

The Role of Hot Spot Analysis in Crime Analysis¹

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Hot spot analysis is a lesser known method of criminal analysis in our country. Unfortunately, in the everyday police work it is not used frequently and even the criminologists and criminal geographers look at this method as an adopted child. It is hard to say why Hungarian experts averse to it, since even in our country the right GIS softwares are available and one does not need any in-depth knowledge to be able to use these computer programmes.³ The above mentioned is further underlined by the fact that there are hardly any studies on hot spot analysis in Hungarian which can be used in practice. It is a similar situation to crime mapping which is also among the wrongly omitted tools, though both of them would be of great help for the everyday police work. The current study wants to introduce the most important notions, research history, map display and analysis possibilities of hotspot analysis.

Conceptual Definition of Hot Spot and Cold Spot

The expression “hot spot” is used in the vernacular, as well. Hot spots are referred to areas which from a social point of view are more active than its surroundings (neighboring countries or cities etc.). Hot spot is also used in science in two areas. In geology hot spot is used for those areas where on the tectonic plate from the depth of the mantle the magma bursts onto the surface. Criminology also uses the term “hot spot” for relatively small areas where crimes are more frequent than in the neighbouring areas. In the English language to differentiate from the geological hot spot they make it very specific what kind of hot spots they are referring to e.g. “crime hot spots”, “hot spots of crime”, “hot spots policing”. For the term “hot spot” sometimes we refer to as “focus point” in Hungarian which also gives a real meaning to it.

There is no widely accepted conceptual definition neither abroad nor in Hungary which can be widely accepted by the scientific community. This can be partly traced back to the fact that researchers work at different fields, so most of them try to define

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³ Mátyás (2017) 217–222.

hot spot from their own perspectives.⁴ If we want to give a conceptual definition, then we must refer to a relatively small area where the concentration of crime within a larger time frame is higher than that of its surroundings.

Though most of the factual elements in the above definition are never defined in an exact way; among others: how big the area of the hot spot can be (“small extension area”), where is the border when we cannot refer to a neuralgic area as a hot spot. It is also problematic what time frame to consider in the case of hot spots (“in the case of a bigger time frame”). Whether we consider an area a hot spot based on the data of a few months or a few years. (The most acknowledged representative of hot spot research is Sherman, according to whom we must consider a more than a year long time frame).⁵ A third important factor is the question of the extent of crime. How much higher should the crime concentration be than its direct surrounding? How many times more should the crime frequency be than the rates measured in the surrounding areas? (According to Sherman the difference should be six-times.⁶) These are all questions which are not cleared comfortably neither in Hungary, nor abroad so the universally accepted definition for hot spot is still some time away.

At the end of this chapter we must mention the so-called opposite of the hot spot which is the cold spot. It marks those low-infected areas where the criminal infection of the area is less than the average of its surroundings. Naturally, we can ask the same questions that haven’t been answered yet in the case of hot spot. So it is not obvious here either how long an area should maintain a low criminal infection and how much lower the infection should be than other areas etc. As we know the negative news have “power”, so primarily the hot spots are marked out, while mapping the cold spots happens much less frequently.

The Initial Steps of Hot Spot Research

The hot spot research does not have a long history, the regularity of criminal activity clusters were recognised only in the late 80s. The first significant examination is connected to Lawrence Sherman, Patrick Gartin and Michael Buerger. It was them who recognised the correlation between the phone calls to the police and the geographical spots marked in the emergency calls in Minneapolis. All together they examined more than 300,000 phone calls and they identified that 50.4% of the phone calls were from 3.3% of the area of Minneapolis.⁷ A few years ago a similar correlation was identified in the city of Jersey, as well. They realised that almost half of the arrests which were drug-related and 42% of disorder arrests were made in 4% of the streets and junctions.⁸

⁴ Mátyás (2015) 105–115; Mátyás–Sallai (2014) 335–353; Piskóti–Kovács (2011) 1–7; Piskóti–Kovács (2014) 174.

⁵ Sherman (1995) 35–52.

⁶ Sherman (1995) 40.

⁷ Sherman–Gartin–Buerger (1989) 27–55.

⁸ Weisburd–Lorraine (2000) 331–349.

The most internationally acknowledged representatives of hot spot research are Sherman, L.W. (1995) and Spelman, W. (1995) who realised that hot spots are not static structures but dynamic and their development cycles can be identified.⁹ Later on several other criminologists “got into” researching hot spots and examined from several points of view these sin-generated formations. As a result, nowadays there is ample, mainly English language literature in hot spot analysis.

Peculiarities and Characteristics of Hot Spots

Temporal peculiarities

In case of hot spots, it is not enough to analyse only the territorial expansion and the spatial peculiarities, the examination of time factor is also necessary. The researchers have observed that hot spots many times have regular temporal changes. This cyclicity can be observed at different parts of the day, different days of the week and in terms of months, as well. Daily cyclicity is present at burglaries. The crimes are mainly committed when supposedly most people are at work, that is between the period of 9 am and 3 pm. Concerning the days of the week we can also notice certain crimes which are committed on certain days of the week. For example, Friday and Saturday nights are the times when most breach of peace and bodily injury are committed. Obviously it can be connected to the opening hours of the entertainment facilities. A textbook example for monthly cyclicity is the popular tourist destinations. At these settlements more than half of the known offenses are committed in the summer period of the tourist season (e.g. Hajdúszoboszló, Siófok). Temporal cyclicity can also be noticed in bigger time frame (years). In relation to this it is also useful to examine the age of hot spots and mark the areas with different “age” on the map and show when the different hot spots were born and how old they are.¹⁰ The hot spots with different ages can show a different crime structure, as well and that would be definitely worth checking. Despite the short term of hot spot research, we can state that certain hot spots can exist for years and even for decades.

Spatial peculiarities

Besides temporal examination another cardinal area in the case of hot spots is the examination of spatial peculiarities. Firstly, we must mention a few words about their creations. The creation of hot spots is usually the result of a longer, self-generating process. What is the effect that creates a hot spot? Generally, the appearance of a few smaller crimes is the factor that ripples and results in a negative tendency. The broken window theory is often used as an example. When there is a place with a broken

⁹ Tóth (2007) 33.

¹⁰ You can find more information on: https://www.ncjrs.gov/html/nij/mapping/ch4_9.html

window, then we can expect that there will be another one and then another one. Naturally, this can be a broken window, a house wall full of graffiti or any other small scale delict. Naturally, it is not by rule that a crime-infected area becomes a hot spot automatically but if the small-scale crimes start to proliferate then sooner or later more serious crimes will appear, too.

During the spatial examination we must point out that the hot spot area cannot be considered constant. It lives like an amoeba, it continuously changes its size, expansion and form. If law enforcement and crime prevention work are successful, then the area of the hot spot can diminish or it can be terminated (e.g. during the physical and social rehabilitation of districts). The changes observed in their expansion can be cyclical, too (e.g. seasonally laden areas).

In connection with spatial peculiarities we must mention the relationship between settlement structures and hot spots. Different settlement structures can cause a hot spot with different layout. The expansion of hot spots is also affected by the types of flats and houses. A different kind of hot spot is produced in a block of flats area than a neighbourhood of family houses (e.g. size, structure, temporal activity). Settlement structure and settlement type greatly determines the population density ratio which is also a “stimulating” factor in the creation of hot spots. The question arises though, if there are hot spots that have totally different characteristics, is it possible to have a minimum density value of a hot spot? The answer is a definite not.

Imagine a settlement with such a low population where there are only ten crimes happening in a year on the main square while there is no illegal activity at any other spots of the settlement. Then the main square of the village is the hot spot of the settlement. Imagine a big city where even in the least crime-infected area there are more crimes committed than on the main square of the village. Then the question beckons whether the whole area of the city can be interpreted as a hot spot. Obviously not. We can state that we cannot define with exact values from what extent of infection can we consider an area a hot spot. Hot spots are always area dependent. Only by knowing the given spatial circumstances can we safely say whether that area is a hot spot or not.

Crimes that create hot spots

Another question arises whether all types of crime can create a hot spot or not. The answer is a definite no. We cannot examine crime as a whole while revealing the hot spots since not all types of crimes can be looked upon as a hot spot generating delict. Foreign literature considers “street crime” the type of crimes that can create hot spots in contrast to white collar crime, organised crime or terror activities.¹¹ In my opinion the crimes which can be put in this category are mainly those that negatively affect the subjective feeling of security of the public (e.g. robbery, pickpocketing, burglary, car picking, car theft, vandalism, bodily harm). It is a mistake then to interpret high

¹¹ Find more about hot spots on: https://www.ncjrs.gov/html/nij/mapping/ch4_9.html

crime-infected areas as hot spots on the map when it is rooted in the total criminal activity. Just think about the fact that the overall criminal values include the big “B” side number crimes such as copyright, sexual offences etc. which practically don’t really affect the subjective feeling of security.

The Typing of Hot Spots

A lot of people have tried to group hot spots from which the Jerry H. Ratcliffe-type of classification is one of the most well-known and most often used (see Ratcliffe-type hot spot matrix).¹² The reason that so far there is no universally accepted, unified hot spot definition is partly due to the huge number of hot spot types. By examining the Ratcliffe matrix we can make the following statements. Based on the spatial setting hot spots can be put into three groups: scattered, grouped and dotlike. Based on the temporal spread we can also make three groups of hot spots: diffuse, focused and acute.

Now let us have a close look on what Ratcliffe exactly means by the names of the different hot spot types. In terms of temporal spread, the hot spot is diffuse if the spread of crimes can be considered consistent. The hot spot is focused when the spread of crimes is inconsistent. A few time periods stand out considerably from the other periods (e.g. in case of tourist destinations). In terms of temporal characteristics, a hot spot is acute where the time frame of criminal activity can be clearly marked. Based on spatial characteristics a hot spot is scattered when in its area crimes happen at an almost similar frequency. A hot spot can be looked upon as grouped when in its area there are space colours where we can meet with outstanding criminal values. Naturally, other areas of the hot spot have outstanding values, as well, compared to its surrounding but this is even more outstanding compared to the others. We can look upon this as a “hot spot within a hot spot”. In terms of spatial characteristics, a hot spot is dotlike when the neuralgic area is caused by only one source (e.g. parking area, shopping centre, market place, railway station). From a spatial point of view it obviously creates the smallest hot spots (a couple of hundred metres).

Where there is a lot of light there are shadows, too, the saying goes. It is no different with the Ratcliffe matrix either. There are lots of merits of the typing but there are mistakes, as well; these mistakes among others are that the author was thinking only in terms of daily cycles, thus the bigger time frames (week, month, year) cannot be interpreted, such as seasonality.¹³

Map Representation of Hot Spots and Cold Spots

The map representation of hot spots is with red colour, while in terms of cold spots it is with blue colour. The map representation of hot spots can be varied depending on

¹² Ratcliffe (2004) 5–23.

¹³ Hlavacska (2014) 60.

what or how we want to demonstrate. Basically it depends on the creativity of the map designer how he/she wants to show the hot spots. Dots are most often used. The size of the dot shows the extent of crime concentration. Another regularly used method is the spot map on which spots and not dots show the infected areas. The latter type may demonstrate more vividly the spatial qualities of the hot spots and their changes.¹⁴

As a final thought we can say that discovering the hot spots can be a vital step to fight off crime though revealing the hot spots won't solve any problems in itself; hot spot analysis is also necessary which can be a key factor to terminate a hot spot. Hot spot analysis can be looked upon as a field of problem-oriented policing. Quoting the thoughts of László Korinek in connection with problem-oriented policing we can say that "The revealed problems [...] must be examined and analysed. The examination supposes the acquisition of further information, thus data collection and analysis continues by building on each other. We must emphasize that the problem itself has to be examined and analysed and not a specific data volume."¹⁵

Summary

The study introduced the most important milestones of hot spot research, as well as defined the notion of hot spot. It achieved this despite the fact that there hasn't been a universally accepted definition of hot spot. This can partly be traced back to the fact that researchers examine hot spots from different aspects, so they consider it necessary to define and emphasize the importance of different aspects. The study showed one of the most well-known typing of hot spot, the Ratcliffe-type hot spot matrix which offers specific police measures in terms of specific hot spot types. It further introduced the temporal and spatial peculiarities of hot spots.

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¹⁴ Mátyás (2017) 371–377.

¹⁵ Goldstein (1990) 36–37. After Korinek (2006) 29–44.

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