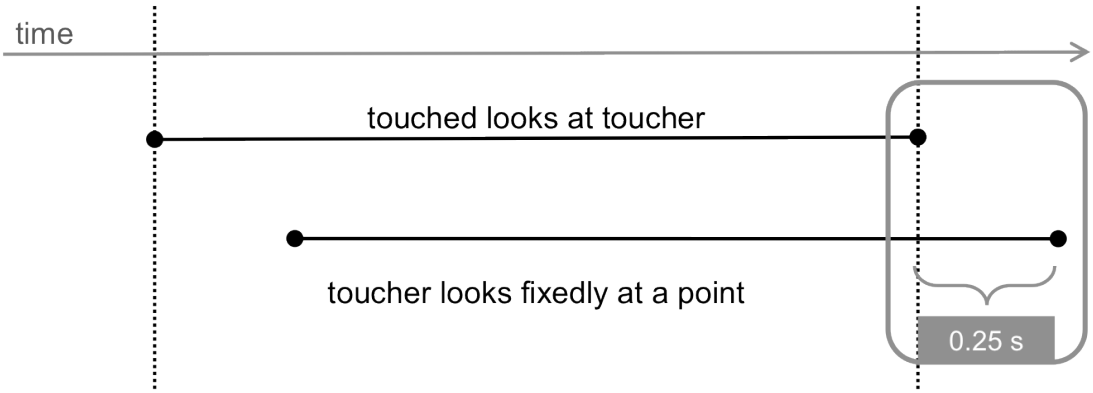


Figure 6: The froze gaze sequence. The toucher keeps on fixing a point until the touched ends the interrogative look.



Figure 7: Face-glossing in the Delhi Metro. The interrogated toucher raises the lip corners and the chin, and presses the lips (AUs 12+17+24)



Figure 8: inward tightening of the lip corners (AU 14)

riders exchange unit	passengers	duration (s)	density begin	density end	mischief
16pm_02	7	11.17	7	8	playful rough jostle with siren-like rising melody
16pm_01	5	4.42	8	9	playful rough jostle
18pm_01	5	10.28	8	9	playful rough jostle
20am_01	5	4.23	7	9	playful jostle and cutting in line
19pm_04	4	6.21	9	12	playful rough jostle
19pm_05	4	4.33	5	5	playful rough jostle and cutting in line
16pm_01	2	4.4	10	10	N/A (probably continuation of previous sequence in same riders exchange)
27pm_03	2	4.37	5	8	playful rough jostle and cutting in line

Table 1: Playful mobs



Figure 9: Sequential unfolding of a playful mob

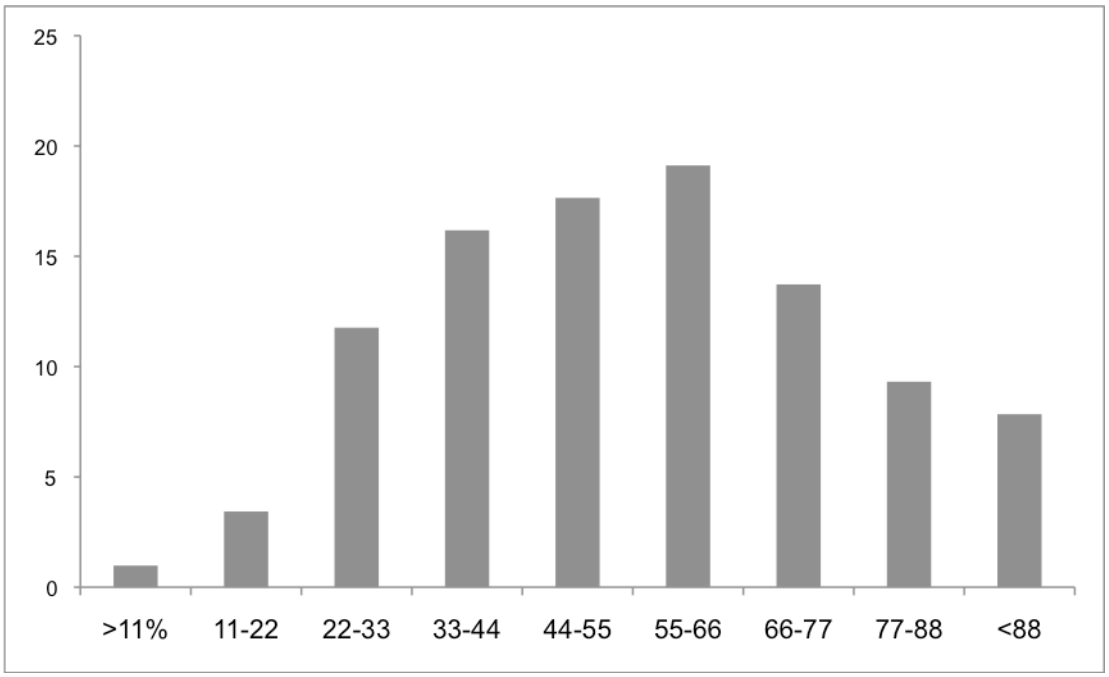


Figure 10: Frequency distribution of interrogative looks (n=204) according to relative incidence time in the course of the riders exchange unit (presented in percentage of unit progression).

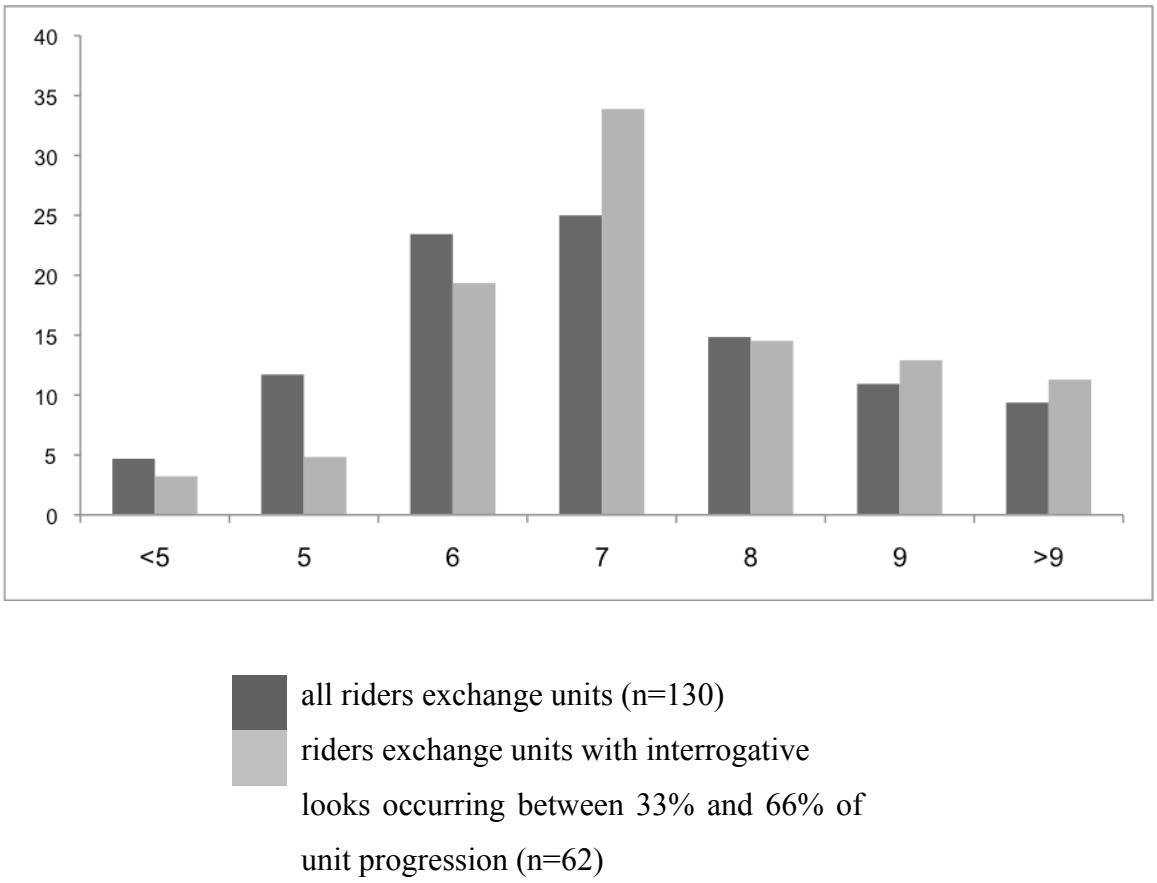


Figure 11: Percentual frequency distribution of riders exchange units according to moving individuals at ½ of unit. Surface reference: 2 m2

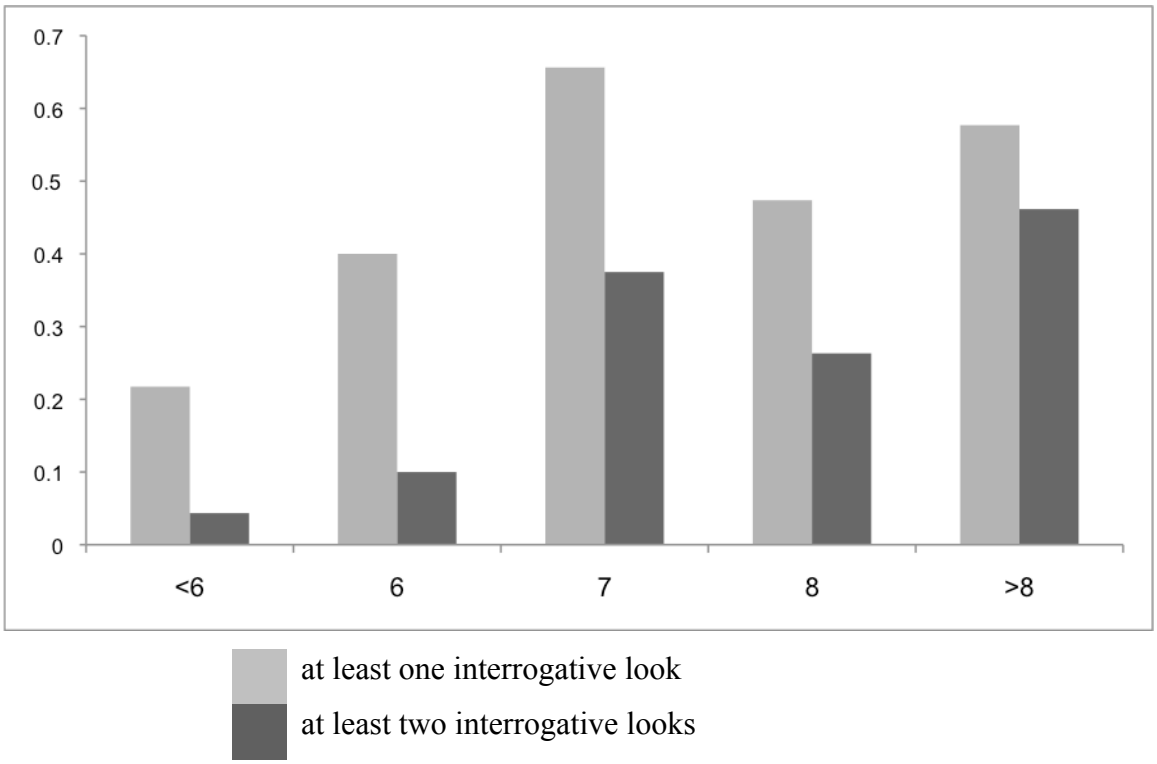


Figure 12: Probability of interrogative looks between 33% and 66% of riders exchange progression according to moving individuals

[i] This research is part of the collaborative project EMOPOLIS funded by the Emergence(s) program of the City of Paris. My acknowledgement goes to Amélie Blom, Jayani Bonnerjee, Véronique Dupont, Namrata Mehta, Partha Mukhopadhyay, Jules Naudet, Stéphanie Tawa Lama-Rewal, Nandini Sundar, and Marie Hélène Zérah for their help with the logistics in Delhi and for their useful comments on the previous versions of this work.

[ii] As many women and some men know, the perverse art of sexual harrassment in the subway often consists in dissimulating a deliberate incursion in the victim's intimate body parts with the innocent appearances of an inevitable jostle.

[iii] The toucher-touched dyad allows for permutations and complications. Occasionally, an apparent toucher manifests that she considers herself to be the touched. In the same vein, a *bona fide* touched may inadvertently transmit the received pressure to a further passenger, thereby becoming a toucher, and so on.

[iv] The difference between these two types of description can be brought out with an example from the domain of facial activity. Having to describe a set of convergent facial movements, I can either say that they express surprise, or alternatively that they involve raising the brow and the upper eyelids, parting the lips and relaxing the jaw. Even though the reference remains the same, the descriptions obey different rationales. In the first case I specify the communicative function of the facial configuration. In the second one, in contrast, I resolve the configuration into its lower-level components.

[v] See Figure 2 for an example of the image and its blind spot.

[vi] However, sticking to the central bar did create trouble once under special circumstances. During a very packed boarding at Rajiv Chowk, in order to maintain camera focus I refused to yield to the sustained pressure I was receiving from one of the sides, which eventually revealed itself to be the attempt of a wife to join her husband. The latter initiated a very explicit scene of angry intimidation amplified by the overt sympathy it evoked in the surrounding passengers. I apologized several times and displayed various submissive expressions before the outraged husband accepted to close the episode.

[vii] The author passed the test of proficiency administered by the authors of the FACS.

[viii] The two last appeareance changes are visible only on the right side of the touched's face, but the outer corner of the left brow remains level with the inner one, which can be seen as evidence of the same AU, namely Outer Brow Raiser (AU2). The more intense action of AU2 on the right side can be attributed to its combination with the orientation movement. In addition, he presents contraction of the muscle *orbicularis oculis* (AUs 6/7) on the left side.

[ix] I thank one anonymous reviewer for raising this important objection.

[x] The disapproval sequence, strictly speaking, does not require the touched to direct her head and eyes to the toucher. In the Delhi database, a fifth specimen of disapproval was found in which these orientation movements are in fact absent.

[xi] While the quality of the video of this sequence is sufficient for identifying these components, it is unfortunatly not for making screen captures and illustrating the phenomenon with a still image. This is why no figure is provided in this section.

[xii] This relative estimate is based on the results of the section "Density as a contextual factor of the interrogative look" presented below.

[xiii] Probably the bald man standing on the lefthand side of the upper-right frame also participates in this mischivous mob as a "follower" displaying an incomplete play-face, since his smile begins soon after the "leaders" end their siren-like sound. I excluded him from the strict demarcation of the mob because he is not immediately contiguous to the other playful passengers.

[xiv] Their number was at most two, and their incidence occasional.

[xv] I thank one anomymous reviewer for his useful comment in this regard.

[xvi] Those that in contrast suggest a cross-cultural consistency with Aranguren and Tonnelat's (2014) Paris study will be addressed in another article.

[xvii] For the Paris study (Aranguren and Tonnelat 2014) such distinction was superfluous, since nearly all physical contacts could be assimilated to the jostle prototype. Additionally, any user of the Paris métro knows that hand-touch between unacquainted passengers is taboo. What the duality of contacts in the Delhi Metro could be pointing at, then, is that hand-touch, while still more severe than the jostle, is not a taboo to the same extent in Delhi as it is in Paris.

[xviii] In this and other composite figures throughout the article the size of the component images is a compromise of scale, focus and quality, and not the result of arty inspiration.