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Mapping Fear of Crime Defining Methodological Orientations

By Julien Noble and Antoine Jardin

Julien Noble, Centre de Recherches Sociologiques sur le Droit et les Institutions Pénales (CESDIP),
Université Saint Quentin en Yvelines (UVSQ).

julien.noble@cesdip.fr

Antoine Jardin, Centre de Recherches Sociologiques sur le Droit et les Institutions Pénales (CESDIP),
Université Saint Quentin en Yvelines (UVSQ).

antoine.jardin@cesdip.fr

CESDIP, Immeuble Edison, 43 Boulevard Vauban, 78 820 Guyancourt, France
+0033 01 32 52 17 00

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MANUSCRIPT

MAPPING FEAR OF CRIME: DEFINING METHODOLOGICAL ORIENTATIONS

The development of new technologies in recent years has encouraged the deployment of systems aimed at mapping fear of crime. However, this new practice is not attended by methodological work aimed at the evaluation of the ability of tools for measurement to effectively translate a social experience into a quantifiable event. On the basis of the results of the survey entitled “Fear of Crime in Ile-de France public transportation” and on the feedback of respondents interviewed as part of an additional survey, the present study shows that the instruments aimed at locating, geographically, experiences of fear of crime encounter two major difficulties. The first pertains to the diversity of emotions felt and of the situations encountered. The second is tied to recall of past experiences. The discussion which concludes the paper proposes some methodological orientations for the future.

Keywords: fear of crime, mapping, state of fear, state of anxiety, public transportation¹

Introduction

For nearly half a century, fear of crime has been the object of considerable scholarly work (Farrall et al. 2009; Hale 1996; Noble 2019; Vanderveen 2006). Among these publications, methodological work has contributed significantly to our understanding of this social phenomenon, by effectively translating conceptual advances into appropriate tools for measurement. These epistemic operations have gradually produced a real change in the way we measure fear of crime. Traditional surveys based on a single indicator have been replaced by much more detailed instruments including questions aimed at identifying several different types of feared crime (Ferraro 1995), the formulation of which targets concrete fears rather than abstract ones (Ferraro and Lagrange 1987; Garofalo 1979). Moreover, the number of indicators are sufficient to register the intensity as well as the frequency of these emotions (Farrall 2004a). Last, given the recognizably multidimensional character of fear of crime (Rader 2004), the most complete surveys now include questions aimed at understanding the perception of the risk of victimization (the cognitive dimension) (Jackson 2005) and constrained behavior (the behavioral dimension) (Lane et al. 2014). However, there is one line of research, developed in recent years, which has escaped methodological examination so far: mapping of fear of crime. What is meant by this term is all of the procedures aimed at geographically locating the threatening experiences reported by respondents. While the new technologies have reinforced interest in this theme (Solymosi et al. 2015), they do not provide any answer to the methodological and epistemological questions raised by these methods. One of the most serious questions concerns the conceptual debate that opposed Hough and Farrall some twenty years ago over the possibility of measuring fear of crime in the same way as victimization (Farrall 2004b; Hough 2004). More specifically, the debate dealt with the relevance of measuring the frequency of fear of crime and more generally on the possibility of grasping this phenomenon in time and space. On the basis of the findings of a survey done in France on public transportation (Noble 2020), this article intends to resume this debate in the light of mapping practices, in order to reflect on their epistemological implications and finally, to propose a certain number of methodological orientations for the future. Before this, we will briefly discuss existing studies and attempt to reconstruct the origins of mapping in research on this theme.

Looking for micro spatial and temporal contexts in fear of crime

The need to precisely determine the spatiotemporal contexts in which fear of crime appears first emerged in the mid 1990s. Motivated by the many critiques which were then addressed to traditional questions (Farrall et al. 1997; Ferraro and LaGrange 1987; Pain 2000), it was first advanced by geographers from two

¹ We are most grateful to the two anonymous evaluators thanks to whose relevant remarks the final version of the present article has been considerably improved.

major schools of thought. The first is feminist and constructivist. The authors who belonged to that school attempt to explain the paradox of gendered fear, according to which women are less often victims than men but they report a much higher level of fear. The explanation advanced is novel: it stresses the socially constructed character of public space (constructivist dimension). It is a space dominated by men, to which women are admitted reluctantly, especially if they are alone in the evening or at night (feminist dimension). In public spaces, many women are frequently the object of low-intensity sexual attacks, which are, moreover, not well identified by the victimization surveys of the time (Pain 1993). To grasp this phenomenon more fully, researchers therefore paid attention to those social, spatial and temporal contexts which create the most anxiety for women (Pain 1997, 2000). This research orientation creates a tie between the feminist researchers and the second school, which, precisely – and exclusively – deals with ecological/environmental explanations of fear of crime. The search for *stimuli*, imperceptible with traditional questions, led them to identify places judged to be anxiety-producing so as to determine the environmental micro-contexts causing fear (Atkins 1989; Bannister 1993; Fisher and Nasar 1995; Nasar et al. 1993). Conducted, for the vast majority, using qualitative methodologies, these studies placed special emphasis on the role of compartmentalized, closed or deteriorated spaces, on the insufficient maintenance of public places – be it of the buildings or of vegetation – or again, of darkness (Nasar and Jones 1997; Valentine 1990). An additional step was made some years later with the studies conducted by a team of young English researchers. Noting that traditional questions overestimate the level of anxiety in the population, Farrall and his colleagues proposed a redefinition of the instruments measuring fear of crime (Farrall et al. 1997). Their proposals stress the need to grasp situations in which fear is experienced personally and not the subjective perception of the probability of being the victim of an assault. It is in this framework that questions aimed at measuring the frequency of fear of crime were integrated in *the 2003-2004 British Crime Survey* (Ditton and Farrall, 2007). While Farrall et his colleagues never had the ambition of mapping threatening experiences, their conception of fear of crime paved the way for this kind of scientific approach. Quantitative surveys are now prepared to measure more than the intensity and occurrences of fear of crime. The experience of fear of crime, defined as an event that can be located in time and space, can be measured with the spatiotemporal micro-context that surrounds it and shapes it (Chataway et al. 2017; Solymosi et al. 2015). To grasp this context, researchers imagined survey tools which may include material or numeric maps on which respondents can report the location of their anxiety-producing experiences. This is in fact the only point shared by the various studies, whose procedures and survey arrangements vary considerably (Solymosi et al. 2020; Vanderveen 2018). Whereas some ask respondents to indicate the places they avoid either frequenting or crossing (Doran and Burgess 2012), others focus on the places where respondents experienced fear of being victim of a crime (Chataway et al. 2017; Noble 2020; Podor et al. 2016; Solymosi et al. 2015). To compensate for difficulties in recall, some researchers recommend the use of applications with systems of notification encouraging respondents to evaluate their perception of risk in the immediate situation and to respond to a questionnaire as soon as they receive a reminder (Solymosi et al. 2015). Others resort to more traditional survey methods and therefore rely on the respondents' more or less distant memories (Kohm 2009). In that case, a graphic method should be employed in order to identify anxiety-producing places. Some people recommend specifying points (Panek et al. 2019) while others prefer the use of circles or areas, which make for the identification of more or less extensive zones (Jakobi and Podor 2020; Kohm 2009); still others do not use maps and work with unfolding menus showing the name of a place (in fact, here, the name of a station or a train stop) (Noble 2020). Last, some arrangements make it possible to record several problems experienced by a single respondent (Chataway et al. 2017, 2019; Solymosi et al. 2015), where others note only one (Noble 2020).

Although by no means exhaustive², the presentation of these various practices gives some idea of the methodological agitation presently affecting research on the mapping of fear of crime. It also informs us of the absence of shared practices and more generally of methodological debates which would contribute to the establishment of a consensus. This is precisely what the present paper intends to introduce. Based on the experience reported by several respondents who participated in the *Fear of Crime in public transportation in Île-de-France* survey, this paper proposes an analysis of the criticism addressed to the mapping devices used in that survey. As we shall see, the remarks went beyond the instruments criticized

² For an exhaustive review of the literature, see Solymosi et al. 2020 and Vanderveen 2018.

here and extend to the practices and methods of the various studies reviewed in this section. But before presenting the outcome, we must return to this survey and its questionnaire.

The survey and respondents' reactions

In the Paris area,³ public transportation is one of the most anxiety-producing places. The latest *Victimization and Fear of Crime in Île-de-France* survey, conducted in 2021 among a representative sample of 10,500 *franciliens*, shows that 37.7% of the population of the region is afraid of being victim to a theft or an assault in public transportation as opposed to 19.5% in their home neighborhood at night and 7.0% at home (Heurtel 2021). To achieve a better understanding of this phenomenon, the Paris Region Institute,⁴ Île-de-France Mobilités⁵ and the French Ministry in charge of transports via the Observatoire National de la Délinquance dans les Transports (ONDT) conducted a survey on fear of crime in public transport in the Paris area. Conducted via the Internet, the survey was sent by e-mail to subscribers to an annual Navigo⁶ or Imagine R⁷ pass aged 18 or over, with an active contract and who accepted to be solicited in compliance with the general European rules on the protection of data (GDPR). Based on a non-probabilistic, volunteer-based sample, the survey was conceived so as to limit access to the questionnaire. The link giving access to the survey was embedded in the e-mail and could be used only once. Once the questionnaire was validated, the link was automatically cancelled, thus preventing respondents from participating repeatedly. Furthermore, this operation made it possible to restrict the survey to the addressees of the message. Sent by e-mail to 515,255 subscribers between September 19th and October 21st 2019⁸, the questionnaire was entirely completed by 50,222 individuals⁹.

The survey questionnaire was composed by the Observatoire Scientifique du Crime et de la Justice (OSJC) which is part of the Centre de Recherches Sociologiques sur le Droit et les Institutions Pénales (CESDIP/CNRS), the Institut Paris Region and the ONDT. It covered the following themes:

1. The usual socio-demographic variables (age, sex, socio-professional category, commune of residence)
2. The reason for using public transportation and the evaluation of transport facilities in the home neighborhood.
3. Worry about becoming a victim of theft or physical assault in public transportation during the last 12 months (frequency) and several questions about the most recent experience of worry (type of crime feared, emotional intensity, location in time and space, reason for travelling, anxiety-producing *stimuli*).

³ The Paris area (or Île-de-France) is the area in France that includes Paris and seven other neighboring *départements* (Hauts-de-Seine, Seine-Saint-Denis, Seine-et-Marne, Essonne, Yvelines Val de Marne and the Val d'Oise). With 12 million Inhabitants (known as *franciliens*), it is the most densely populated region of France. It represents 19% of the French population.

⁴ Formerly the Institut d'Aménagement et d'urbanisme (IAU). The Paris Region Institute is the design office of the Île-de-France region.

⁵ Formerly Stif. Île-de-France Mobilités is the authority in charge of organizing public transportation in the Île-de-France region.

⁶ The annual Navigo pass is a subscription for unlimited use of all public transportation in the Île-de-France region.

⁷ The Imagine R Navigo is a service similar to the annual Navigo pass but it is open only to high school and college students under 25 years of age.

⁸ A protocol for sending reminders was set up in order to improve the response rate. Ten days after the first mailing (September 19-27, 2019), those people who had not login to the questionnaire received a reminder between the 7th and the 10th of October.

⁹ This is not a representative sample of the target population. When a survey is conducted on a non-probabilistic sample, the invitations to respond to the questionnaire are sent to as many individuals as possible, with no prior selection of participants, aside from the fact that they belong to the target group. The consequence of this self-selection of respondents is the introduction of two main population biases, now well identified by methodological research. The first is the overrepresentation, within the sample, of respondents who feel concerned by the theme broached (Shropshire et al., 2009). In the present survey, there are proportionally more individuals who claimed to have worried about theft or physical assault in public transportation than in the Île-de-France victimization survey (63% of respondents versus 40.9% in the *Victimization and fear of crime in Île-de-France* survey). The second bias is the underrepresentation of some categories of the population, especially those with the fewest diplomas (identified here using socioprofessional categories). The lower the educational level, the more the group involved is underrepresented (Frippat & Marquis; 2010; Loosveldt and Sonck, 2008). The consequence of the latter bias is shown in Table 2, appended.

4. The criteria of vulnerability (reasons for which the respondents thought they might be the object of a theft or an aggression, and the subjective assessment of their ability to deal with an aggression (physically and verbally)).
5. The constrained behavior adopted to reduce the risk of victimization in public transportation spaces.
6. The victimizations (thefts, assaults, incivilities, etc.) experienced, observed or heard of in public transportation (without information on their location in time and space).
7. The systems that might be reinforced in order to improve safety in public transportation.
8. Two general opinion questions (one on concerns about crime, the second on the perception of social diversity in public transportation).

In the framework of the present paper, we will deal exclusively with the part of the questionnaire which corresponds to the third theme, and even more specifically to the questions concerned with mapping. To obtain geographic information, the questionnaire follows a precise path. The first question in this section attempts to determine whether the respondent was afraid of being victim of a theft or a physical assault in public transportation during the last 12 months. To measure frequency, the responses show the number of occurrences: “Never”, “only once”, “between 2 and 10 times”, “more than 10 times”. For people who claimed to have experienced fear at least once, the survey contains a unit of questions aimed at specifying the nature and context of the most recent experience of fear. Three of these questions are devoted to mapping. The first pertains to the type of transportation used when the experience occurred (RER, metro, suburban train, bus, tramway), the second asks about the line, and the third the train or subway station or the bus or tram stop involved.

As we will see, nonresponse rates increase with the level of geographic precision. To understand this phenomenon, we will resort two types of information. First, some raw survey findings, subsequently and essentially, the reactions of several respondents interviewed as part of an additional survey. In October 2022, the original survey questionnaire was sent by email to 438 students from two Île-de-France region universities. These students were encouraged to massively distribute the email containing the survey questionnaire to their family members and friends. The message contained a brief introduction of the questionnaire, a link to access it and an invitation to provide feedback on the questions posed. We asked the respondents to tell us, by email return or by answering the open question at the end of the questionnaire, what they thought of the survey. In all, we received 111 comments. Among the 58 messages dealing totally or partially with the conception of the questionnaire, 13 were retained for analysis. Those mails whose content was not sufficiently explicit or unequivocal and those whose criticism or suggestions were not related to the subject discussed in this article (for instance, one respondent suggests that questions on the risk of terrorist acts be included) were excluded from the selection. The messages retained were written by 13 different respondents and relate to the difficulties they encountered in transcribing their experiences through the questions and types of response proposed by the survey. It is the latter messages, precisely, which are analyzed in this paper, inasmuch as they contribute information which is relevant to a discussion of the epistemological implications of methods of mapping fear of crime.

Data analysis: the difficulties in mapping fear of crime

As we have seen, this survey maps fear of crime on the basis of three questions, each of which narrows down the scale with respect to the previous one. However, to avoid the introduction of a bias in responses, none of those questions was compulsory. Respondents could refrain from answering the question, and could simply go on to the next question by clicking on the appropriate button. Conversely, in order to answer the last question on mapping, the respondent must necessarily have answered the previous two questions. A respondent who passed the first question – when this experience occurred, what type of transportation were you using or did you intend to use? – was not asked to answer the following two. Similarly, the third question – can you indicate the station at which you were afraid of being victim of a theft or physical assault ? – was not asked unless the respondent had answered the second (during that experience, what [subway] line were you on or did you intend to take?). The table below shows the raw response rate for each of the three mapping questions.

Table 1: Crude rate of response for each mapping question

Questions	Total respondents
Question 1 (Type of transportation)	31 494 (100%)
Question 2 (Line)	29 661 (94,2%)
Question 3 (Station train/subway, bus/tram stop)	25 159 (79,9%)

The findings shown in table 1 show an increase in loss of information with increasing geographic precision: the more the question targets a specific place, the lower the response rate. Thus, all of the respondents who claimed to experience fear in public transportation during the last 12 months were able to identify a specific type of transport (first question) and were therefore asked to answer the second question involving identification of a line. 94.2% of respondents answered the second question, and by the third, about the specific station, only 79.9% responded. This corroborates the results of a study conducted by Kohm in 2009. The author questioned 394 residents of a central neighborhood in Winnipeg, Canada, in order to study fear of crime and victimization there. 296 (or 75.1% of the sample) were able to identify – by designing circles on a map of the neighborhood – one or several areas they felt to be anxiety-producing. However, and this is the most interesting point, 349 respondents (or 88.6% of the sample) answered a question aimed at justifying the previous choice: “Why does the area you circled create anxiety for you?” (Kohm 2009, pp. 13). In other words, 45 respondents (11.4% of the sample) completed the last question without having previously identified any particularly anxiety-producing area. This is the point of departure of the present paper: what is the reason for the loss of information when one attempts to obtain a precise location of an experience felt to produce anxiety? The results of the survey on *Fear of crime in public transportation in Île-de-France* and the feedback of several respondents interviewed as part of the additional survey suggest three main reasons.

Meaninglessness: information which is incompatible with the experience of anxiety

Actually, the debate between Hough and Farrall on the possibility of determining the frequency of fear of crime revolves around the opposition between two different emotional states. The former stresses the relatively abstract, diffuse apprehension whose intensity is measurable but actual occurrence is difficult to determine (Hough 2004). The latter focused more particularly on a more concrete sort of fear, triggered by the presence of a threat that can be located in space and time (Farrall 2004b). Although there was little follow-up to this debate, it warrants special attention, inasmuch as the neurosciences now point to the existence of these two distinct emotional states (Lang et al. 2000; Sylvers et al. 2011). The state evidenced by Farrall is designated as fear:

“State fear is an aversive emotional state during which an organism is motivated to escape a specific and imminent threat. The characteristics of state fear include short-lived arousal that quickly dissipates after the threat is avoided” (Sylvers et al. 2011, pp. 133).

And the state studied by Hough is designated as anxiety:

“State anxiety, in contrast, is an aversive emotional state that occurs while an organism approaches an ambiguous and uncertain threat. The behavioral characteristics of state anxiety include sustained hypervigilance and hyperarousal, which persist even after the potential for threat is removed” (Sylvers et al. 2011, pp. 133).

This distinction is important because it is the reason for some of the non-responses to questions on precise locations. Several respondents describe the inability to anchor their “diffuse” experience of fear of crime in a specific place:

The survey is very complete and interesting, but it is limited to a punctual feeling of insecurity linked to a specific experience, whereas it might also deal with a more diffuse feeling: not of an attack, but the

feeling of a threat (particularly for all sorts of pickpocketing), which is not tied to any specific time or place. In any case, that is my way of feeling I am not safe in public transportation sometimes (with respect to my wallet or the cell phone in my pocket) and I didn't really find any questions about that in the survey).

(man)

Another respondent sent an e-mail admitting that she did not complete the questionnaire for a similar reason:

Unfortunately, even if I consider my latest experience [of fear in public transportation], I cannot fill out [the questionnaire], since my last feeling of insecurity may have been at night, for instance, but on the other hand it is all along the way (not in any single station) and for all the reasons: theft with or without violence, assault, etc.

(woman)

It is clear, based on the definitions of fear and anxiety states, that these remarks testify more to the latter emotional state than to the former: the experiences reported speak of diffuse apprehension based on a relatively ambiguous threat. In this sense, the content of these contributions strongly corroborates Hough's analyses:

“When we talk about a mental state such as anxiety or worry, we are concerned with *intensity*, not *frequency*. Leaving aside acute anxiety attacks, anxiety is not comprised of a series of events that can be located in space and time. Rather, it is a rumbling state of unease, often partly submerged, sometimes fully surfacing” (Hough 2004, pp. 174).

Apparently, then, the use of public transportation is an element that arouses a state of anxiety for these particular respondents. While it seems possible to identify some contextual elements which explain the emergence of this emotional state (the first respondent mentions fear of theft without violence, the second speaks of nighttime), the identification of a specific situation seems nonsensical for this type of experience. It is as if anxiety was first and foremost a state of malaise the causes of which are not really identified. While the person who experiences it is quite conscious of the overall context in which this emotion appears (in this case, public transportation), he or she is unable to identify one station rather than another, inasmuch as the anxiety state does not vary in conjunction with that variable. Similarly, since the threat behind this emotion is ambiguous, we understand the difficulty encountered by respondents in describing precisely the nature of their fear of crime.

I wanted to respond to your survey on fear of crime in public transportation, but the questions are too restrictive [...]. Insecurity in public transportation requires multiple answers and cannot be too restrictive. It is a mixture of all, or almost all, of the responses proposed.

(woman)

Thus, the questions aimed at defining a micro spatial and temporal context on the one hand and the nature of fear of crime on the other hand seem to be particularly inappropriate for the apprehension of the experience of anxiety states (Hough 2004).

Variability of the scale of contextual precision: fear in travel situations

While this paper does not claim to answer the question of how these two emotional states are distributed, or even the conditions under which they come into being, it does show the existence of two distinct states. Whereas some respondents corroborate Hough's assertions, saying that they experience fear of crime through a state of anxiety, others experience a fear state as described by Farrall. The latter emotional state is particularly salient in comments which stress the impossibility of describing more than a single threatening experience in response to the survey. For these respondents, the problem has nothing to do with

the ability to locate their personal experience in a specific spatiotemporal context, but resides in the fact of reducing fear of crime in public transportation to that one and only experience:

[On] the question of the place of a potential attack: sometimes I no longer feel safe in several places in the course of my travels, depending on the people around me and on what time it is. Requesting a single response makes it impossible to answer the question correctly.

(woman)

However, I have one remark about the survey: it is impossible to explain only a single “experience” in the questionnaire. The importance of the subject is due to an **almost daily feeling of insecurity in public transportation** (placed in bold by the respondent), much more than on a single experience in which one was afraid.

(woman)

After having answered that I had been afraid of a verbal aggression on several occasions, and specified that this had really happened several times, the questions that followed asked about the place, the time, the reason for traveling (...) for a single event although there had been several.

(woman)

It would be an error, however, to think that questions on location would enable us to define the spatial context of experiences of fear – triggered by a specific *stimulus*, immediate and therefore localizable in space and time – and that if we allowed respondents to describe several such experiences that would suffice for us to understand the reality of these situations. As with the state of anxiety, the state of fear takes place on variable spatiotemporal scales. This variability is not caused by an ambiguous or unspecified threat, as in the emotion studied above, but in the fact that these people are on the move. The identification of a train or metro station is appropriate for all *stimuli* located in a set place, but is inappropriate for all those situations felt to be threatening in a moving train. This is why the experience of fear, even when it is generated by an immediate threat, such as the presence of an inebriated man or of a group of turbulent youths, is not necessarily more precisely localizable (in this case in a train or metro station).

Many questions do not allow for several answers [...]. For example, to mention a place where I may not feel safe, it is surprising that I cannot give several answers (for instance, in the metro, on the platform, in the corridors). Fear does not necessarily stop when one changes places.

(woman)

Aside from the last message, feedback provided by respondents hardly ever mention the variability of contextual scales from one experience of fear to another. The problem connected with imposed scales for locating fear of crime when travelling does however appear again in answers to the question about the bus stop at which one last experienced fear.¹⁰ The specificity of this question is tied to its open answers. As opposed to railway lines and stations (RER, metro, Transilien, tramway), bus lines and stations could not be included in the questionnaire in the form of a pre-recorded list. Given the extensive network of public bus lines throughout the Île-de-France region (over 1,500 lines for the entire region and several dozens of thousands of bus stop), it was difficult to integrate a list of all of these in the questionnaire without considerably increasing the weight and increasing the risk of computer bugs for respondents. The solution retained, then, consisted of leaving it up to the respondent to give the name of the bus line, the transporter and the stop at which the last experience of fear took place. This freedom had some consequences as to the choice of how the respondents answered, especially with respect to stops. One of these was the refusal of several respondents to identify a sole and unique place (as requested in the question), and their preference for naming a portion of the trip between two stops:

Between Chatelet and Alésia (woman)

Between Bobillot Tolbiac and Jeanne d’Arc (woman)

¹⁰ That question was put only to respondents who had previously claimed to have had their latest experience of fear in a bus. The results presented below are taken from the main survey carried out in 2019.

Between Chatillon Montrouge and Dampierre (man)
Approximately from Botzaris to Couronnes¹¹ (woman)

In short, as opposed to anxiety states, the state of fear always takes place in a context determined by the presence of what are judged to be threatening *stimuli*. It is possible then to question respondents on the contexts surrounding these emotional experiences, provided we take the variations in spatiotemporal scales into consideration, at least for situations involving travel. This remark is particularly relevant for questions aimed at locating places very precisely, as shown by this woman who responded to the question of where her last experience of fear took place:

The person followed me (*threatening stimulus*) from the Noisy-le-Grand station [to] my home.
(woman)

In this specific case, the identification of the station only partially corresponds to the spatial context in which the threatening experience took place. For this reason, we must limit as much as possible the questions imposing a geographic scale, and prefer less targeted questions leaving more leeway for respondents to choose their responses.

Imprecise memories: recall of a threatening experience

Respondents who choose not to answer questions aimed at identifying a train or metro station in which the most recent threatening experience took place may also be explained by difficulties in recall. This problem, identified long ago in studies of fear of crime, is far more extensive than the theme of mapping (Jackson 2005; Warr 2000). To attenuate the effects caused by imprecise memories, Farrall already insisted twenty years ago on the need to limit questions on fear of crime to the last 12 months (Farrall 2004a). Some researchers judge this lapse of time still far too long for the precise recall of a personal experience, and have recently called for the development of *experience sampling*, encouraging respondents to describe the situation when it takes place, or immediately thereafter (Solymosi et al. 2015). This determination to considerably decrease the lapse of time between the experience and its reporting is perfectly legitimate, in view of our survey findings. The recall of events is explicitly mentioned by some respondents, although the experiences included were restricted to the last 12 months:

I feel it most unfortunate, however, that some questions were not sufficiently thought out or tested previously. For example, it is quite legitimate not to remember at what time one traveled, but you absolutely must know where you were going.
(woman)

For the following question [*In the course of the last 12 months have you ever felt fearful about becoming a victim of theft or assault in public transportation?*] you should have given the choice of “I don’t remember”... One does not necessarily count those painful moments, and above all one tries to forget them.
(woman)

Although the respondents’ messages never mention difficulties in remembering places, it is not because the memory treats geographic information better or differently, but because questions on geographic location take this problem into account. By allowing respondents not to answer those questions, the survey made it possible to continue the questionnaire without being obliged to remember at all costs the place where the last threatening experience took place. Respondents therefore had little reason to mention this point in their feedback. Nonetheless, two types of responses to the open questions on bus stops suggest the existence of this problem. The first has to do with the identification of a town or a commune instead of a bus stop. In this case, however, the problem of recall is only one of a number of hypotheses. While the fact of giving the name of the commune may really be because one is unable to remember the precise place

¹¹ All of the names correspond to names of bus stops.

where the threatening experience took place, it may also be because the person wants to indicate the name of the commune through which he or she travels most often, because the personal experience is not directly anchored in a specific time or place (state of anxiety). The second type of response, more directly tied to recall, corresponds to a more or less precise description of the place without ever mentioning the name of the stop involved:

The stop before Abbé Henocque (*name of a stop*) when going toward Laplace RER (*name of an RER station and end of the line*) (woman) ;
Arcueil (*name of a commune*) near the Leader Price store (woman);
Shortly after Montparnasse (*a Paris train station*) (woman);
A stop near a train station (Austerlitz or Gare de l'Est) (*Parisian train stations*) (man)¹².

In all these instances, either the respondent's memory failed or he or she did not know the name of the stop. However, what escaped them is not the precise memory of the place at which the last perception of fear was experienced, but only the name of the stop involved. The first two responses demonstrate this situation clearly: the descriptions given enable us to identify precisely where the threatening experience took place. As for the latter two responses, it is more difficult to establish a diagnosis. What is perfectly clear is that the descriptions given do not yield the same scale of geographic precision as those obtained with the first two responses. Be that as it may, the answers to this question clearly reveal the difference between the memory of a place and that of its name. Mapping questions aimed at identifying a place by its name therefore have the disadvantage – and especially so when the types of response are preregistered in the form of lists – of increasing the number of non-responses by respondents who no longer remember the name of the particular place.

Discussion and conclusion: constructing appropriate tools for mapping fear of crime

In recent years the development of new technologies has stimulated the implementation of systems aimed at mapping fear of crime (Chataway et al. 2017; Solymosi et al. 2015). However, development of this practice was not attended by methodological studies, the aim of which is to evaluate the ability of measurement tools to efficiently translate social experience in terms of quantifiable events. This is precisely why the present paper is concerned with the epistemological and methodological implications of these methods. Based on the results of the survey on *Fear of crime in public transportation in Île-de-France* and on the feedback of several respondents interviewed as part of an additional survey, this study shows that the tools used to geographically locate personal experiences felt to be threatening encounter two major difficulties.

The first takes a firm stand in the debate between Hough and Farrall as to the possibility of measuring the frequency, and more generally the spatiotemporal context of fear of crime. It is due to the diversity of emotions felt and of the situations encountered. As opposed to the state of fear, triggered by a *stimulus* which may be located in time and space, the state of anxiety – much more diffuse – is the response to an ambiguous, uncertain threat (Lang et al. 2000; Sylvers et al. 2011). In the first case, the spatiotemporal context can be determined since it partakes of the state of fear (Farrall 2004b). In the latter case, however, it is no longer a decisive factor, which explains why questions on context turn out to be nonsensical for respondents who are faced with the state of anxiety (Hough 2004). In short, questions connected with mapping seem to be appropriate for state of fear but are incompatible with state of anxiety. Is this a reason to abandon any attempt to map fear of crime, then? We do not think so, for two reasons. First, because a state of anxiety, even so, is always linked to a specific context, however general and far-reaching. Although it is diffuse, this state of malaise arises – or at the least more perceivable – in specific contexts. The feedback of some respondents shows that the mere use of public transportation suffices to elicit this emotional state more clearly than in other spaces. For still others, the state of anxiety seems to be particularly great during travel at night as opposed to daytime. Hough himself gives an excellent illustration of the context surrounding states of anxiety in his response to Farrall (Hough 2004). In order to clarify the distinction

¹² This results are taken from the main survey carried out in 2019.

between these two emotional states, the author tells of an experience of anxiety that he felt personally. While he explains that he is unable to say how frequent this apprehension is, he gives the exact context in which this state of malaise overwhelmed him: at night, when he was out alone in his neighborhood. This emotional state continued until he decided to move to another neighborhood. The author explains that going out at night ceased to be a source of apprehension in his new neighborhood. Thus, fear and anxiety are really two transitory and contextual emotional states, but on different spatiotemporal scales. It is possible, then, to develop indicators aimed at informing us on contexts involving fear of crime, provided we take into account – in the form of the questions and in the possibilities of responses – the different spatiotemporal scales on which these emotions are felt. The second reason for which we encourage practices aimed at mapping fear of crime is mostly based on this reasoning. Since these two emotional states are situated in different time frames and on different geographic scales, any well-conceived mapping tool should help us to separate a state of fear from a state of anxiety.

Before going into the conception of the questions on geographic location, it is important to return to the measurement of fear of crime. A respondent cannot be asked to locate a threatening experience without first asking him whether he was worried about being the victim of a theft or physical assault. The formulation of that initial question has been dealt with extensively, and a broad consensus has now been reached. It must refer to the specific types of crime worried, rather than mentioning the abstract notion of “feeling safe” (Ferraro, 1995; Ferraro and Lagrange, 1987; Garofalo, 1979; Warr, 184; Warr and Stafford; 1983) and include a temporal boundary aimed at limiting problems of recall (Farrall and Gadd, 2004, Farrall et al., 2009).¹³ Conversely, far fewer publications have been devoted to designing complementary questions aimed at grasping the nature (intensity, frequency, and type of aggression feared) and the spatial and temporal context of fear of crime (time of day, geographic location, reason for travel, threatening *stimuli*). Yet, these questions are faced with a major epistemological problem: how can this information be obtained when respondents claim to have experienced fear of crime on several occasions during the period under consideration? In this case, the nature and context of fear of crime may vary from one instance to another (Farrall et al., 1997). Farrall and his colleagues propose a simple solution to this problem: focus on the most recent experience of fear of crime (Farrall, 2004a; Farrall and Gadd, 2004; Farrall et al., 2009).¹⁴ While this solution may be criticized for eliminating a number of experiences (since it retains only the most recent one), it admittedly has the immense advantage of increasing the precision of the data collected. When asked to concentrate on one particular souvenir, respondents are much less apt to refer to a number of experiences – whose nature and context may be heterogeneous – to complete their responses.¹⁵ Thus, with this progressive operational frame, questions on geographic location may be used to determine where each threatening experience took place.

It remains for us to discuss the characteristics of any such tool. Given the results of the present study, it should necessarily break with questions aimed at identifying any single geographic scale (in particular that of a station or bus stop) and leave it up to respondents to define its dimensions. When studying fear of crime when travelling, the best solution, according to us, is to ask respondents to report on the entire trip – from the point of departure to arrival – during the last experience felt to be threatening. After this stage, respondents would be encouraged to highlight – directly on the route of the trip – those places where they perceived a risk of victimization, with the possibility of selecting the entire trip (state of anxiety), a portion of it (state of fear in a moving vehicle) or a single place (state of fear in a station or a bus stop). Thus conceived, mapping tools would be appropriate to all of the personal situations and would make it possible – with the help of other questions – to sort out states of fear and states of anxiety.¹⁶

¹³ During the last 12 months, have you ever felt worried about being the victim of a theft or physical assault on public transportation?

¹⁴ This solution is proposed for the measurement of the intensity of the fear of crime. To those respondents who claimed to have felt worried at least once during the past 12 months, Farrall and his colleagues put the following question: “on the last occasion you felt worried about [that problem], how worried did you feel?”

¹⁵ Several threatening experiences may be recorded provided the same set of questions is repeated as often as necessary so as to document each experience separately.

¹⁶ This solution is appropriate for fear of crime in public transportation, but it may be applied to other, broader contexts. It is possible to provide other forms, usable for studying fear in a neighborhood, inasmuch as people necessarily travel within it (to go to work or school, to shop, for sports or cultural activities, etc.).

All survey methods focused on fear of crime in concrete situations share one defect, however. In a note commenting an article by Solymosy et al. (2015), Innes (2015) mentions the impossibility – for these tools – of detecting fear of crime in individuals who adjust their behavior and avoid places they feel to be threatening. The content of some comments corroborates this critique:

I just filled out the questionnaire on fear of crime in public transportation. I think it lacks a space for making comments. If there was one, I would have said that I don't feel unsafe in public transportation because I only use them in daytime. I stopped going to Paris alone at night, by train, years ago.

(woman)

I selected the tram [as the last type of transportation in which I experienced fear] since that is the way I travel most frequently, but to be honest, the worst, by far, is the Noctilien¹⁷ [...]. I don't take it any more since I can afford to travel by Uber. My experiences on the Noctilien date back to more than 2 years ago and were unpleasant on several occasions.

(woman)

One way of recording this component of fear of crime is to add a set of questions on avoidance behavior. In addition to questioning respondents on the frequency of such practices (as is done in the *Fear of crime in public transportation in the Île de France* survey), the questions should stress the spatial and temporal context in which this behavior is adopted (Doran and Burgess, 2012). This would enable the respondents concerned to specify the places, or at any rate the contexts, they avoid more or less systematically because of worry about being a victim of theft or physical assault.

The second difficulty with which tools aimed at the geographic location of fear of crime are faced has to do with the difficulty in recalling personal experiences. The results of our study clearly show the difficulty encountered by certain respondents in recalling some details of their latest experience, and especially the name of the station or bus stop where it took place. The decision not to answer is not, then, necessarily tied to the inability to remember where the experience took place (the geographic memory may even be extremely precise), but it may be motivated by the simple fact that they forgot or do not know the name of that place. A solution for getting around this problem is to develop a computerized tool which uses an on-line mapping service. The objective is to identify the portion of a trip during which the experience of fear of crime took place by giving respondents the possibility of locating themselves in space virtually. When they can identify a street, a shop or a building they remembered, respondents are better able to identify the stations located nearby and thus to find remember their name. This solution is of course perfectly useless for those respondents who no longer recall the route on which they personally experienced fear of crime. To effectively overcome this level of memory loss requires a reduction of the lapse of time separating the point in time when the experience took place from its reporting. It is important, however, to be fully aware of what is at stake in this type of solution. While an excessively long lapse of time increases the risk of problems tied to recall, too short an interval tends to decrease the number of experiences susceptible of being reported. It is therefore most important, in our opinion, to assess the proportion of respondents who do not answer the questions because of a total inability to recall their experiences before considerably shortening the lapse of time proposed. Be this as it may, questions on mapping should include the option of not answering. Respondents who no longer recall the route they took should be allowed to skip that question and go on to the next one. It is always preferable not to get a piece of information rather than to get an unsatisfactory answer, or to have a respondent drop out along the way. An alternative or complementary solution would be to include a type of response aimed at clearly identifying problems of memory or knowledge. Giving respondents the possibility of saying "I don't know or I don't remember" would enable us to determine the proportion of non-responses tied to forgetfulness or ignorance.

In brief, the improvement of measurement tools aimed at mapping fear of crime requires that we take into greater consideration the variety of the emotions felt and of the problems tied to recalling a personal experience. Although the results presented in this paper are taken from a study using a peculiar mapping method, they are nonetheless susceptible of generalization. All of the tools conceived for the specification of the geographic context of fear of crime are obliged to take these two problems into consideration, to

¹⁷ The name of night buses in the Paris area.

varying extents. Survey arrangements aimed at retrospectively recording personal experiences are necessarily faced with problems tied to recall. In most cases they respond by limiting the experiences that may be reported to a given lapse of time (Chataway et al. 2017; Farrall et al. 1997; Noble 2020). While this solution has the advantage of limiting severe cases of memory loss, it also has the disadvantage of gradually reducing the number of experiences susceptible of being collected to the extent that we reduce that lapse of time. However, all recall problems are not tied to memory loss (described as partial or total forgetting of a lived experience); some of them – how many requires quantification – have to do with the inability to remember certain details or simply not knowing them. For this reason, we need to conceive tools which would facilitate the recall of this information. In this regard, devices based on *experience sampling* have the great advantage of recovering accounts from respondents at the very time when it happened or immediately afterward (Solymosi et al. 2015). But these methods require relatively burdensome survey protocols for respondents, who must download applications in advance and then fill them in on several occasions, the outcome being that the level of participation is often extremely low (Solymosi et al. 2020). But above all, these devices do not take into account the variety of the emotions involved. When a respondent reports a threatening experience, the GPS device of the application gives the precise location of his smartphone. However, by narrowing down the geographic scale to this extent (to a point on a map), this method introduces a major epistemological bias. For data interpretation, in particular, there is a great risk of reducing all threatening experiences to states of fear, triggered in an extremely precise spatiotemporal context. For this reason, it is advisable to prefer measurement tools leaving respondents themselves the possibility of defining the dimensions of the geographic scale on which their experiences of fear of crime took place¹⁸.

The main difficulty, then – with respect to the mapping of fear of crime – resides in the development of a survey device capable of responding to this double necessity – of taking into account both the different types of emotions and the problems tied to recall – barring which we considerably distort the personal experiences reported. For this reason, it is important to pursue research on this theme: so as to improve our adjustment of mapping issues to the question of fear of crime.

¹⁸ While experience sampling is the only methodological alternative discussed in the present text, it is important to make it clear that many other methods exist. The space-time budget method developed by Wilkstrom (2017) is one of them. This technique involves questioning respondents retrospectively on their activities, hour by hour, during the last 4 days. This presents the advantage of accurately showing the spatial and temporal context and the duration of each day-to-day activity, while reducing problems linked to recall. However, the temporal limit of 4 days is far too short to allow us to deal with less frequent occurrences, such as fear of crime (Farrall et al., 2009).

APPENDIX

Table 2 : Socio-demographic structure of respondents to the survey on *Fear of crime in public transportation in the Île-de-France region* (ESITP 2019) as compared to the structure of the target population (EGT 2010) (%)

	ESITP 2019	EGT 2010 ¹⁹
Sex		
Female	63,1	56,5
Male	36,9	43,6
Age		
18-24	27,6	30,5
25-39	35,7	33,0
40-49	17,9	17,4
50-64	17,7	14,4
65 or over	1,1	1,7
Occupational status		
Active	78,9	64,8
Students	17,0	29,8
Other, non active	4,1	5,4
SPC		
Farmers	0,0	0,2
Craftspeople, shopkeepers, company heads	2,3	1,0
Executives and higher intellectual professions	66,5	35,0
Middle management	16,1	30,1
Employees	13,9	27,0
Workers	1,2	6,8
Area of residency, by <i>département</i>		
Paris	31,3	30,1
Hauts-de-Seine	15,4	15,0
Seine-Saint-Denis	9,1	10,9
Val-de-Marne	11,4	12,7
Essonne	7,2	6,7
Seine-et-Marne	7,1	7,4
Val d'Oise	6,8	7,7
Yvelines	9,9	9,5
France (other than Île-de-France)	1,7	0,0

¹⁹ The Overall transportation survey (*Enquête Globale Transport*, or EGT), conducted by Île-de-France Mobilités, collects information on how individual *franciliens* travel, the types of transportation used, the reasons for travel and duration of their journeys. Five EGTs have been conducted since 1976 (1976, 1983, 1991, 2001 and 2010). The latest edition, conducted in 2010, questioned 18,000 households, representing 43,000 individuals, a representative sample of the population of the region. This survey has the advantage of requesting whether the person has a subscription to the public transportation system, which makes it possible to clarify the social and demographic profile of that specific group (age, sex, occupation, socio-professional category, *département* of residence). The SPC is the variable whose distribution shows the greatest differences between the two samples. Executives and higher intellectual professions are twice as frequent in the ESITP than in the target population (furthermore, they represent the groups with the highest educational level). Conversely, and in the same proportions, employees and middle management professions (less educated than the former group) are underrepresented in the survey. Last, there are almost one-sixth as many workers (still less educated) in the ESITP sample.

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