The Psycho-criminology of Burial Sites: Developing the Winthropping Method for Locating Clandestine Burial Sites

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Abstract

The majority of geographical profiling research focuses on the relationship between offender and location, which works particularly well when a burial site is known. In real-world investigations, however, burial or dump sites are often not known. The aim of the current paper is to outline a relatively under-used method of geographic profiling: Winthropping. While the method has been around for several decades, few studies have provided any research findings using it. There are two likely reasons for Winthropping being under-used: first, it has not been clearly, theoretically explained; second, given its relative novelty, it may not be immediately clear how to use it in research and real-world scenarios. The current paper outlines several key psychological (e.g., satisficing and affordances) and criminological (e.g., rational choice theory and crime geometry) theories that may explain why Winthropping works. Case studies are provided, and a methodological approach (matrix forecasting) is then provided to show how it could work in research practice and real-world applications. Overall, Winthropping is deemed to be highly useful, and it is hoped that experts in the field will begin developing this tool for wider, applied use.

Keywords Winthropping · Burial · Affordance · Homicide · Scan pattern

It's got a long rock wall with a big oak tree at the north end… find that spot. At the base of that wall, you'll find a …piece of black, volcanic glass. There's something buried under it I want you to have (Tim Robbins, Shawshank Redemption).

Some killers, after murdering their victim, decide to move and attempt to conceal the body. To date, a number of methods have been suggested to map and explain the typology of criminal that takes or moves a victim (Taylor et al. 2017, 2012). Criminal profiling is the process by which evidence ascertained from a crime scene is used to build a portrait of the criminal. Many jurisdictions will not pursue murder charges without a body being found, and such 'no body homicides' are a major contributor to cases going cold and can significantly delay or jeopardize the investigative process. The aim of the current paper is to show how a relatively unknown method, Winthropping (Humphrey et al. 2010; Keatley 2020; Moses 2019), can be used to assist with locating criminal's hidden burial or disposal sites. Winthropping is a means of locating certain hidden sites (e.g., weapon caches, burial sites). Winthropping suggests that to find such hidden or clandestine locations, you should begin by putting yourself in the mind (decision-making position) of the criminal. The next stage is then to navigate around the landscape or geographical area using waypoints or markers as a criminal might in order to find and possibly relocate a site. While Winthropping seems intuitively appealing, and the few studies using it seem generally supportive (Humphrey et al. 2010), it remains largely unknown. One reason for it not being studied more might be that it is not yet situated soundly in the theoretical literature. Many academics may be cautious of using a method *that* works until

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we understand *why* it works.[1] Combining psychological and criminological fields may offer the best framework on which to understand Winthropping and elucidate the underlying theoretical mechanism. A second reason for Winthropping being unknown is that it may be that the method, while useful, is not easily turned into publishable studies. The aim of the current paper, therefore, is to situate Winthropping soundly within the Psychological and Criminological fields and provide a method for researching Winthropping and applying it to real-world cases.

Clandestine Graves

Before we begin with the search pattern techniques and underlying theories, it is important to properly define what is meant by clandestine graves, and what we know about offenders that create them. A clandestine grave or burial site, or "dump site" (depending on the level of concealment involved), typically refers to a location defined by the process of concealing a body (or other items) in the ground (Dupras et al. 2011; Hester et al. 2016; Sorg and Haglund 1996). The clandestine grave is usually selected based on the goal of minimizing risk of being caught burying a body/item, and it being later found by chance. Clandestine graves can be seen as a form of detection avoidance (Ferguson 2019; Pettler 2011) in which the perpetrator is attempting to avoid detection and thus arrest.

Forensic scientists and crime scene examiners look for telltales and have techniques within their 'grave toolkit' to assist in identifying a gravesite. Physical changes to the gravesite landscape associated with the process of digging a grave and the subsequent taphonomic processes that take place postmortem can provide indicators for investigators to focus a search. Soil naturally settles into various horizons, or strata, each being defined by differences in colour and physical characteristics like density, pH and organic content. The various strata of soil are akin to the rings of a tree, each being laid down over time and being representative of that era. When a grave is dug by an offender, these different strata are removed and comingled, creating a homogenous mixture that takes on its own characteristics. The most evident of these characteristics is the colour. Grave fill (the homogenous mixture returned to the hole after burial) is therefore often identified by a contrasting colour to the surrounding undisturbed soil. There is rarely complete return of the homogenous fill to the original hole also, leaving depressions, mounds and excess (overburden) around the grave site as well as a phenomenon
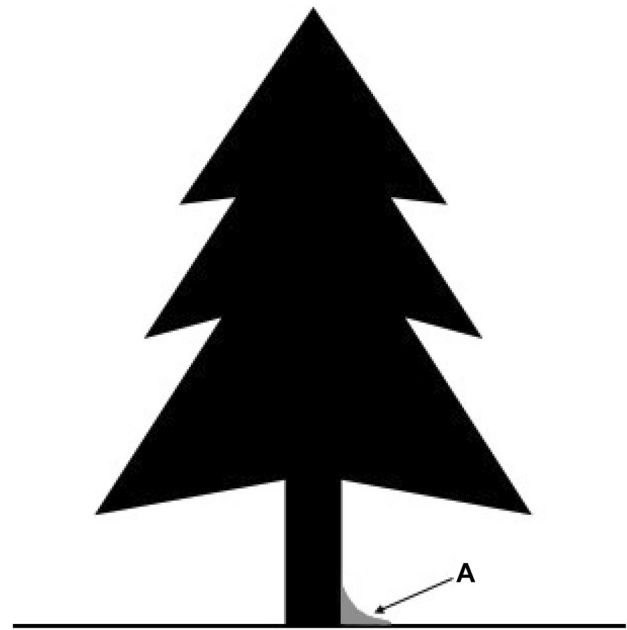

Fig. 1 Excess grave fill cast against nearby trees and shrubs can be identified weeks to months after a body has been deposited in a grave. This "tenting" (indicated by A) is one of many indicators that investigators can use to identify a grave site

called tenting, whereby excess grave fill is left resting against shrub branches and other flora (Fig. 1).

Another indicator of a potential grave site can be excessive blooming of ground cover immediately over a grave site as nitrogenous by-products of decomposition serve as nutrients to nearby flora. This can also be accompanied by the presence of non-uniform plant species taking advantage of grave site conditions and sprouting where there appears to be no other similar plants nearby. Depending on the geography and grave depth, scavengers and various entomological fauna are often brought to the site by odours associated with decomposition and can provide their own indictors by way of digging/scratching or the presence of flies and other necrophagous insects.

With each additional indicator, comes more confidence of a grave being present, allowing for more focussed tools such as ground probing, metal detection and ground-penetrating radar. The addition of cognitive "markers" by a proposed winthropping method would work to further strengthen the prospect of grave identification. Essentially, Winthropping might take as closer to a more narrow area to begin searching for markers.

Profiling

In the traditional profiling literature, *organised* serial killers were deemed more likely to move and attempt to conceal or hide their victims, while *disorganised* serial killers, in

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[1] Moses (2019) made a compelling case for Winthropping within Forensic Archaeology; however, the current paper provides a fuller account from the Psychological and Criminological perspectives.

contrast, were more likely to leave the victim where they had been killed (Taylor et al. 2017). While this dichotomous approach to profiling has been largely disputed in the research literature (Canter 2004; Egger 1999), it still acts as a useful framework on which to begin making inferences about crime scenes. Moving and dumping a body typically requires a level of planning or at least intention, typically with the goal of thwarting or stalling investigations. There are also known killers that moved a body so that they could return to the burial site for other nefarious reasons. Ted Bundy infamously returned to his dump sites in order to perform sexual acts on the corpses. Whether a killer meticulously plans their crime and post-crime activity beforehand, or not, may alter the routes they use. It may be that Winthropping is more useful for organised-type killers who plan to revisit their burial sites, and therefore use features of the environment that can be reused to relocate their chosen sites.

Winthropping

Winthropping was originally developed for counter-terrorist purposes in Northern Ireland (Humphrey et al. 2010), though specific details of it being used are unavailable to the public.[2] The method was used as a means of identifying possible locations that weapon caches might be found. These caches were typically concealed or hidden and without a map or direction would not be found. Winthrop, the creator of Winthropping, suggested that burial or concealment sites were not random,[3] that when individuals chose a location, it was affected by factors or markers in the landscape. Winthropping suggests that features in the environment play a key role in decision-making processes. Features such as walls, rivers, trees, and other boundaries affect the mental maps we create of an area. Therefore, investigators attempting to locate hidden sites should attempt to navigate a landscape (geographical area) as though they were the criminal or terrorist originally locating a site. The investigator begins, for example, at the last place a victim was seen and navigates forward using waypoints (markers, features etc.) to arrive at a location that they could find again or direct someone

towards. This process, of working through geographical routes as though you were in the mind of the criminal, using waypoints to guide yourself is the basis of Winthropping. Given the relatively straightforward nature of Winthropping, it is surprising that it does not feature more predominantly in the geographical profiling or criminology literature. To date, relatively few publications mention Winthropping, and while one does mention clandestine burials (Humphrey et al. 2010), it is a brief poster presented at a conference, with seemingly no published follow-up. Moses (2019) outlined how Winthropping may be useful for forensic archaeology, but this was a theoretical approach and not directly related to criminal behaviours and psychology.

Winthropping makes intuitive sense, if you think about an individual who wants to return to a buried cache, or direct someone else to it. In everyday terms, think about when we give directions: we typically scan (visually or mentally) for key markers or waypoints that we can direct someone towards or past. The same process occurs when choosing a burial site. Conscious, explicit rationalisation is not necessarily needed; decisions could be relatively implicit. Features in the environment might affect our decision-making without our conscious awareness. Essentially, prominent features in the environment affect and shape our interpretation and memory for that location. Remembering you buried something 'past the wall, near the third tree, beside the large rock' is easier to recall than 'in the middle of a non-descript group of trees'. Understanding the psychological processes of travel routes is therefore central to Winthropping.

Psychological Theories

Affordance

In cognitive psychology, affordance is defined as the interaction between the environment and the animal within it, a connection or relationship between an object's properties and an operator's use of that object (Gibson 1966, 1975). To Gibson, affordance referred to all of the possibilities of actions that an operator could perform on an object based on the person's physical capabilities and is directly related to the operator's task at that moment in time. In Gibson's view of affordance, a chair would have several affordances, including sitting on, standing on and throwing. The term affordance was developed by Norman (1999) to include *perceived* possible actions—thus, even if an operator could not physically perform the action themselves, the term referred to perceptions of what might be possible. Overall, the literature has largely agreed that affordances should highlight the use of an object and what the individual wishes to achieve. For example, many of us will have experienced walking up to a door with a large handle on it and attempting to open

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[2] A Freedom of Information application can be found; however, the Government response was to neither confirm nor deny the use of the method. The current paper, therefore, attempts to rebuild possibly theoretical underpinnings of the method, so that it may be studied and developed by researchers in the area.

[3] A number of psychological studies also point to the fact that humans are typically very bad at understanding randomness and very bad at making truly random choices. For example, if you ask someone to imagine a die is rolled 5 times, and write the outcomes, few would write "1, 2, 3, 4, 5" though it is equally likely/as random as "2, 1, 4, 3, 5," which appears more random. Therefore, a criminal attempting to appear 'random' is unlikely to be truly random.

the door towards us—only to find it is a 'push' door.[4] If the door had a flat mental panel, we would be more likely to push without much deliberation. Another example is that of a button that clearly needs to be pushed (flat surface) rather than twisted (bevelled edges). Affordances facilitate our actions without our conscious appraisal.

Clearly, the primary purpose of a tree or wall is not for navigational purposes. In much the same way as a dominant use of a chair is that it is meant for sitting on, rather than being thrown; however, in Gibsonian theory, the affordance is an integral part of the optic array. The optic array is the continuous signal that allows the operator to navigate in their environment; thus, a tree or wall or other prominent feature in the environment affords the opportunity to use the object as a navigational waypoint. If we accept this tenet of affordance in navigating environments, then we may begin to ask research questions such as what type of landmarks or features in the environment serve as better waypoints.

There may also be questions in terms of the sequence of waypoints chosen. Perhaps, after using a gate and a fence, an offender feels an implicit or explicit urge to use a different waypoint, attempting to appear random and not follow any clear or obvious paths. There are a number of behaviour sequence analysis (Keatley 2018, 2020; Keatley et al. 2017) methods that could be used to sequence the discrete sequential decision-making steps in an individual's site selection. Coding each step of the sequence could be done based on the 'affordance' of each landmark or waypoint, as well as grouping or categorising the landmarks.

Recently, research has shown that movements through locations can also be sequenced through behaviour tracking (Keatley et al. 2019). Further stratification of sequences could be made in terms of the typology of criminal, as well as the type of crime (body burial versus trophy burial). In Winthropping terms, offenders may have a different visual search pattern when they survey an area, perhaps seeing the environment differently in terms of affordances (ground that is easier to dig, areas that are more concealed). Mapping the search patterns and key affordances that criminals use is an important step in Winthropping. Of course, not all criminals will evaluate a location in rational, affordance terms, so it may be the role of the academic investigator to analyse locations in terms of markers and features that lead a criminal there. In classic criminology terms, the 'affordance' of a geographical area may be thought of as a 'buffer zone' (Rossmo and Rombouts 2016), which is an area that has significance for an offender (such shops, schools, etc.)

Satisficing

Satisficing, a portmanteau of 'satisfy' and 'suffice', is a decision-making heuristic in which a number of alternatives are compared until a satisfactory (or sufficient) but not necessarily optimum decision can be made (see Oh et al. 2016 for review; Simon 1959). There are times when an optimum strategy or solution cannot be determined, and in these instances, individuals must come to a decision that is the 'best' available to them. With enough resources and time, individuals may be able to calculate or find the optimal solution to a problem; however, some problems are intractable or hindered by constraints (e.g. time, stress); in his theory of bounded rationality, Simon (1997) proposes that individuals will make a decision based on the best available information and utilise a less-than-perfect strategy, using factors that may always be present compared to those in flux. In applied terms, given the current context, it may be that some criminals take their time to carefully plan where to dispose of or hide a body; however, even with careful planning, such *organised* criminals may still be thwarted if they find a road blocked, or something occurs during the commission of a crime that impedes or blocks their optimal strategy. Even if the criminal is able to enact their plan and dispose of the body in the preferred clandestine grave, Winthropping is still effective in understanding why the burial site was chosen—what features or characteristics of the site and the pathway to it affect decision making.

The satisficing process also occurs in situations where the criminal is put under pressure to find a place to conceal a body. Indeed, even with careful planning, satisficing might be the approach many criminals take, as they might not know all of the forensic processes and methods of detecting burial sites and analysing evidence. Therefore, even in extremely carefully planned clandestine graves, it is likely that a form of satisficing has occurred. In classic criminology, satisficing can be seen as the cognitive process behind the *least effort* principle (Moses 2019) in which individuals generally expend the least amount of effort to reach the best achievable goal—in the current context, hiding a body/trophy without being seen.

Forensic approaches to the identification of gravesites are largely observationally based and are only suggestive of a potential burial site. There are some guidelines that assist in determining a grave burial site that are mostly related to the difficulty in moving a body and access and egress to appropriately concealed locations. It is suggested that most grave sites are within of vehicular access and almost always downhill (Killam 2004), which seems common sense for anyone placed in a situation of needing to move a body without being detected and with as little effort as possible. Of course, dismemberment, addition of accomplices and

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[4] This would be defined as a 'false' affordance—an object giving the appearance of a use or affordance when in fact it cannot be used in that way.

victims that are taken to sites alive are all variables that will affect this general rule.

As the investigation narrows in on a likely burial site, forensic methods can be used to specify exact locations. Macro-scaled characteristics of an area such as mounds and depressions that appear inconsistent with the surroundings are immediate screening tools that can be assessed more closely for additional details to support the premise of a grave site. Changes in vegetation over or near the grave can also be semi-diagnostic as nutrient blooms from decomposition can accelerate growth of local species over the grave. Otherwise dormant weed and grass species may be present as a result of the disturbance to the area during burial. Appearance of faunal markers such as increased insect activity and other scavengers drawn to the site can also strengthen the proposition. Other indicators, such as tenting, may also help narrow the focus of investigation, after Winthropping has highlighted a particular area.

Criminological Theories

Rational Choice Theory

Rational choice theory (RCT; Cornish and Clarke 2016) suggests that individuals weigh up the costs and benefits of a decision and decide on a course of action to reach an intended goal. Within Criminology, this generally refers to the process by which a criminal decides whether to commit a crime, and having done so, how best to conceal the crime to get away with it. Forms of concealing the crime include moving the body or concealing evidence through staging (Pettler 2011) or detection avoidance (Ferguson 2019). While RCT is a broad metatheory, applied to multiple crimes and everyday behaviours, it can also be applied to choosing a clandestine location. The extent to which a criminal makes a 'rational choice' may be affected by issues outlined in satisficing, including time pressures and external sources of conflict (e.g., witnesses).

Not all actions are the outcome of rational decision making, and many criminals are impulsive or disorganised (Brower and Price 2001; Sorochinski and Salfati 2010). Indeed, the *disorganised* offender (Kocsis et al. 1998; Taylor et al. 2017) will be less likely to have planned their attack and is more likely to leave a victim in the place they are killed. It could well be the case that Winthropping is not as useful for certain types of criminal (e.g., disorganised). Beauregard and colleagues (Beauregard et al. 2018; Beauregard et al. 2007) analysed a number of serial sex offenders and showed that a quarter claimed to have paid no attention to the location and simply attacked their victim because the victim was there. While Beauregard and colleagues' work did not focus specifically on clandestine graves, it does highlight the thought process and decision-making of offenders. Similar research should be conducted on murderers in terms of their decision-making, and Winthropping provides a structured approach to do this. It may be that criminals do actually choose their locations non-consciously, and until they are made to 'retrace' their steps, they are unaware of environmental influences.

In terms of clandestine burial sites, RCT suggests that criminals choose a location based on a number of rational considerations such as the location being covert/ hidden from view, easy-to-access by motor vehicle, unpopulated, close to where the perpetrator lives or works. A number of further practical considerations may also be taken into account, such as whether the ground is soft enough to dig in, or whether there are tree branches or debris available to cover or conceal a victim. Indeed, while many crime scene investigators focus on analysing the crime scene, a separate important step is to analyse the choice of that crime scene location (Canter and Youngs 2005; Meaney 2004). This is especially important if the case goes cold, wherein the crime scene and surrounding areas at the time of the crime may be changed drastically or 'destroyed' through buildings being erected or knocked-down or other natural or industrial changes.

In terms of investigating disposal or burial locations, once found, an analysis of the rationality of the location should be conducted to determine whether it is likely to be the primary site chosen by the criminal. For example, when analysing the larger geographical area of where a body is found, analysis should be conducted to investigate whether other locations would be more rational or suitable. An example of this recently came to light in a case that the authors worked on, involving the disposal of a victim by the side of a ditch. Although the site was relatively concealed, and the criminal was not seen dumping the body, it was not the most obvious place to conceal a body. Two more rational choices were immediately present: first, a larger reservoir was located in the local area (less than 1 mile from the actual dump site); second, the body was found on the bank of the ditch, rather than in the swamp itself, which was surrounded by debris under which the victim could have been placed and hidden for an extremely long time (perhaps forever). Therefore, consideration of the actual place the body was left showed it was not a rational location if the primary objective was for the body not to be found and thus the chance of the criminal being detected being reduced. This subsequently led the investigation to begin asking questions about *why* that site was chosen, and a new profile was developed to account for this location above the two alternative, more rational sites.[5]

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[5] Further details of the case cannot be published, for obvious reasons of maintaining case integrity. We also appreciate that anecdotes are a poor form of evidence; however, it is provided here as an illustration of how RCT for location selection can be applied.

Profiling and Crime Geometry

This section focuses on the geographical profiling literature to show how it could be used to appreciate the value of Winthropping and assist with developing investigations. Broadly, geographic profiling is an approach to criminal investigation that focuses on the locations of crimes and the patterns that connect these locations (Balemba and Beauregard 2013; Bennell et al. 2007). Within geographic profiling there are various approaches, methods and statistical analyses that can be conducted in order to find different patterns and infer different meanings. Crime pattern theory (CPT; Brantingham et al. 2016) is a method of mapping individuals' movements and travel in an activity space. Within the activity space, which may span many miles depending on the individual and their life circumstances and travel routines, a series of nodes can be placed. Each node relates to a location that the person attends or travels to, such as their home, workplace, shops and entertainment locations. Connecting each of these nodes is an individual's personal travel paths. If we were to plot this, then an activity space would be created, the outer limits of which outline the individual's awareness space—defined as the area in which they have a good working knowledge of the geography and location relationships. Clearly, activity spaces and awareness spaces are idiosyncratic, creating a signature-like movement pattern that can be used to help understand the geography of crime.

There are a number of key concepts in the CPT framework, which are useful for understanding clandestine crime scene locations. First, some areas can be *crime attractors*, in that they are places in which many people travel to (e.g., shops) and thus attract the likelihood of criminals attending to commit a crime. In terms of mundane crimes such as theft, shopping centres could be seen as crime generators, as they have multiple opportunities for theft to occur. In terms of clandestine grave sites, it may be that some areas, as outlined above, have a greater 'affordance' for disposing of bodies, such as looser soil in which to dig, or debris with which to cover or conceal a body. A clandestine grave could also have affordances (such as the side of a cliff or ravine), in which disposal is easy and the risk of being found is low. While it would be unfair to suggest that police investigators are naïve to these types of locations in their jurisdiction, it would be fair to say that many do not fully account for the affordance or 'crime attractor' of a site—especially in contrast or comparison to other sites. Also, given that many criminals are not completely rational or logical in their choices, it may be that when a criminal picks a sub-optimal location, it tells us more about their individual risk-analysis process or awareness space. For example, many people have a preferred parking place in a supermarket, regardless of whether spaces closer to the entrance exist. It may be that criminals have a personal bias to favour certain locations,

meaning if we can accurately detect and interpret the decision-making process that leads them to see one site as being attractive, and then we may be able to better predict other similar sites. This process can be applied to single serial-offenders, or across offenders classified as similar typologies. Essentially, using CPT, we may be able to better profile clandestine graves and dump sites, allowing another window into a criminal's psyche.

While some forms of geographical profiling do account for criminal decision-making processes, and the function or role of locations, Winthropping places this as the main focal part of profiling and tracking. In Winthropping, features in a criminal's path or route are taken into account and used as potential waypoints. Therefore, unlike CPT, which outlines the role of certain places in a geographical area, Winthropping focuses on the pathways and what features may influence directional navigation. What remains, of course, is understanding which features are used by criminals, and why.

Case Studies

While there is a lack of published research using Winthropping, there are a number of case studies that can be used to show how criminals may have engaged in decision-making processes when deciding on a disposal location. First, criminals may choose a site based on various psychological influences (e.g., concealed or hidden, unlikely to be disturbed, relatively easy to access and leave). Factors that may influence a criminal's decision to use a particular site may be sub-conscious or implicit. Even if the criminal does not intend on returning to the site, these psychological processes may still influence their decision. The two infamous serial killers Herb Mullin and Edmud Kemper provide a clear illustration of how geographical and psychological features may influence their decision to choose a dumpsite location. Both serial killers were active in the same area of California in the 1970s. While there is no clear evidence to link them as operating together (in some form of *folie à deux* couple killing), their crimes were linked through their disposal sites. In 1972, Mullin picked up a hitchhiker, Mary Guilfoyle, and stabbed her to death in his car. Mullin then drove to a remote hillside road where he dissected her body and scattered the remains. Unknown to Mullin, this location was also chosen by Edmund Kemper as a place to dispose of one of his victims. Kemper was later able to take detectives on a tour of his gravesites and knew exactly where he was going, pointing detectives directly to the clandestine shallow graves. While the areas that Kemper directed detectives toward seemed remote, Kemper was able to precisely find the clandestine graves. Bringing the

two cases together, Kemper commented at his trial that the body of one his victims was "amazingly close to where the girl from Cabrillo was found up there, stabbed" (the girl being Mullin's victims). Indeed, while Kemper and Mullins were arrested and in neighbouring cells, Kemper is alleged to have accused Mullins of stealing his dump sites. It is unlikely Mullins was stealing Kemper's sites—which would have required Mullins to know them; it is more likely that both serial killers were attracted to the same sites through various markers or features that the sites shared. If these two serial killers were able to detect and use the same sites, then it is possible a method like Winthropping could be used to understand why this site was chosen, and indeed why other sites may be chosen.

The case of Christopher Halliwell, a serial killer in the UK, highlights the selection of disposal sites wherein the killer was able to return to the site. The case of Halliwell is contested owing to police procedures in the procurement of information pertaining to the dump sites of two of Halliwell's victims; however, the fact that Halliwell was able to precisely return to these locations indicates they were *not* randomly chosen. Sian O'Callaghan's body was found dumped in a shallow grave near Uffington, Oxford, UK. During the investigation of this crime, Halliwell also told Detective Superintendent Stephen Fulcher where another victim, Becky Godden, was buried in another shallow grave on a farmyard field in the Cotswalds. Becky had been missing for over a decade, yet Halliwell was immediately able to direct police to the location of her clandestine grave. Since his arrest and imprisonment, Halliwell has made further suggestions that there are more victims and indeed sites where he kept items belonging to the victims. If investigations could begin to map the features or landmarks that serial killers use to navigate and select these sites, we may better be able to profile other likely locations.

It is known that some serial killers will keep items or trophies from their victims, and in a number of cases, these trophies are kept in clandestine sites separate from the bodies and the killer's own residence. In terms of serial killers hiding belongings of victims, sometimes referred to as trophies, Hadden Clark is another clear example. Clark is an American serial killer convicted for the murders of Michelle Dorr in 1986 and Laura Houghteling in 1993. Since his arrest, Clark has taken detectives on various trips to locate items belonging to his victims.

Particular sites can also draw non-serial offenders to them on the basis of their location and apparent covertness. One of the authors, in his role as a forensic scientist attending crime scenes, exhumed two unrelated gravesites within weeks of each other, with both bodies disposed of less than a kilometre apart in the same pine plantation. This location has been chosen for no less than four body disposals within recent years.

These case studies show that killers appear to be influenced (consciously or subconsciously) by features of the environment that 'guide' them to select certain sites for disposing of a body or attempting to hide trophies. In the cases of Mullins and Kemper, they appear to have used almost exactly the same site, independently of knowing the other killer's selection. It is suggested, here, that Winthropping may provide a new way to investigate the decision-making process in an attempt to better predict other possible locations of other criminals (as well as for those criminals that we already have some information on). In the cases of Clark and Halliwell, they show that some features of the location and route are so clear that they can re-navigate to the exact same location many years later. Whatever aspects of the route or pathways these killers take are clearly salient to them, and researchers should try to better understand what these features or markers are, and how we can use them. To do this, we propose a decision-making approach that has recently been given focus in terms of criminal and cold case investigation, Matrix Forecasting (Keatley and Clarke 2020).

Moving Forward: Matrix Forecasting

Winthropping has the potential to be a useful method and the process can be underpinned by a number of existing psychological and criminological theories. It remains somewhat of a mystery, therefore, why it remains relatively under-researched and not used in more investigations. It may be that Winthropping has simply not hit 'critical mass' of publications, so it is not known to many researchers. Another reason for its relatively unknown status might be that it is difficult to operationalise both in research and practical terms. The central tenet of Winthropping is to imagine yourself in the mind/place of a criminal attempting to bury or conceal a body or evidence. The face validity of this could deter many people—how possible is it to think like a criminal, or mimic their decision-making process? While psychologists generally accept some level of 'theory of mind' (Astington et al. 1988), the ability to put yourself in the mental position of someone else and interpret the world from their point of view, there are clearly limits to how far this goes. To operationalise Winthropping and explicitly develop the process, a method is required: matrix forecasting (Keatley and Clarke 2020).

Being able to predict or forecast future events and outcomes is clearly a desirable process in a range of areas, especially criminal investigations. Human judgement and decision-making can be improved through a number of methods (Sniezek 1992); however, a recent publication in criminology provides a new approach (Keatley and Clarke 2020). Keatley and Clarke (2020) showed how matrix forecasting, originally developed by Clarke (1992),

could be applied to criminal investigations. Briefly, matrix forecasting is a process through which predictions are explicitly made and evaluated in incremental steps. For example, if an investigator is attempting to reconstruct a timeline of events that occurred in a crime, they would write down incremental steps through the crime scene that the criminal may have performed. After making each prediction, they would then check with forensics or investigators about the accuracy of that prediction. Some steps may remain unknown; however, others might be verifiable. The matrix then requires investigators to outline their accuracy, biases and what could be done to improve accuracy moving forward. A similar process could be used for tracking the Winthropping process (see Table 1).

The matrix presented in Table 1 relates to a seven-column forecasting approach, wherein each row is a new prediction that is made in column 1. Once a prediction is made, it is then reviewed through each of the remaining 6 columns. The aim of matrix forecasting is not necessarily to be perfect on the first attempt; such aspirations are likely to fail. The process of explicitly stating predictions and then reflecting on accuracy and biases, however, is an important learning process for investigators. Databases of these matrices can be made and learning principles (columns 6 and 7) used to train and inform future investigators. The matrices may also be useful to speed-up the process, so that future investigations can refer to other similar cases and see the types of predictions made and the accuracy of those predictions. The process, if done correctly, is not particularly fast—it requires constant introspection, debate and reflection on why predictions are being made, and how they may be improved. The benefits, however, are that with every follow-up iteration of the seven-column forecasting approach, investigators' speed and accuracy should increase. Patterns and trends may also be shown through repetition and widespread use of the matrix—perhaps certain landmarks of waypoints are preferred. Profiles of types of killers and their preferred waypoints may also be ascertained. Researchers should aim to review clandestine burial sites of offenders (or participants) and then map their decision-making process for choosing that location. With more iterations and growing databases of Winthropping matrix forecasts, it is possible trends and patterns will emerge.

A further benefit of the matrix forecasting approach is that it lends itself to research designs; therefore, academics interested in this area of investigation can create research programs. This is especially important as there has been a recent push for bridging the gap between academics and police practitioners, with the Journal of Criminal Psychology publishing a landmark special issue edited by an academic and a Major Crimes Detective (Keatley and Cormier 2020). Many academics and even more students are keen to be involved in applied criminal investigations, and matrix forecasting provides an entry into that crossover.

Table 1 Matrix forecasting for Winthropping

1. Prediction	2. Rationale	3. Degree of certainty	4. Number of other routes	5. Discrepancy	6. Changes needed	7. List of principles
A prediction of what location is likely	Drawing on anecdotal, experiential, theoretical and practical reasons—why did you make the prediction in column 1?	Given an estimate of how certain you feel about the prediction in (1). If multiple investigators/researchers involved, give a percentage agreement for column 1	A list of other possible locations/sites/or routes—which may be important for future follow-up/additional matrices	If a discrepancy occurs—in what ways, by type or degree?	What changes are needed to improve forecasting moving forward	Summary of principles learned through the process to take forward. Including biases, accurate, and inaccurate predictions

Conclusions

The aim of the current paper was to clarify the use of a relatively unknown method for crime site locating: Winthropping. While the method has intuitive appeal, it lacked a significant and strong theoretical framework, which it now has. While Winthropping may be unheard of, the theories that explain *why* it works are generally accepted and well-researched. Next, a method of judgement and decision-making, matrix forecasting, has been outlined as a possible means of understanding *how* it could work in research contexts. It is hoped that experts in the field of criminology and especially geographical profiling will begin focusing on Winthropping and developing it. The authors' anecdotal, real-world experience has shown across numerous cases that finding a body is often the first stumbling-block for investigations, and if a body is not retrieved quickly, vital evidence can be lost. Therefore, the validity and applicability of Winthropping is of utmost importance. It is also hoped, as the method becomes more widely known and used, that more Police Departments will be encouraged to develop collaborations with research groups, fostering better applied work.

Declarations

Research Involving Human Participants and/or Animals The current study did not use or involve any human participants or animals.

Conflicts of Interest There are no conflicts of interest or competing interests.

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