



Winthroping as an Investigative Tool in Clandestine Grave Discovery and Psychological Profiling

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Abstract

Missing persons cases are some of the hardest investigations to solve. The lack of forensic evidence impedes an investigation and critical time can be lost attempting to find the person or body. Recently, researchers have attempted to develop new approaches to help police in these types of investigations. The current paper continues research into Winthroping as a means of assisting police investigations when searching for clandestine, hidden graves and missing persons. A novel approach, using geocachers, to help inform Winthroping processes is outlined, and support gained through a survey of geocachers. The findings are then applied to a series of real-world homicides, including several serial killers. Analyses of gravesite locations in serial killer cases matched many of the features and properties outlined by geocachers. The results also indicate the potential of using Keatley and colleagues' Winthroping as a psychological profiling as well as geographical profiling technique. Support was provided through the case of a murdered child who was later dumped. Recommendations for further research and application are provided.

Keywords Winthroping · Missing persons · Murder · Geographical profiling · Police investigations

Introduction

Finding a clandestine grave or cache is an extremely challenging task for investigators. Missing person (MisPer) cases and their possible gravesite locations are some of the most complex and difficult for police and law enforcement organizations to investigate. Typically, in these cases, there is a lack of forensic or eyewitness evidence to assist with the investigation. With little to go on, investigators are often tasked with large-scale searches of increasingly growing geographical areas or other approaches (Richards et al. 2023; Richards and Keatley 2023). These searches consume a large quantity of time and finances to orchestrate

and conduct effectively. In many cases, by the time a person is found, they are deceased, and the MisPer case becomes a homicide investigation. In cases where a body has been deliberately hidden, for example (partially), buried in a clandestine grave, then investigators are challenged in overcoming the intentional deception of the offender—choosing a location to minimize discovery. In some cases, offenders choose a location that appears covert, but that they can return to later. Such locations cannot be entirely random locations; otherwise, re-finding the site would prove very difficult or even impossible. For obvious reasons, offenders are unlikely to want to spend large quantities of time attempting to find their clandestine location. What is not clear, therefore, is the dual process by which offenders can intentionally deceive investigators about the location of a body, while still being able to find the site—sometimes many years later. The aim of the current study is to further explore this duality through the use of a recently researched method—Winthroping (Keatley et al. 2022).

Academics have provided police investigators with several notable theoretical and practical models and geographical profiling approaches to assist with searches (Bennell et al. 2007; Ferguson and Pooley 2019a, 2019b; Rossmo and Rombouts 2016). More recently,

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several groups of academics have begun to investigate a lesser-known approach to clandestine site locating and geographical profiling—Winthroping (Keatley et al. 2022). Winthroping was developed in the 1970s in the UK, but relatively little is documented about it, and even less if officially known. Recently, Keatley et al. (2022) have attempted to reverse-engineer the process of Winthroping through psychological, criminological, and forensic approaches, providing some theoretical support for its use. The current research takes Keatley and colleagues' Winthroping approach a step further by investigating whether public groups with experiential skills in locating hidden caches and clandestine sites can provide their anecdotal expertise to help build Winthroping profiling (Part 1). This is then applied to several real-world criminal cases in which individuals were abducted and their bodies found sometime later (Part 2).

Missing person (MisPer) cases are common news items, often gaining public attention and support. An inherent difficulty in MisPer cases stems from the absence of evidence or leads, owing to the lack of known crime scene. In those cases wherein a person appears to disappear, investigators are left with very little to base their search parameters on. Of course, if police develop a suspect (e.g., partner, friend), then they may use this information to narrow down search parameters. For example, police may begin backtracking that person's movements with the hope of discovering possible sites that the victim may have been left. Police, however, are generally aware of this fact and due diligence in investigations typically means that people close to the missing person are investigated intensely first. It is those cases in which no successful leads are found that investigators need additional help. That is where the Winthroping method may be useful.

Winthroping

Winthroping was originally developed for counter-terrorist purposes in Northern Ireland (Humphrey et al. 2010; Keatley et al. 2022; Moses 2019). The issue that faced investigators was how to find hidden caches and clandestine locations that people were using to store and transfer items. Methods of surveillance and interrogation provided one route into the investigation; however, these processes were not always possible and not always accurate. Therefore, Winthrop, the creator of Winthroping, developed a new approach. The basic concept is that in order to find where a person has hidden something, we should imagine we are that person and also attempting to hide the same thing. While this may appear an obvious process to do, the Winthroping approach (as defined by Keatley et al. 2022) highlights that this process includes several psychological and, in terms of criminal cases, criminological steps. The inclusion of psycho-criminological (see Keatley et al. 2022) processes provides a more insightful approach that may

improve location-finding accuracy. Now, with this psychological approach, investigators survey the geographical landscape and pinpoint locations that they would choose. Locations must be accessible, while hidden. Importantly, locations must be re-identifiable so that others can be directed to them, to collect the items in the cache, and so that the hider can return to them if they choose to. Though a location may appear random and unmarked, this is a form of intentional deception as the hider will use landmarks and features that are not obvious to a layperson or passers-by. While little is known about Winthroping, per se, researchers have begun to put together a framework of psychological, criminological, and forensic methods and theories that support its further investigation.

Focusing on the psychology, Winthroping appears to incorporate several theories and approaches. Theory of mind (Astington and Dack 2016; Goldman 2012), for example, is necessary to understand how others perceive and understand the world. It is a person's ability to understand that others have cognitions and beliefs that are separate to ours—and to understand that person, we should attempt to see their world through their mind. Indeed, it may be that some individuals are naturally better at theory of mind and/or other related cognitive or emotional traits (such as empathy and understanding). It may also be that the theory of mind, empathy, and understanding can be improved through repeated practice and training (Dorn et al. 2020; Trautwein et al. 2020). In terms of Winthroping, perhaps as individuals are trained, they become better at putting themselves in the mind of the original cache hider. Therefore, people who are practiced in Winthroping techniques may be able to teach us something of their knowledge and processes. Theory of mind also allows an individual to intuit what someone else's beliefs and knowledge are and thus have the opportunity to intentionally deceive them. For example, if I know that investigators will check waterways, I may leave a false clue near a waterway to distract investigations, while I hide the real cache somewhere else.

A further psychological theory that is postulated by Keatley and colleagues (2022) to be important in Winthroping is *affordance* (Gibson 1975; Norman 1999). Affordance is the concept that there is an interaction between the environment and animals within it—a connection between an object's properties and an operator's use of it (Norman 1999). Later developments of affordance included perceived affordance of actions—wherein individuals may perceive a use for an object, even if they themselves do not use it for that purpose. As with theory of mind, it may be that individuals can be trained to see and interpret objects differently and possibly to re-organize objects in terms of the affordance they may offer to those attempting to hide caches. A more concrete example of this can be seen by envisioning a tree or wall. Clearly, these objects have their own meaning and interpretation (tree – growing plant, living species; wall – border, property). However, to an individual attempting to navigate a landscape,

these objects may take an additional meaning—a directional marker or waypoint. It is possible that with practice, individuals may begin to see and interpret the landscape and objects within it differently. It is possible such experts are not simply seeing, “tree, bush, wall, gate,” but instead seeing a sequence of markers to find their way to, and possibly back to, a clandestine location.

A final psychological theory offered by Keatley et al. (2022) to explain Winthroping was *satisficing*. Satisficing is the name given to a type of decision-making wherein individuals perform to the best of their ability, to a satisfactory or sufficient outcome. Humans are not computers, and investigators have to make the best decisions they can based on the limitations of information, time, and cognitive capacity (Oh et al. 2016). Again, as with theory of mind and affordance recognition, practice can improve performance. Seasoned investigators may have experience to fall back on and provide enlightened new avenues of exploration; however, given the relative novelty of Winthroping, it is unlikely that many in the law enforcement investigations have training and experience. This is not to say that investigators do not progress through Winthroping-related thought processes; however, in the authors’ experiences, structured Winthroping psycho-criminological profiling is not undertaken in MisPer cases. Understanding more about the psycho-criminology of cache cite locating might support and advance current methods used, synergistically, rather than replacing them completely. Therefore, while several psychological tenets have been suggested to underpin Keatley and colleagues’ Winthroping, it is still not entirely clear how, when, or why the approach may work. It is also worth understanding whether certain individuals, who have practiced many of the Winthroping-related processes, could help investigations.

The aim of the current study was to provide further insight and support for Keatley and colleagues’ Winthroping. A group of individuals who are trained and practiced in finding clandestine locations were questioned to provide their experiential expertise, which may help develop the Winthroping method. There is a worldwide group of individuals who participate in a recreational activity of hiding and/or finding hidden caches, called “Geocaching.” This free-to-play activity has gathered a very large number of people who participate regularly and often hide and find multiple hidden caches. The goal of geocaching as a hider is to find a location that is not obvious to the public—geocachers would not want their caches randomly found by anyone and everyone passing by. Instead, geocachers will often find clandestine locations. In these locations, geocachers will leave boxes or caches for other geocachers to find. As seekers, geocachers are often given some type of global position system (GPS) clue regarding the general location of a cache, and then possibly some clues about its final location. Sometimes, geocachers are simply given a large area and challenged to find the cache therein. The idea

is to allow geocachers to know a general area to search, but then leave them to find the specific clandestine cache.

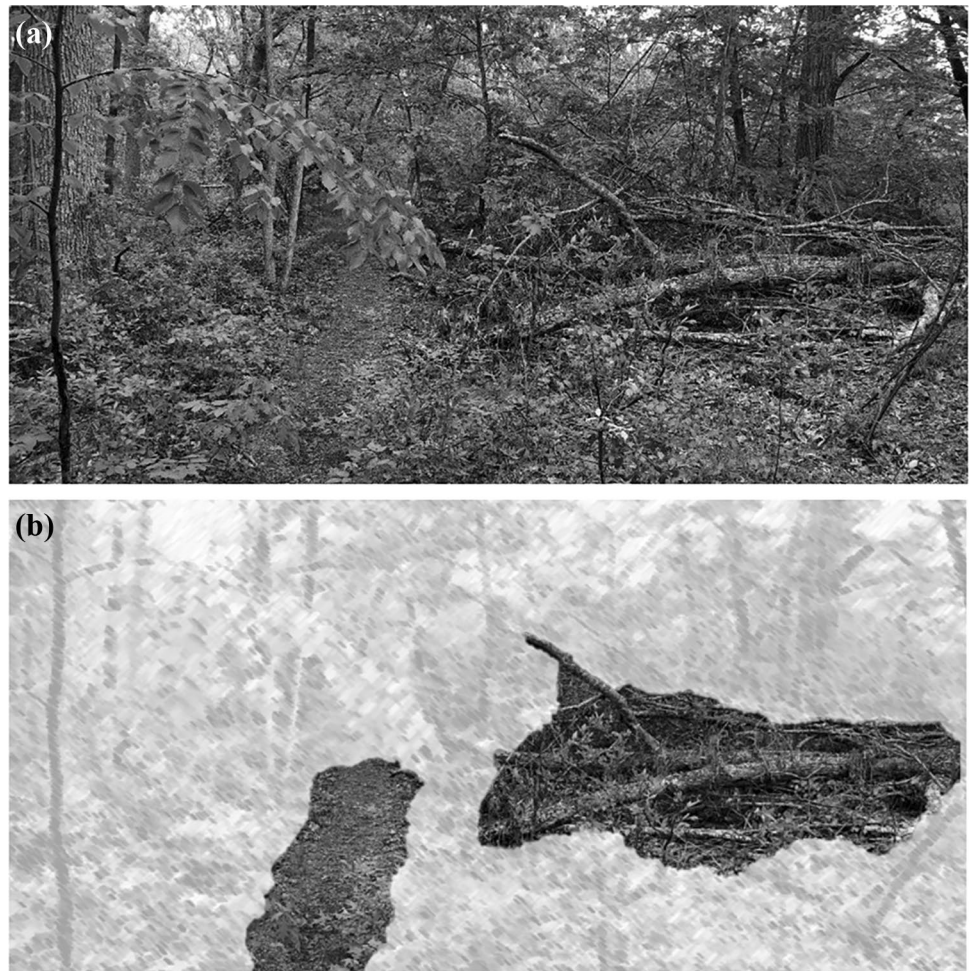
Geocache seekers, therefore, are often tasked with finding a cache in a large area (e.g., a swamp, woodland, forest). The hiders’ goal is to hide a cache in a position that is not easy, but not impossible, to find. The location must be somewhere the hider knows and can easily return to, so they can check the cache—as a killer might return to a dumpsite for various reasons. It must also be a location that they can provide (cryptic) clues for finders to follow. Again, there are known real-world cases of killers having sketch maps to their dumpsite locations. The seekers’ goal is to find the cache. Forests are often used by geocachers, for the obvious reason that the foliage offers cover in terms of hiding a cache, as well as coverage so that geocaches are not easily discovered (see Fig. 1). Figure 1 shows the location of a geocache. To an uninitiated or naïve passer-by, this is simply a fallen tree in a forest filled with them. To a geocacher, the tree may act as a landmark or feature that attracts their attention, indicating that a geocache location may be nearby. The fallen tree would be a feature that is only perceived and correctly interpreted by someone with expertise in looking for initially deceptive patterns in the landscape. From a psychological perspective, the fallen tree offers a perceptual affordance. Once alerted to this possibility, the slightly worn track to the left of the tree offers a cognitive affordance opportunity that indicates the possibility they are closing in on the clandestine cache. Typically, perceptual affordances may be easy to spot with training (e.g., “look for fallen trees”). The next step is to attain the expertise for cognitive affordances—correctly interpreting the scene and features to overcome the hider’s deception.

If we compare the images in Fig. 1 with those in Fig. 2, the differences become more notable. Figure 2a shows a forest road; however, there are no clear or obvious features that would allow easy re-locating of a section of the road. The trees are relatively uniform, and there are little navigational affordances. If a body were dumped along this road, it would be less likely to be disposed of with the intention of returning, as there are no clear markers to find/remember where the body was left. Figure 2b, however, has some features that would offer perceptual and cognitive affordances. The bend in the road is easier to remember, especially with the overhanging trees that may not be typical of that area of woodland. These features combined may be used to recall that a body is placed in close proximity.

The Present Study

Geocachers, therefore, through innocently participating in their recreational activity, may have trained themselves in several of the Winthroping theories and practices as outlined by Keatley and colleagues (2022). The current research

Fig. 1 a Geocache location (Rhode Island, USA). Note, the geocache location is visible in this photograph, but a passer-by would not notice. Geocachers, however, as shown in Part 1 would see this image differently, interpreting the foliage, trees, and objects as having different (navigational/locating) affordances. **b** highlights the key affordance features



will explore how many of the key skills that geocachers have learned through experience relate to Winthroping psycho-criminological framework and could be used in MisPer cases. The skills and expertise that geocachers have may prove useful in locating criminal caches. The current research investigated the cognitions and decision-making processes of a group of geocachers, to investigate to what extent their expertise might transfer to Winthroping and, in turn, MisPer and body retrieval investigations. The first part of the study was to sample a group of geocachers to understand how they interpret the landscape when hiding and seeking geocaches. What objects do they attend to, what affordances do they pick up on, and what satisficing do they perform? This will provide, through a grounded theory coding approach, a series of waypoints, indicators, and understanding points that may have relevance to Keatley and colleagues' Winthroping in MisPer and clandestine grave investigations. Part 2 will outline 3 solved, real-world cases of offenders that dumped a body in a clandestine location and were then known to have returned to those dumpsite locations. A final real-world case will be reviewed that highlights the potential for Winthroping to be

used as a profiling tool. The findings gained from Part 1 will be overlaid onto the pathways between where the victim was abducted and where they were finally found. Pathways will then be assessed in relation to the extent that criminals may have performed similar cognitive appraisals and decision-making in their choices.

Methods

Participants (Part 1)

A sample of 78 participants (28 men, 49 women, 1 non-binary, $M_{\text{age}} = 46.49$, $SD = 14.94$, range = 18 to 76 years) were contacted via online questionnaires. All participants were fluent in English and from either the USA (5), Canada (6), UK (65), or Australia (2). All participants had multiple years' experience ($M = 8.65$ years, $SD = 4.72$) of hiding and finding geocaches. Participants were recruited via online advertising of the study and voluntarily participated. All participants were required to have hidden

Fig. 2 Forest roads without (a) and with (b) potential Winthroping features. Note the corner of the track marked with overhanging/leaning trees in b



($M = 4968.77$; $SD = 8831.75$) and found ($M = 96.90$; $SD = 272.98$) geocaches in their activities. Participants were selected from forums of geocachers found online and survey sites and self-selected in terms of experience and expertise.

Materials/Interview Schedule

Two researchers in the field of Winthroping developed the open-ended questionnaire. In relation to choosing a location to hide a cache, participants were asked the following about their decision-making generally: Where do you prefer to put geocaches? (e.g., countryside, swamps, roadsides, trees), and why; What are some of the considerations you have when placing a geocache (i.e., location, difficulty of access, likelihood of being found); Do you pay particular attention to the route/path to your geocache (e.g., difficulty, obstructions, “waypoints”), please give some details of what has influenced you in the past; Tracking your journey/pathway to that final location, did anything stand out along the way? Natural or

manmade structures that may have influenced your decision to choose an area. Participants were then asked about a specific geocache location they had used to hide a cache. Participants were also asked about what features or factors would make them avoid a particular location. Finally, participants were asked about their decision-making when attempting to find a cache.

Procedure

An online survey platform was used to question participants from various Western countries (noted above). This was done to ensure some overlap in cultural and geographical practices. Participants were asked a number of open-ended questions relating to their geocaching experiences, both in terms of hiding and finding locations. Open-ended text boxes were provided to allow participants to respond in full to each question. The entire study took approximately 25 min to complete. The study was approved by the University Ethics Board.

Results

Grounded Theory

Similar to previous research in forensic crime scene investigation (Keatley 2018, 2020), the current study used a grounded theory approach (Glaser and Strauss 1967) to code the behaviors and cognitions that participants outlined in their responses. Similar to the classic grounded theory (Keatley 2020; Strauss and Corbin 1988), more recent developments in behavior coding have been suggested (Keatley 2018, 2020; Strauss and Corbin 1988). Keatley (2018, 2020) suggest a *bottom-up* approach when little is known of the research area, and it is important to not miss any potential important detail in the data. Grounded theory is an inductive approach that allows researchers to develop theories and understanding through careful examination of the data. Discussion between experts in the field were then conducted to ensure data saturation—that all meaningful findings had been taken from the data, and parsimony of accounts—that codes, working definitions, and examples were accurate and clear. Two researchers analyzed the data and fully agreed on data saturating and coding.

Therefore, applying the grounded theory approach, a series of codes related to behaviors, events, and cognitions were developed (see Table 1). Table 1 indicates a number of cognitions and factors that geocachers commented on in the hiding and finding of their cache locations. These were grouped for easier understanding and application in Part 2. In terms of interpreting the environment, the majority of geocachers looked for waypoints and features in the environment that might give an affordance for the use of locating a particular point: “any previous activity in the area, e.g., slightly worn path that doesn’t seem to go anywhere”; “Obvious feature... largest tree... tree stump... ivy on a tree”; “log pile or stone pile... extra bit of wood on a fence or style”; “anything that is out of place e.g., piles of sticks, unnatural rocks, extra fence posts.” While these features and factors may seem obvious when written and presented in a paper, in the real world, they may often go unnoticed or overlooked. Searchers may be scanning for mounds or bodies, instead of paying attention to features of the environment that may act as waypoints and guidance markers to some other location. These quotations from the geocachers are expressions of an understanding of the cognitions of experts in environmental affordances.

Winthroping-Related Comments

A final question was asked: “When looking for a geocache, what are some of the decision-making processes you use that help?” This was asked to understand what

methods and analytical approaches experienced geocachers use to assist in the discovery of hidden caches. Twenty-three of the geocachers made comments that correspond to a lay definition of Winthroping, namely, putting themselves in the position of the hider to interpret the landscape. For example, “I usually place myself in the shoes of the hider”; “Where I would hide the geocache”; “Where would I hide it”; “I try to think about where that person would put it. I do find that your geosenses do kick in!” This clearly overlaps with the basic approach of Winthroping and gives further support to the premise that geocachers are well-practiced, experiential experts in the interpretation of environments to find hidden, clandestine caches.

Part 2

To understand the applied value of geocachers’ expertise to Winthroping and investigations, a number of solved, real-world cases were analyzed through the lens of geocaching expertise. The premise of this part of the study was to see whether the routes that criminals took and locations chosen could be reconsidered in terms of Keatley and colleagues’ Winthroping approach. Keatley et al. (2022) previously postulated this was possible, looking at two serial killers. The current study develops this by looking at 3 serial killers and 1 single-kill offender, wherein the route between abduction and disposal of the body was known to investigators. The investigative standpoint was whether knowing where a body was located, could we ascertain the likely path and reason for that disposal site being chosen. The hypothesis was that the pathways to final disposal locations would be underpinned and marked along the way by waypoints and objects that geocachers would also use. This transference of object affordance between geocachers and offenders might offer future potential investigative leads in MisPer cases to find the body.

Sample

Owing to the sensitive nature of some of the real-world material, not all details from the cases can be publicly revealed. Therefore, three famous, open-access cases are outlined here, to offer readers an insight into the type of analyses conducted. A further 5 serial killer cases were reviewed for this manuscript; however, owing to non-disclosure agreements, the evidence cannot be publicly shared. Therefore, the three cases outlined here offer a clear representation of the other restricted access cases. Following the serial killer cases, which overlap with many of tenets proposed in Keatley and colleagues’ Winthroping, the case of Jane Doe, who died in the USA in the

Table 1 Geocachers' behaviors and cognitions identified through the grounded theory analysis related to choosing a location

Behavior/event	Definition	Example
Attractors		
Ease access	Nearby parking	"Near carpark," "parking nearby," "will not hide if you have to walk more than a quarter of a mile from suitable parking"
	Near pathway	"Slightly off beaten path," "slightly off path," "rural walks... simple and easy," "defined path at least close to location"
	Ease of returning to cache	"Maintenance is fairly easy, i.e., not miles in the middle of nowhere," "ease of access to maintain and check," "good transport links"
Knowledge area	Local to home	"Near where I live," "local areas," "in my neighbourhood"
	Travel there often	"I'm really familiar with area so I plan exactly where to hide"
Clandestine hide/find	Good/multiple hiding spot	"a place that won't be found by anyone else by accident or seen by people just walking past"
	Away from public thoroughway	"Countryside... as they are less likely to be found unintentionally"
	Low chance of being caught hiding cache	"Not easily seen by anyone that could interfere"; "ability to hide cache"
Concerns		
Terrain	Risk flooding	"Not likely to get flooded," "likelihood of flooding"
	dangerous rocks	"Very rock terrain, slopes"
	gradient	"Terrain too steep," "terrain is too difficult"
Theory of mind	Can others access it	"Too much effort to get to," "I like others to have the same experience," "something I believe other people should see," "Where I would hide a cache" (when looking for cache sites)
Awareness	Location in relation to other caches	"Part of a series planned around public footpaths in a countryside area that previously didn't have any caches there," "determined by any other nearby caches"
Intentional deception	Natural hiding spot	"Natural formed landmarks," "right amount of camouflage for the location," "an old tree with a large cavity," "hollowed out log," "plants surrounding the hide area"
	Undisturbed flora	"Whether it disturbs the environments," "I don't want people to go off trail too much and disturb the forest," "nice hiding spot in ivy tree"
	Innocent reason to be in area	"Location -reason to be in the area," "there needs to be a good reason to put a cache there in the first place," "can sit on the bench and attempt to be nonchalant"
Repellents		
Buildings	Manmade barriers	"Opposite a house," "near a police station," "proximity to houses," avoid any busy location or one that is overlooked by a house," "closeness to houses or business"
Smell	Sewage; faeces; trash	"litter," "dog faeces," "sewage treatment plant," "lots of rubbish in the area"
Signs of use	Indication area is used (often) by public	"High people area," "busy or crowded," "places frequented by teenagers," "graffiti"
No/limited access	Natural barriers	"overgrown," "lots of undergrowth that you don't know what is hiding in it," "stinging nettles," "brambles"
Waypoints		
Natural	Landmarks/features that are natural	"Large rock structures, unique tree plantings," "trees... I might count them, or the bushes etc.," "large tree covered with ivy stems," "Lots of bushes with a small access point to go further into the bushes towards a wall within the undergrowth," "unique looking trees," "tree stump," "natural formed landmark in the landscape"
Manmade	Landmarks/features that are manmade/ possibly made by geocachers	"A light pole," "old metal bridge," "back corner of the cemetery, there was a bridge I put the cache under," "war memorial (stump)," "carving of an acorn"

1980s is provided to explore a further possibility of applying Keatley and colleagues' Winthroping approach. This final possible application was alluded to explicitly by two

of the geocachers—to what extent can Winthroping, as defined by Keatley and colleagues (2022), be used to profile the offender?

Ivan Milat

In Australia, between 1989 and 1993, a series of killings occurred in New South Wales (NSW). The bodies of several victims were found in Belanglo Forest, situated approximately 15 km (9.3 miles) south-west of Berrima, a smaller town in NSW. These murders are now known to have been committed by the serial killer, Ivan Milat, and are often referred to as the “backpacker murders,” because the victims were backpacking at the time they were abducted and then killed. Milat dumped several of his victims in Belanglo National Forest (see Fig. 3). Note the proximity of bodies to walkways/pathways in the forest (denoted by gray lines). Milat is known to have returned to the victims.

Looking at the sites Milat chose, the close proximity of the bodies may offer insight into the type of psychology and profile of the killer. Choosing a forest area indicates that the killer does not want the bodies to be easily found (they are not left in urban areas or by the side of a road, as other serial killers do). The close proximity of the sites, however, may indicate that the killer knows particular areas of the park very well and has a focal or localized geographical representation. The proximity of the bodies to walkways and paths indicate that the offender is likely to want to return to the sites quickly and easily—it does not require multiple miles of hiking to return to the site. This overlaps with many of the codes seen in geocachers’ rationale for choosing cache sites.

Theodore “Ted” Bundy

Perhaps one of the most infamous serial killers, Bundy is likely responsible for over 30 murders. While several were performed in private residences and victims left at the crime scene, Bundy was also known to move and hide some of his victims. Furthermore, in relation to Winthroping, Bundy was also known to return to the dump sites to interact with victims. Bundy is by no means unique in this behavior;

indeed, criminal profilers have been aware of this for many years (Douglas et al. 1986; Sutton and Keatley 2021). Clearly, Bundy was not randomly disposing of bodies as he could return to them. Indeed, in several cases where he dumped bodies, he knew the area well—what criminologists often refer to as an “awareness space” (Berezowski et al. 2022). Profiling awareness spaces and general distances, using distance decay methods (Beauregard et al. 2018; Rossmo and Rombouts 2016), may narrow down a search area. Then, once entering into that space, which may still be multiple square miles, investigators could prioritize search “hot spots” (Keatley 2020; Keatley and Clarke 2020) by using a Winthroping approach. Looking at Bundy’s known victim dump spots, several key Winthroping-related features emerge.

A clear pattern emerges in Fig. 4 of where the victims are found. As geocachers often stated, they preferred areas with easy access and that were not directly on, but not too far from a path or walking route. One of the victims was found on the corner of the path—bends in a route being something that geocachers suggested they used as a marker—often picking circular routes to allow a return to their car by the end of the walk, and because the bends are long-lasting, natural features. Taking a closer inspection of the other sites, notable features of the woodland emerged. For several of the victims, there were notable trees that could be used as waypoints. In one crime scene photograph, a bent-over tree can be seen leading away from the main path. To the unsuspecting hiker, this would just be a natural oddity of the forest; to a geocacher, this could provide a key marker.

Gary Ridgway

Gary “The Green River Killer” Ridgway was a serial killer who was active in the 1980s–1990s in Washington, America. While speculation remains about the exact number of kills

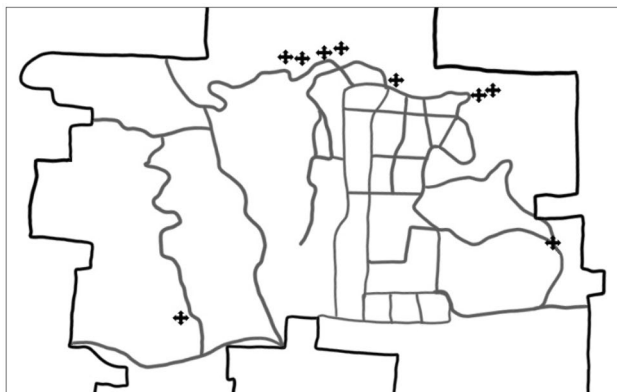


Fig. 3 Milat dumpsites in Belanglo State Forest, New South Wales, Australia. +, dump site location; gray lines, hiking trails

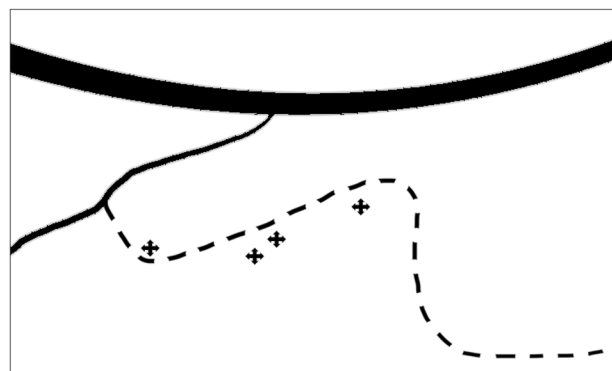


Fig. 4 Ted Bundy dumpsites around Taylor Mountain, USA. +, dump site locations; dotted line, hiking track

Ridgway is responsible for, he was convicted of 49 killings. It is also known that he would return to many of the disposal sites. Ridgway provided an explanation of how he re-located dumpsites: “I placed most of the bodies in groups, which I call ‘clusters.’ I did this because I wanted to keep track of all the women I killed. I liked to drive by the ‘clusters’ around the country and think about the women I placed there. I usually used a landmark to remember a cluster.” Investigating some of the scenes that Ridgway disposed of his victims offers another possible example of Winthroping, as defined by Keatley and colleagues. As outlined previously, simply choosing a non-descript section of road would make re-locating a site difficult, and Ridgway was unlikely to want to spend a period of time wandering in close proximity to a dead body. Figure 5 shows the location of Denise Bush, a victim of Ridgway’s. Note the leaning over tree, the only one in that section of pathway. To a casual hiker, it would gain little attention; however, to someone attempting to re-locate a body, it could provide a good perceptual and cognitive affordance.

As outlined in Keatley’s Winthroping (Keatley et al. 2022) previously, a number of serial killers follow similar patterns of location navigation. For example, Herb Mullin and Ed Kemper used some of the same locations. The fact that two independent serial killers chose the same and very similar sites indicates that some common cognitive processing is attracting individuals to certain locations. Other serial killers who were able to dispose of bodies and return many years later include Hadden Clark, who also buried underwear and trophies. Hadden Clark is thought to have buried a victim in a graveyard before returning to move her. Several geocachers stated they used graveyards in their hiding process. Christopher Halliwell in the UK was able to lead police to two victim’s disposal sites with precision. In addition to these famous cases, the lead author had access to police files from across America and Australia, and while



Fig. 5 Location of Denise Bush, a victim of Ridgway. Note the leaning tree—the only one of its type along this stretch of the path—and the rock underneath it

the files cannot be made publicly available, a re-analysis of crime scene locations offered several Winthroping-related markers that may have been used by criminals.

The above serial killer cases indicate support for the use of geocaching insights into criminal investigations. Serial killers’ dump sites exhibit many patterns and decision-making processes that geocachers suggested they employ when attempting to purposefully hide a cache, while allowing easy re-access of the site. There is, however, the potential for a secondary use of Winthroping, which was outlined by two geocachers in Part 1—attempting to effectively profile the type of person hiding the cache. Taking this profiling approach a step further, a known case to the investigators was used to see whether Winthroping could be used to help provide a profile of the suspect that might assist with police investigations.

Jane Doe

In the late 1980s, in the USA, a child (referred to as Jane Doe to protect identity) went missing from a local playground. Her young siblings could not offer any helpful information, and all leads seemed to dry up quickly. Police launched a search for the child, with the help of local volunteers. The young Jane Doe was found a few days later, less than a kilometer from where she was last seen playing in the school playground. This case has remained officially unsolved for over 30 years; however, fresh leads have potentially pointed to a suspect. The lead author of this manuscript has been assisting with the case for the last 7 years, and therefore, the details of locations, times, and movements are known. Let us imagine, however, that we are back in the 1980s and standing on the site where Jane Doe was found. While locating a body provides some forensic pathways forward, it also offers geographical profilers the opportunity to begin conducting a range of analyses (Keatley and Clarke 2020). It is suggested here that Winthroping might also be useful at this stage of an investigation. Looking at the locations of where the victim was taken from to where she was found. In the Jane Doe case, it became clear that the victim was not moved very far, less than 1 km. Indeed, the child was found in a location that was relatively well-known to children and their parents at the time. She was also not buried. This leads to the question of why she was transported to and left in that location, which would surely be checked and reveal her. Given the body was dumped down the embankment of a swamp at the end of a cul-de-sac, it is likely that she was driven to the approximate location and then carried the final few feet down the embankment. An offender attempting to avoid detection, who has access to a car, has the option to transport the body many miles away. In the part of the USA where this crime occurred, there were state borders within short drives. Investigators could question whether someone could not afford to be absent for the duration of a

drive out-of-state. If the offender could not afford to make a longer drive out-of-state, then there was also a much larger and more isolated swamp to the north of the city, about the same distance as the location Jane Doe was found, and also with vehicular access routes. In short, the location of leaving the victim where she was found does not make sense from a detection avoidance standpoint. It does make sense from a geocaching approach—the body, as with geocaches, is meant to be found (eventually). Indeed, two geocachers stated, “When you have found a few by the same hider you get a feel for their hiding style” and “you get a feel for how individual cachers hide their caches.” Geocachers, it seems, have a sense of profiling a hider, and this may be a skill set that investigators could utilize to their advantage.

The location that Jane Doe was left could indicate that the offender wanted her to be found, even at risk of being caught putting her there. This shows a lack of detection avoidance (Beauregard and Martineau 2014; Ferguson and McKinley 2019). This would explain the locality, which was also a known meeting point for local children.¹ The offender in this case had a number of decisions to make: hide the body in a known, local location where she would be found or move the body north to a larger swamp that she might never be found. Leaving her in the known location also incurred a risk of being caught, as it was more central in the city. This raises the question of why an offender would choose this spot. Geocachers suggested that they preferred areas they knew well, were low-population locations, that were easy to get to, and that could be explained away without raising awareness if caught. In the current Jane Doe case, the area Jane Doe was left was well-known and relatively central to the city she was abducted in. Other locations existed in equal proximity. Using geocaching-informed approaches, profilers could begin to investigate *why* this location was chosen—what practical, personal, or symbolic meaning it might have had.²

General Discussion

The central aim of this manuscript was to further explore the possible usefulness of Keatley and colleagues’ Winthroping (Keatley et al. 2022) approach in missing persons and clandestine grave investigations. There are, currently, very few published studies using the method, though there

is sound theoretical and practical reason to think it is effective. A novel approach in the current study was to investigate whether experienced experts in the field of hiding and finding clandestine caches could offer insights that may overlap with Winthroping. Geocachers provided key insights into their hiding and finding decision-making processes. Without knowing of Winthroping, per se, geocachers provided key intelligence and insight that could be helpful in real-world investigations of crimes. Support for this was shown through analyzing a number of real-world serial killer dump sites through a geocaching-informed Winthroping lens. A total of 8 serial killers, with known disposal sites and photographic evidence of each, were analyzed, 3 of which are presented here. Dumping sites and the routes to them exhibited several features that were consistent with geocaching/Winthroping. A tentative step forward to investigate the possibility of Winthroping-profiling was provided through the case of Jane Doe.

To highlight the overlap between geocachers’ decision-making choices and real-world criminals, Fig. 6 provides a relatively clear example. Figure 6a is a geocache location chosen by an innocent geocacher attempting to avoid



Fig. 6 Natural formed rock formations that are used by geocachers (a) and killers to dump their bodies (b)

¹ Note, there is no evidence that Jane Doe walked herself to this location; there is evidence she was transported here.

² For the sake of case integrity, more about the disposal of the victim cannot be revealed in this paper. There were, however, several aspects of the disposal site that corroborates the assumption that this site was not randomly chosen and had some personal meaning to the victim and offender.

detection by people casually walking past, while providing a geographical landmark that has meaning to them (to return to) and to others (to direct to). It is, in many ways, a perfect example of a Winthroping landmark. Figure 6b exhibits many of the same characteristics—a large mound/rock that would not gain any scrutiny or further cognitive affordance from a casual hiker. However, Fig. 6b is actually the location of a body disposal. These landmarks are also relatively permanent, allowing geocachers/criminals to return to the site many years later.

A potentially very important avenue of further exploration was also found in the geocachers' responses and support gained in a real-world investigation. It may be that geocachers are also able to profile the hider. Some caches are more cleverly hidden than others. It may be that geocachers can offer a lay profile of the type of offender that has attempted to hide a body or cache or find other caches hidden by that hider more quickly. Having experienced several finds, the geocacher may gain an appreciation of the type of hider and where similar caches are likely to be hidden. Indeed, the current data appear to suggest that geocachers have preferred types of hiding spots. Given the overlap in cognitive decision-making satisficing between geocachers attempting to hide a cache and criminals attempting to hide a body, it may be that geocachers can profile a criminal through a Winthroping frame.

Furthermore, part of the Geocaching experience is to upload hints, tips, or clues to where a geocache is hidden. Geocachers can leave approximate coordinates through to (cryptic) clues about the final location of their hidden cache. This is similar to offenders who message or taunt investigators—leaving letters, maps, or telephoning the police. It may be that geocachers can help with deciphering clues or possibly understanding the skill level of the hider and their chosen location based on the technicality or type of message being given. This is, of course, very speculative at this stage; however, future research should provide experienced geocachers with messages received from offenders and investigate whether they can offer insights into the (known) locations of the victims.

An obvious limitation of the current study is that we cannot be certain whether a serial killer was actively engaged in attending to their environment and using waypoints to select a site. The current findings certainly indicate that it is a theoretical and practical possibility and makes intuitive sense. Further research could seek to interview criminals about their decision-making process, to see whether they had similar decision-making patterns as outlined by the geocachers. This, of course, comes with the complication that features of the environment may not always be explicitly clear or remembered. Or criminals may be unwilling to tell the truth about how they decided on a location—for fear that other crime sites may be found. At present, more research is needed on Keatley and colleagues' (2022) Winthroping to support its applied

use; however, the current manuscript perhaps offers a key step forward in developing crime mapping and clandestine grave locating through the approach. Furthermore, it may at first appear using geocachers as proxies for serial killers is not a perfect match, owing to the typical (small) size of geocaches compared to human bodies. This is not as problematic as it may appear. First, serial killers are known to also hide items of clothing and trophies (Sutton and Keatley 2021). Furthermore, this research is focusing on the psychological underpinnings of navigation, which appears to generalize. The size of the object being hidden may affect total distance carried or final spot chosen, but finding the pathway there using landmarks or feature affordances (Gibson 1975; Norman 1999) is likely to transfer. Of course, further research is recommended to fully test this tenet.

A further limitation and area for future research and development is in the classification of expertise in geocaching. Participants included in the current sample were self-selected as being experts in the field with experience of having hidden and found multiple caches; however, this has clear and obvious limitations. While some participants had many hundreds (or even thousands) of finds, others had fewer. For completion, the data were median split, and answers between "high" and "low" scoring geocachers were compared. Their responses were not markedly different, and this might indicate that the number of finds is more likely a representation of time available to find caches, rather than implicit skill set. It would be useful and important, however, to develop a measure of expertise in geocachers, so that investigators can be trained by experts rather than novices. It is suggested that geocachers be involved in the development of this "expertise" scale as they have greater knowledge of the hobby and perhaps awareness of what makes someone an expert.

Clearly, there is growing support for the use of Keatley and colleagues' version of Winthroping, and now a sample of the wider population has been identified that may be able to assist with developing Winthroping methods and potentially helping to inform investigations. It would be unwise to begin a training program for investigators without knowing exactly which skills are most important and what training regimen is most effective at transferring those skills. It is easier to teach a bad method than to unteach one, and until there is confidence in which geocaching skills are most useful to clandestine site locating, it is recommended more research is conducted. This is intended to provide a synergistic addition to investigators' current approaches, rather than replace the systems they already use—which may incorporate some facets of the Winthroping approach. The current research is another step along the pathway to better informing *Mis-Per* cases and clandestine grave locating. It is suggested that further research is conducted on the areas outlined here. The use of criminologists and psychologists can assist with

“translating” geocaching lived experiences and expertise into applied criminal investigations. However, for any method in criminal research to be properly applied and effective, it is not only important to know when to apply it, but also when to not use it. An important next step in Winthroping is to document the cases and times it is not useful. For example, when a suspect is not planning to return to the victim; when the suspect is acting erratically and dumping a body impulsively; or when features of the landscape change in a way that might not have been predicted by the offender. This will not diminish the effectiveness of Winthroping, overall, but instead highlight the types of crimes it is most useful in.

A final area for future research is to integrate Keatley and colleagues’ Winthroping (Keatley et al. 2022) approaches into other related geographic and psychological approaches used in MisPer cases. There have been recent publications focused on the forensic linguistics of MisPer cases (Richards et al. 2023; Richards and Keatley 2023). It would be interesting to see whether statements provided by suspects could be dissected and analyzed in terms of Winthroping waypoints. In several cases, suspects have provided linguistic indicators of the location of a missing person, and overlapping this with Winthroping may provide additional insights.

Conclusions

Finding missing persons and clandestine graves is one of the most difficult types of investigations for law enforcement organizations. The lack of information and evidence, coupled with the intentional deception on behalf of the hider, creates complex cases with large search areas. Recently, Keatley and colleagues (2022) outlined the possible use of Winthroping as a search strategy. The current manuscript makes a significant contribution to the research literature and provides a potential large step forward for investigations by highlighting further support for Winthroping as a practice and providing insight into a group of real-world experiential experts in the field of hiding and finding clandestine locations. Further research is recommended before a widespread application is fully supported; however, the cases outlined here certainly provide evidence that this may help ongoing police investigations. It is also important to compare dump sites that do not have Winthroping affordances with those that do, as it may be that this provides an indication of whether the suspect intends to return or why else they may have chosen that location.

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Data Availability Data are available from the corresponding author on request.

Declarations

Ethics Approval and Consent to Participate The current study had full ethical approval from both University Ethical Review Boards. Informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare no competing interests.

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