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DECEPTIVE SIGNALS: THE ANIMAL KINGDOM AND COUNTERDECEPTION

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DECEPTIVE SIGNALS:
THE ANIMAL KINGDOM AND COUNTERDECEPTION

by

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Knowledge of signals—particularly deception and counterdeception—is a crucial component of both diplomacy and war. The use and evaluation of costly signals are both central to everyday politics and war as they are pervasive in the natural world. As such, this thesis explores the underlying strategic logic of animal signaling and how this benefits us in daily foreign policy challenges. The detection of incongruous cues can index the need for further evaluation of signals while costly signals that take up significant resources are unlikely to have been sent casually. Future studies should further identify other ideas not explored in a foreign policy context and make further use of solutions to problems that predate human beings.

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THE ANIMAL KINGDOM AND COUNTERDECEPTION

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ABSTRACT

Knowledge of signals—particularly deception and counterdeception—is a crucial component of both diplomacy and war. The use and evaluation of costly signals are both central to everyday politics and war as they are pervasive in the natural world. As such, this thesis explores the underlying strategic logic of animal signaling and how this benefits us in daily foreign policy challenges. The detection of incongruous cues can index the need for further evaluation of signals while costly signals that take up significant resources are unlikely to have been sent casually. Future studies should further identify other ideas not explored in a foreign policy context and make further use of solutions to problems that predate human beings.

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LIST OF ACRONYMS AND ABBREVIATIONS

DISO	Deception in Support of OPSEC
MILDEC	Military Deception
OODA	Observe, Orient, Decide, Action
OPSEC	Operations Security
TAC-D	Tactical Deception

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EXECUTIVE SUMMARY

The process of deception and counterdeception has been studied by military practitioners and academics since warfare became a human endeavor. While communication methods and communication systems have evolved over the years, the principles through which humans deceive humans remain relatively unchanged. Knowledge of signals is an essential part of both diplomacy and war. Costly signals are central to diplomacy and politics but are also pervasive in the natural world. As such, instead of "reinventing the wheel," analyzing how animals signal and deceive each other allows an additional way to assess communication. Can the animal kingdom and the signals they have evolved to use provide an analogous means to analyze and detect human deception?

Signals are a means by which an animal affects the behavior of another animal.[1] Signaling between animals is largely categorized as how the signaling relates between the interests of two parties. These categories are 1) interests overlapping, which is generalized as signaling within family groups such as begging for food, alarms, and food calls; 2) interests diverging, which is generalized largely as mating signals; and 3) interests opposing, which includes displays of aggression, badges of status, weapons display, and signaling dominance.[2] The framing of the signaling into these categories assists in understanding the value or cost of a signal, the meaning behind the signal, as well as understanding their use and tools and as drivers of circumstantial behavior.

Alternatively, there are also cues, which are animate or inanimate indicators that guide future action.[3] These differ as they are actions that are not intended to be signals but serve to inform the decisions of others upon their detection. Where signals are communication between two animals, cues are observed or detected aspects of something

[1] John Maynard Smith and David Harper. *Animal Signals*. (Oxford: Oxford University Press, 2003), 15.

[2] William A. Searcy and Stephen Nowicki. *Evolution of Animal Communication Reliability and Deception in Signaling Systems*. (Princeton, NJ: Princeton University Press, 2010), Table of Contents.

[3] Smith and Harper, 15.

that guide decision making. A simple example is the actions of an impaired automobile operator who struggles to control their car at speed and in their lane. The behavior is not intentional, but the effects are observable to others on the road that the operator of that particular car is impaired.

Within the animal kingdom, a signal—if it is to be regularly trusted by other animals—is established by consistent, honest signaling. If a signal is dishonest, the signaler may be punished for dishonesty by other animals, or the signal may become deemed unreliable and disregarded. There are also differences in the dishonest signals, the most common being mimicry, which can be summarized as animals pretending to be something they are not (simulation) or pretending to not be what you are (dissimulation).[4]

In terms of when humans attempt to use dishonest signaling in a deliberate or organized fashion, it is considered deception. "Deception is any attempt—by words or actions—intended to distort another person's or group's perception of reality."[5] Deceptions are grouped as two different types of deceptions. There is ambiguity decreasing, which is attempting to make a target more assured of a misperception, often referred to as a type-M deception. The opposite is a type-A deception, where the ambiguity of a situation is increasing, which makes the target of the deception less certain about the reality of what is happening. The term ambiguity in each scenario is referred to as a target decision-maker's perceived reality of a situation. If the signals they are viewing increase confidence that their understanding of reality is correct, then the deceptive signals they are being subjected to are decreasing their perceived ambiguity of the situation. If the deception is sowing doubt within a targeted decision-maker and their perceived understanding of reality, then they are subject to an ambiguity-increasing deception.[6]

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[4] Smith and Harper, 10.

[5] Whaley, Barton, and Susan Stratton Aykroyd. *Textbook of Political-Military Counterdeception: Basic Principles & Methods*. (Washington, D.C.: National Defense Intelligence College, 2007), vi.

[6] Whaley and Aykroyd, 7.

Counterdeception is the detection of an adversary's attempt to deceive.[7] To an animal, deception and counterdeception occur with detecting the best mate, deceiving a predator, or seeing through a prey's ruse. There are other operations that are enabled by taking advantage of detecting an adversary's deception which are commonly referred to as counter-deception; however, these are beyond the scope of this paper. The detection of deception is the most important aspect of protecting timely and accurate decision-making for a staff, military commander, or key policy decision-maker.

To explore the analogy, three case studies are taken into consideration:

- Operation Mincemeat—The World War II British deception which used a corpse to deliver false correspondence about the location of the Allied invasion of southern Europe[8]
- Operation Spark—The 1973 Egyptian deception which caught Israel off guard using annual exercises[9]
- British use of Q-ships in the First World War—retrofitting merchant ships with hidden weapons and sailing under the flags of neutral countries to sink German U-boats[10]

In the cases of Operations Mincemeat and Spark, the deceivers took advantage of cognitive biases that were present within their targets. However, there were cues around their deceptive signals which should have led to greater scrutiny of their operations and given away the presence of their deception. The Egyptians' cues were the advanced assets that are unnecessary for an exercise, and should have been indicative of offensive military operations, while the British had an agent interfere with a Spanish autopsy to prevent the discovery of tell-tale decomposition cues and also cues to the true cause of

[7] Whaley and Aykroyd, vii.

[8] Barton Whaley, *Stratagem Deception and Surprise in War* (Boston: Artech House, 2007), 349.

[9] Yigal Sheffy, "Overcoming Strategic Weakness: The Egyptian Deception and the Yom Kippur War." *Intelligence and National Security* 21, no. 5 (2006): 813–814. https://doi.org/10.1080/02684520600957746.

[10] Deborah Lake, *Smoke and Mirrors: Q-Ships against the U-Boats in the First World War* (Stroud: The History Press, 2009), 83–84.

death with the corpse they used. Those cues had the potential to derail the operations and were either detected and discarded as irrelevant or should have been detected.

The outlier is the British use of the Q-boats. Their use of false merchant ships flying neutral-country flags as bait for German U-boats to put themselves into the vulnerable position of surfacing was an example of a signal being abused, so one party stopped observing its meaning. The implication here is that established norms can serve as cover for future deceptions. Protected symbols' meaning is protected so long as all sides trust them and do not use them to gain a deceptive advantage.

Together, the data suggests that using cues to verify the truthfulness of signals, regardless of how familiar or consistent the signals are, is a "best practice" of avoiding being deceived.

- The key to detecting lies is in the incongruities of the cues. Signals are honest or dishonest. They can be well established and trusted; however, if the cues of an action are not in line with the signals given, the full intentions of the signaler are potentially dishonest. If an incongruity exists, further investigation of the signaler's intention is warranted.

- If a costly signal is to be trusted, it must be true most of the time. If protected symbols are abused enough, the protection offered by them will no longer be honored. The signal itself loses its meaning.

Cognitive tripwires along these lines suggest that detecting deceptive signals is possible but requires vigilance. Using the cues to guide or trigger further investigation allows a signal to be tested, and potentially assists in not falling victim to preconceived notions or cognitive biases.

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I. DECEPTION AS A PROBLEM

A. INTRODUCTION

Humans have needed to communicate with one another throughout history. Whether it is an individual's intentions, the presence of safety or hostility, or the right foods to eat, communication was always a necessity. As society and technology evolved, so too did the methods of communication. First, languages evolved, then writing, and eventually radio communications, television, and the internet within the past several decades. With each new evolution in communication, the reach of ideas and concepts from one group spread easier and farther to another group. Today, information can travel around the world nearly instantaneously, which is both a good and a bad thing. As a result of the speed of modern communication, vetting what information is correct or accurate is often very difficult to do, even in the best of times. The task of vetting information becomes even more complicated when someone deliberately shares malign information with the intent of deceiving or influencing others.

The idea of communicating and deceiving to gain an advantage over an adversary is not new. Humans have been doing it for hundreds of thousands of years, animals have been doing it for billions of years.[1] As animals evolved, so did the methods through which communicated intentions, threats, or desires to each other. As such, animals seeking to gain an advantage developed methods to deceive, while animals receiving signals sought to detect the truthfulness of the signals.

Whether operations are waged by nation-states or non-state actors, governments and organizations communicate through signals of varying methods and mediums. During political and military operations truth and lies are employed to gain an advantage over an adversary, which can lead to difficult in determining what information is truthful

[1] "Early Life on Earth – Animal Origins," Smithsonian National Museum of Natural History, Smithsonian Institution, Accessed November 15, 2022. https://naturalhistory.si.edu/education/teaching-resources/life-science/early-life-earth-animal-origins; Ethan Siegel, "What Was It like When the First Humans Arose on Earth?" *Forbes* magazine, October 12, 2022. https://www.forbes.com/sites/startswithabang/2019/05/15/what-was-it-like-when-the-first-humans-arose-on-earth/?sh=7bb6ab526997.

or not. Since information and ideas can embed themselves within a group, sometimes the deceptive (or malign) information becomes accepted and thus more difficult to remove from collective knowledge, even when proven false.

So, what is the best solution for detecting deception? The spread of information and ideas has been well studied, deception and counterdeception have been studied, and governmental manuals and documented cases of deliberately placed malign ideas and information have been documented and deconstructed. The answer for generating a proactive countermeasure or idea is the detection of deceptive signals as they are emitted. Assuming this, can the animal kingdom and the signals they have evolved to use provide an analogous means to analyze and detect human on human deception?

B. LITERATURE REVIEW

1. Signaling Theory

To be able to engage or detect malign information the individual looking for it needs to detect it. Seeing how information moves and evolves in acceptance and trust does not necessarily mean how it enables deliberately bad information to take root and spread. Seeing that information and communications need a mechanism to establish trust the concept of Signal Theory was developed to bridge that gap.

In "Signaling Theory: A Review and Assessment," this work takes a business management perspective and outlines that the intent of signaling theory is to address Information Asymmetry between people or organizations when the two sides have an imbalance of information. An example being a job interview where there exists an asymmetry between the hirers and the job applicant. To signal competency for the job, the applicant displays relevant work experience and credentials, such as a degree, to balance out the asymmetry.[2]

Additionally, Connelly et al. differentiates between the position of the signaler and the receiver. The Signaler is defined as, "Insiders who obtain information about an

[2]Brian L. Connelly et al. "Signaling Theory: A Review and Assessment," *Journal of Management* 37, no. 1 (2010): 41–42. https://doi.org/10.1177/0149206310388419

individual, product, or organization that is not available to outsiders,"[3] or those who know select information. The Signaler displays a signal which comprises the second aspect of signaling theory which breaks down into signal observability (can it be easily perceived) and signal cost (the cost of acquiring or displaying the signal such as time and money for a degree). The Signal is intended for the Receiver, which is defined as, "outsiders who lack information about the organization in question but would like to receive this information."[4]

The further application of these frameworks from a management perspective does not remain useful for the analysis of disinformation and the detection of malign activities, however the basic framework and understanding of what Signal Theory is helpful for. Looking to another application of signal theory and how it can be used provides a more in-depth and relatable context in which to analyze how disinformation may act differently than organic information and that is in the animal kingdom, and how they use signals in varying ways.

In *Animal Signals*, by John Maynard Smith and David Harper, the authors apply signaling theory to consider how animals use signals. Through various illustrations and explanations, they demonstrate how signals are a means that an animal alters the behavior of another animal. Examples are mating calls or coloration that indicates danger. They also differentiate between signals and cues, where cues are that animate or inanimate indicators that guide future action.[5] A case in point would be a spider detecting a size disadvantage between it and another spider through the vibration of a web they are both on, such that the smaller spider decides to withdraw without having to fight a more advantaged adversary.[6]

Another relevant analysis is that within the animal kingdom, trusted signals need to be true indicators, at least most of the time. Whereas dishonest signaling can have

[3] Connelly et al., "Signaling Theory," 44.

[4] John Maynard Smith and David Harper, *Animal Signals* (Oxford: Oxford University Press, 2003), 44–45.

[5] Smith and Harper, 6–7.

[6] Smith and Harper, 3–4.

repercussions from receivers, or if a signal is inconsistent, it becomes disregarded by others. There are also differences in dishonest signals, the most common being mimicry. The forms of mimicry are Termed Mullerian and Batesian, where Mullerian is toxic animals display similar patterns or coloring to indicate that they are toxic or dangerous, whereas Batesian is an edible animal or insect mimicking a toxic one in the hopes its appearance as toxic will prevent its predation. There are other examples of dishonest signals however they generally fall into the basic principles of pretending to be something they are not (simulation) or pretending to not be what you are (dissimulation).[7]

There are other methods of analyzing signals in the cost of them. Some signals are deliberately costly which enables those with high resources or stamina to emanate them and prevent others from mimicking them.[8] To low-cost signals which have evolved to communicate a consistent message at as efficiently low cost as possible to effectively communicate the signal.[9] There are also costs associated with dishonest signaling through punishment, so repeating deceptive behavior would lead to a disadvantage through lack of cooperation, physical violence, or death for repeated offenses.[10]

The application of understanding how animals use signals to communicate intentions, as well as how the deceive each other, leaves a framework that can be used to look at the signals being sent, how they are intended to be perceived, and analyze the action target receivers take. From there the nature of those signals may implicate disinformation as it enters an information system. Applying how animals use cues and signals may assist in discerning between dishonest and honest signals between humans.

2. Deception and Counterdeception

Laying the foundation for understanding deliberately placed deceptive information understanding the practice of deception and the concepts behind it is crucial.

[7] Smith and Harper, 10.

[8] Smith and Harper, 26–27.

[9] Smith and Harper, 37–38.

[10] Smith and Harper, 99–100.

Barton Whaley's book, *Stratagem*, analyzes deception as a strategic tool. Specifically, deceptions application and uses within military operations and how it is part of the concept of stratagem. Exploring countries that have and have not successfully employed deception within their operations through stratagems and how those operations were executed. While he recognizes the theory of stratagem and deception are not the end all be all for operations, he presents the theory of stratagem as a relevant consideration for military operations.[11]

Altering from deception to counterdeception, or the detection of a deception, Whaley wrote the *Textbook of Political-Military Counterdeception: Principles & Methods*. In the book, he re-iterates the purpose and process that a deceptive action/signal is attempting to accomplish. Whaley then outlines ten principles of detecting deceptions before presenting 20 detection methods that can be employed. His final analysis is verifying the deception is what it is detected to be and not a false alarm. Interestingly, the section on proactive measures takes mostly offensive measures to destabilize or penetrate the adversary as opposed to proactively discovering the operation's characteristics.[12]

The Whaley principles and methods will be a useful framework to use to analyze disinformation campaigns. In the end, both disinformation and deception campaigns are related, the difference is generally their target. Applying signaling theory as well as counterdeception techniques allows military operations to serve as additional case studies as deceptions are attempting to pass their information off as legitimate whereas disinformation is doing the same to pass itself off as legitimate or organic information.

Other studies into counterdeception, such as Michael Bennett and Edward Waltz's book, *Counterdeception Principles and Applications for National Security*, they provide a theoretical guide on how deception is conducted and how one should conduct counterdeception. Their approach also seeks to understand deception and in turn how to counter deception by detecting it and operationally exploiting it. It explores the different views that intelligence analysts need to look at the information to see whether they're

[11] Barton Whaley, *Stratagem Deception and Surprise in War* (Boston: Artech House, 2007), 138.

[12] Barton Whaley and Susan Stratton Aykroyd, *Textbook of Political-Military Counterdeception: Basic Principles & Methods* (Washington, D.C.: National Defense Intelligence College, 2007).

being deceived and how operational planners can then take advantage of a detected deception. However, while the book effectively maps out what it considers counter deception principles and then attempts to implement systems in which an organization can develop counter deception mechanisms, it does not seek an overall understanding of the flow of a deceptive idea or the various ideas that constitute a deception.[13]

In Robert Clark's and William Mitchell's book, *Deception: Counterdeception and Counterintelligence*, the authors take a similar model and explain what deception is, how it works how it's detected. They differ from the previous two books as they include exercises and instructions on how to identify deception and protect decision-makers from being deceived. Their approach focuses on the concept of the OODA loop as the primary decision-making mechanism and how that is what needs to be protected from being deceived. The OODA loop is based upon John Boyd's Observe, Orient, Decide, and Action decision-making model.[14] While adding exercises in this perspective of deception and counter deception is helpful, it relies too much on one method of receiving and executing upon the information. The methods discussed as means to filter information and detect deceptions are useful for further examination of case studies.

3. Conclusion

The methods of planning, executing, and detecting deception and counterdeception are also valuable ways to look at information campaigns that were designed and executed using malign information to achieve their goals. Unfortunately, most instances—except for say, intelligence agencies—do not actively help detect and discover deceptive information as it moves through society. Other methods of detecting false information, such as open-source intelligence, can be useful when looking at social media platforms for disinformation and the line information; however, those are areas that can be looked at for further research.

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[13] Michael Bennett and Edward Waltz, *Counterdeception Principles and Applications for National Security* (Boston, Mass: Artech House, 2007), 303–305.

[14] Robert M. Clark and William L. Mitchell, *Deception: Counterdeception and Counterintelligence* (Washington, DC: CQ Press, 2019), 33–34.

C. APPROACH

Exploring how malign information successfully navigates into the mainstream and how to counter it will require several different avenues to explore successfully. This research will explore a qualitative analysis of methods of idea diffusion, idea spread, and methods for detecting malign information. The first step is identifying a target area in which proactive measures may to taken to protect a network. The target area, or person, is who initially receives the deceptive information. Looking at the iterative process employed by information laundering allows a possible application or a defense in depth by allowing multiple communities to require adoption of an idea allowing multiple opportunities to detect a deception as it branches from group to group within an organization.

The following concepts to explore are counterdeception techniques and procedures ascribed by national defense and information professionals. Counterdeception and deception understanding may contain the same practices that are important to detect malign information as it moves through systems. Understanding the methods through which deception planners integrate and synchronize their efforts to maximize the potential outcome of the campaign understanding the mechanisms working against them can assist in building mechanisms that mirror counterdeception to detect and mitigate against disinformation and malign information campaigns.

The case studies are going to be applied to the case studies and where Signaling Theory is going to be applied. Here it takes the case studies of the analysis of the deceivers, their target, and how they surrounded their deception (disinformation) with signals so the target believed the legitimacy of the information. This analyzes the aspects and observables, the cost which those observables incurred on the deceivers, and what incongruencies exists within those signals that indicated that the deception was not legitimate.

The findings from the case studies should indicate whether there is some legitimacy to the idea that disinformation is detectable as it behaves differently within the information environment that organically discovered information and innovations. If that

holds true then future research may indicate possible policy, practices, or detection methods may be used in natural and digital environments.

II. SIGNALING IN THE ANIMAL KINGDOM

Applying signal theory and looking at its application within evolutionary biology and how animals signal each other offers a mechanism to analogize how and why humans deceive each other. Signals are a means by which an animal uses to alter the behavior of another animal. Some examples are mating calls or coloration that indicates danger.[15] There is also a difference between signals and cues, where cues are animate or inanimate indictors that guide future action.[16] An example would be a funnel-web spiders, *Agelenopsis aperta,* detecting a size disadvantage between itself and another spider through the vibration of a web they are both on. The spider senses how small or large the other spider is based upon how severely the web shakes from its movement. Based upon their assessment of the vibrations the smaller spider decides to withdraw without fighting. This cue has been manipulated by placing weights on the back of a smaller spider, making it weigh more than the other spider, which lead to the larger spiders withdrawing because of the assessment of the cues of the other spider's weight were misrepresented by the observed cue.[17]

A. COSTLY SIGNALING

Signals generally come with two different forms of cost required to transmit them; "efficacy cost" which is required for a signal to be accurately received, or "strategic cost" which is the cost to ensure honesty in the signal.[18] The cost of a signal is often used in terms of Game Theory, which is a contest where two or more parties weighs costs and expected outcomes from various games or scenarios to determine how an actor is expected to act.[19] In a case of costly signaling with strategic costs, there exists a sense of

[15] John Maynard Smith and David Harper, *Animal Signals* (Oxford: Oxford University Press, 2003), 6–7.

[16] Smith and Harper, 3–4.

[17] Smith and Harper, 3–4.

[18] Smith and Harper, 16.

[19] John Maynard Smith, *Evolution and the Theory of Games* (Cambridge: Cambridge Univ. Press, 1982), 2–3. For an in-depth background of Game Theory as it relates to evolutionary biology, see *Evolution and the Theory of Games* by John Maynard Smith.

signaling equilibrium. In the case of male African elephants, *Loxodonta*, in which a male in musth (sexually active, testosterone increase approximately by a factor of 50; signaled by secretions from the temporal gland, dribbling of urine, vocalization, and posture) while seeking females in oestrus will sense other males in musth, determine the size of an adversary, and determine whether to fight or withdraw. Larger males tend to be in musth during the wet seasons and smaller males in the dry season. Males not in musth will withdraw from potential conflicts because the nature of males in musth who opt to fight, are more willing to risk severe injury to win a contest. If two males in musth encounter each other, smaller elephants withdraw and their musth signals lessen, but if they are similar sizes both opt to fight and risk severe injury or death as a result.[20]

Signaling between animals is largely categorized as how the signaling relates between the interest of two parties. These categories are 1) interests overlapping, which is generalized as familial signaling such as begging, alarms, and food calls; 2) interests diverging, which is generalized largely as mating signals; and 3) interests opposing, which includes displays of aggression, badges of status, weapons display, and signaling dominance.[21] The framing of the signaling into these categories assists in understanding the value or cost of a signal, the meaning behind the signal, as well as understanding their use and tools and as drivers of circumstantial behavior.

B. OVERLAPPING INTERESTS

In the case of signaling between two individuals who have overlapping interests means that the behavior induced through signaling to each other is beneficial to at least one of the parties, if not both.[22] In the case of begging for food amongst European magpies, *Pica pica*, signals its need to feed with four levels of signaling: low intensity signaling, raising head and slightly gaping, medium intensity signaling which involved begging calls and gaping, high intensity which adds standing to the begging calls and

[20] Smith and Harper, 34–35.

[21] William A. Searcy and Stephen Nowicki, *Evolution of Animal Communication Reliability and Deception in Signaling Systems* (Princeton, NJ: Princeton University Press, 2010), Table of Contents.

[22] Searcy and Nowicki, 24.

gaping, and the highest level intensity which involves begging call, gaping, standing, and flapping of their wings.[23] The intensity of the begging affects how the parents distribute the food they have collected amongst their hungry offspring, with the stronger signals getting more food.[24] To test whether deception may occur among hungry offspring, scientists have used various species, sizes of offspring, and levels of food deprivation, to test whether deprived chicks altered their signaling when a hungrier chick was introduced as a competitor for food. The findings illustrated that in begging chicks, most signaled based upon their need of food, and did not match the intensity of those most deprived of food.[25]

Alarm signaling comes with different intended receivers, there are signals intended for predators and there are signals intended for fellow prey.[26] An example of predator intended signaling for Thomson Gazelles, *Eudorcas thomsonii*, includes the leaping of individuals into the air when they spot a predator, in a dazzling performance known as "stotting."[27] As stotting is energetically highly taxing, it is used to signal their health and that they will be difficult to pursue and subdue, which when observed by predators pursuing multiple gazelles, they will choose who to pursue. The gazelles exhibiting the lower quality stotting was the one in which the predator typically pursued when the predators observed the difference in performance.[28] Concerning signaling to alarm conspecifics, alarm sounds amongst chickens notify other chickens of threats and have signals that differentiate between threats from the air or the ground which alters how the other chickens react to the possible threat.[29] In these cases the signals themselves have evolved to be as low cost as possible. Since all sides are cooperating, simple signals with as little as necessary effort led to lower cost signaling.

[23] Searcy and Nowicki, 36.

[24] Searcy and Nowicki, 37.

[25] Searcy and Nowicki, 50–51.

[26] Searcy and Nowicki, 53.

[27] Smith and Harper, 60.

[28] Smith and Harper, 61–62.

[29] Searcy and Nowicki, 60–61.

Deceptive alarm signals in the animal kingdom depended on the species and the intent of the alarm. Great tits, *Parus major*, sometimes signal alarms to flocks of various species in concentrated feeding areas to attempt to scare competitors away from the food temporarily. In the case of false alarms or deception, emitting of false alarms did not illicit any punishment for the mistake or deception.[30]

C. DIVERGING INTEREST

Signals where the two parties have Diverging Interests are categorized around mate selection, whereby generally the female interprets the male's signals, and then determines which male she chooses to mate with. There are multiple factors that females consider when choosing a mate, depending on the species. Typically, eggs are more expensive to create than sperm, and in the case of many species, the male only provides sperm while the females provide the egg (that only needs to be fertilized once) and/or raises the young. This leaves males seeking as many mates as they can to reproduce, and females selecting who they believe is the best male to procreate with. In species where males participate in raising the children, other signals and factors may come into the female and male decision-making on mate choice. The primary motivator in courtship rituals will continue to be based upon what is the most advantageous for both parties.[31]

D. CONCLUSION

Within the animal kingdom a signal, if it is to be regularly trusted by other animals, is established by consistent, honest signaling. Within honest signaling there are two different aspects of signaling which pertain to the cost is incurred. If it is cooperative or high-risk, low-cost signals lead to cooperation, or substitute high-cost activities, such as combat. For signals that have high consequences, such as survival, the costs of the signal are high, such as stotting in order to not be pursued by predators who choose weaker prey. These honest signals have varying consequences so the most important should be truthful and has the highest cost.

[30] Searcy and Nowicki, 65–66.

[31] Smith and Harper, 12–13.

Whereas dishonest signaling has repercussions or punishment from receivers, or if repeat dishonest signaling occurs it can make the signal itself disregarded by others. There are also differences in the dishonest signals, the most common being mimicry. The forms of mimicry are termed Mullerian and Batesian, where an example of Mullerian is toxic animals displaying similar patterns or coloring to other poisonous creatures to indicate that they are toxic or dangerous, whereas Batesian is an edible animal or insect mimicking a toxic one in the hopes its appearance as toxic will prevent its predation. There are other examples of dishonest signals however they generally fall into basic principles of pretending to be something they are not (simulation) or pretending to not be what you are (dissimulation).[32]

There are other methods of analyzing signals in the cost of them. Some signals are deliberately costly which enables those with high resources or stamina communicate them while preventing others from mimicking them.[33] To low-cost signals which have evolved to communicate a consistent message as efficiently as possible.[34] There are also instances when dishonest signalers are punished, where repeating that behavior would lead to costs, disadvantages (such as ostracization), or death as punishment for repeated offenses.[35]

The application of understanding how animals use signals to communicate intentions, as well as how the deceive each other, leaves a framework that can be used to look at the signals being sent, how they are intended to be perceived, and analyze the action target receivers take. From there the nature of those signals may implicate disinformation as it enters an information system.

[32] Smith and Harper, 10.

[33] Smith and Harper, 26–27.

[34] Smith and Harper, 37–38.

[35] Smith and Harper, 99–100.

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III. DECEPTION AND COUNTERDECEPTION

A. INTRODUCTION

Like other species in the animal kingdom, human interaction from the personal to the societal level involves signaling to others. Whether it is to communicate hostility, romantic interest, or familial affection, or something else, humans utilize verbal and nonverbal signals as part of their social interaction daily. This also applies when humans use signals to deceive each other as well. Whether it is an attempt for one person to deceive another, or an organization or a team attempting to deceive an opponent, the methods through which those are accomplished are the transmission and reception of intentionally misleading and deceptive cues and signals.

The focus of this thesis is the type of human-on-human deception that is in the realm of political and military deception. The acts of deception then are military organizations and political entities trying to find means and methods to deceive other military organizations and governments in order to gain an advantage on the battlefield, whether it is a theater wide strategic deception, or a battlefield tactical deception, similar principles and techniques apply in the realms of deception.

B. DECEPTION

"Deception is any attempt—by words or actions—intended to distort another person's or group's perception of reality."[36] Deceptions are grouped as two different types of deceptions. There is ambiguity decreasing which is attempting to make a target more assured of a misperception, often referred to as a type-M deception. The opposite is a type-A deception where the ambiguity of a situation is increasing which makes the target of the deception less certain about the reality of what is happening. The term ambiguity in each scenario is referred to as a target decision-makers perceived reality of a situation. If the signals they are viewing increase confidence that their understanding of reality is correct, then the deceptive signals they are being subjected to is decreasing their

[36] Whaley and Aykroyd, vi.

perceived ambiguity of the situation. If the deception is sowing doubt within a targeted decision-maker and their perceived understanding of reality, then they are subject to an ambiguity-increasing deception.[37]

Similar to understanding the types of deception, is considering the function the deception has within the broader context of an operation. The three functions that deception has are:

- Deception In Support of OPSEC (DISO)
- Tactical Deception (TAC-D)
- Strategic Deception.

OPSEC itself is a formal of managing signals that a military formation emits. It is analogous to Signature Management within the electromagnetic spectrum, which is an attempt to manage signals that a formation emits in order to prevent identification of a units' composition, disposition, and intention from an enemy's intelligence apparatus.[38] DISO then implies that the unit uses deceptive ques and signals to support the goals of the OPSEC program being employed. These could be basic signature managers such as camouflage and decoys, to emitting false signals or radio traffic.

Tactical deception, in contrast, is employed by a battlefield commander in order to gain a momentary tactical advantage.[39] This may involve techniques such as feints or displays through the maneuver of forces to employing decoys and dummies to fool enemy collection efforts. The effects of the deception only need to last long enough to accomplish its desired result, or sufficient tactical advantage has been obtained.

Strategic Deception, referred to generally as Military Deception (MILDEC), is the largest and most involved form of/category of deception. Usually comprising of multiple executions as well as multiple executions of TAC-Ds and DISOs to cause an adversary

[37] Whaley and Aykroyd, 7

[38] Department of the Army, *Army Support to Military Deception*, FM 3-13.4 (Washington, DC, July 2019), 1–3. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN15310-FM_3-13.4-000-WEB-2.pdf.

[39] Department of the Army, 1–2.

decision maker to misappropriate allocating forces and resources to gain a strategic advantage over an adversary. The scale and duration of strategic deception last weeks, if not months in their preparation and execution, and do not necessarily provide any indicators of success until significant time has passed.[40]

During deception planning the main considerations that formulate the outline consist of answering three main questions. These three questions become summed up as the "Do, Think, See" model of planning, where the plans are then executed in the order of "See, Think, Do." Meaning once you have planned all of those signals the sequential execution of events will happen in the inverse order of your analysis. In other words, it is a method of enforcing backward planning for a deception planner.[41]

First, what do you want your adversary to do? What action or inaction can your adversary take that will result in the desired outcome of the deceiver. If the desire is a freeze an enemy or provide too much information for them to make a concerted decision (type A), that becomes the objective of the plan moving forward. If the goal is to make the adversary choose a course of action that provides you with an advantage over them (type M) then eliciting that reaction is the goal of the deception.

Since deceptions are the manipulation of an adversary decision maker's perception of reality, that reality is what drives their actions. Understanding a particular situation and operational picture will determine what actions a commander or decision maker may be considering. These "do" actions of the adversary become the goals of the deception, and as a result must be based within the realm of considerations an intelligent, rational decision maker would conclude. If the goals of the deception are too outlandish, an adversary will not perform the desired reaction and indicators to do otherwise will lead to undesirable or unpredictable outcomes.

Once you have decided what you want your adversaries to do, you then must ascertain; what reality the adversary needs to perceive in order to do that? Important for this part of the operations is knowing an adversaries' predisposed beliefs and disposition

[40] Department of the Army, 1–2.

[41] Department of the Army, 2–5.

to know if there are biases or cognitive vulnerabilities present in the deception target. Knowing that an adversary is predisposed to believe certain ideas and realities over others allows for a planner to play into those biases and avoid ideas that would be likely be rejected. If an adversary is presented a reality that confirms their expected outcome a decision maker is more likely to believe what is presented whether it is truthful or not.[42]

Leveraging cognitive biases is a fundamental practice amongst deceivers and deception planners along which are then used to exploit adversaries' decision making. Some of the commonly referenced biases are:

- Confirmation Bias—The tendency to seek out, interpret, and/or remember information that confirms one's preconceptions.[43]
- Anchoring—Relying too heavily on one piece of information when planning or forming conclusions.[44]
- Bandwagon Effect—Believing things because many other people believe the same thing, related to the concept of "Group Think."[45]
- Framing Effect—Drawing different conclusions from the same information, depending on how or by whom that information is presented.[46]
- Mere Exposure Effect—Expressing undue liking for things or ideas because of familiarity with them.[47]

[42] Department of the Army, 2–7.

[43] Emily Spencer, *Thinking for Impact: A Practical Guide for Special Operations Forces* (Ottawa, Ontario: Department of National Defence, 2018), 91. For an in-depth list and definitions of cognitive biases as it relates to deception and psychology, see *Thinking for Impact: A Practical Guide for Special Operations Forces* by Dr. Emily Spencer, Chapter 10.

[44] Spencer, 90.

[45] Spencer, 91.

[46] Spencer, 92.

[47] Spencer, 93.

- Ostrich Effect—Ignoring obvious situations or events that will have a negative impact or outcome on something.[48]
- Selective Perception—Allowing expectations to effect perceptions of outcomes.[49]
- Stereotyping—Expecting a member of a group to have certain characteristics without having actual information about that individual.[50]

All of these cognitive biases are exploited to manipulate others' perceptions, when influencing or deceiving a target. The presence and knowledge of the biases leads to the final question; what does the adversary or their intelligence apparatus need to see to come to the desired conclusion? Before taking action, the adversary will need to achieve confidence in their perception of reality, to gain that confidence they will need to see signals and cues that lead them to that perception of reality without seeing indicators and warnings that indicate other potential outcomes.

Knowing what the adversary needs to see then frames the outline of a deception plan. Those indicators are what are planned to be displayed to the adversary, so the adversary sees them, then thinks and concludes what the deceiver needs them to, while concealing indicators of alternate conclusions, and then makes the decision or action that the deceiver desires them to take. Every signal or cue displayed or concealed is then deliberately managed to provide a convincing non-reality for the adversary to perceive and exist within. The issue with generating those cues and signals, while concealing others is that falsehood and concealment can be detected and deceptions discovered. The practice of doing so is known as counterdeception.

[48] Spencer, 94.

[49] Spencer, 95.

[50] Spencer, 95.

C. COUNTERDECEPTION

Counterdeception is the detection of an adversaries attempt to deceive.[51] There are other operations that are enabled by detecting an adversary's deception can are also commonly referred to as counter-deception, however that is outside the scope of this paper. The detection of the deception is the most important aspect of protecting timely and accurate decision making for a staff, military commander, or key policy decision maker.

Methods of detecting deception apply when looking at the information that is presented and discerning whether the information about the adversary is accurate, or intended to deceive the observer or analyst. The first method is looking for incongruities and congruities; these are seeing discrepancies in information that you are expecting to see.[52] These items are the expected patterns of behavior or equipment that is expected to be seen if you are observing an operation demonstrates the congruity of a situation, appearing as you would expect to see. The incongruities are where detection of a deception is likely to occur. There are omissions in the data or something is out of place from what is expected. While battling biases to explain away discrepancies, those indicators are also what shows that the potential for a deception operation being underway is present.

A secondary method for detecting deception is applying the plus-minus rule, where looking for incongruities only requires the detection of a single false characteristic of an event, whether it is an added signal (plus), or a missing signal (minus), that indicates that whatever is being observed deserves greater scrutiny.[53] This allows for the application of other methods such as the Jones' Law of Multiple Sensors, which stipulates that deceptions that require fooling more than one sensor are harder to achieve. For example, an auditory deception can be accomplished by mimicking a sound, but if the deception target can both see and hear the deception then the deceiver is required to

[51] Whaley and Aykroyd, vii.

[52] Whaley and Aykroyd, 45–47.

[53] Whaley and Aykroyd, 47.

develop visual and audible deceptions, or risk discovery.[54] With layering deceptions, more indicators of a deception are now present for discovery.

Locard's Exchange Principle, originally a criminological concept, stipulates that a criminal always leaves evidence of their crime at a crime scene, while also taking evidence of their crime with them when they depart from it. In applying the principle to counter deception, it means that during the action of deceiving there are detectable signals, or incongruities, that are present. After the deception has concluded, the ability to conduct a postmortem analysis of what happened during the deception operations remains as other simultaneous operations provide further context to frame an analysis.[55]

One of the more common methods in counter deception detection is the Analysis of Competing Hypotheses. It applies a version of the scientific method to explain data and signals that are observed.[56] Additional methods of contribution such as Occam's Razor (the simplest explanation is the likeliest explanation) and Crabtree's Bludgeon (no set of mutually inconsistent observations exist that humans cannot create a coherent explanation for) which serve to sort and prioritize potential explanations of signals, or hypothesis', for analysis.[57] The hypothesis being the explanation of what has been observed that an adversary is doing, and whether what they are presenting is intended to deceive or are signals and cues of their actual actions/intentions.

Capturing the application of multiple methods of deception detection and leveraging intuition, Busby's Ombudsman Method, seeks to apply a human-as-sensor approach because it derives from the human sensor, "…confront straight on that nagging, almost subliminal, sense of unease about a situation or person that somehow does not seem quite right, that does not quite fit as it should those little incongruities that can signal a deception in progress."[58] Originally developed by magician Jeff Busby as an approach to teach casino employees how to detect cheaters without teaching the

[54] Whaley and Aykroyd, 51.

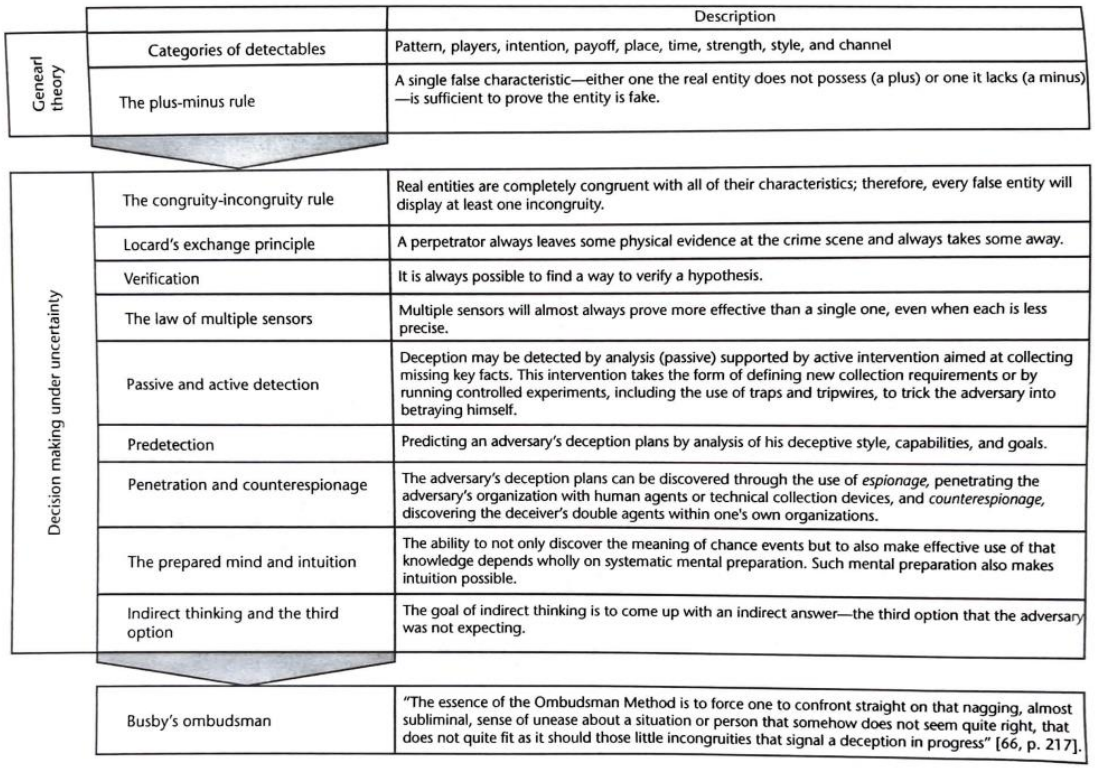
[55] Whaley and Aykroyd, 58–59.

[56] Whaley and Aykroyd, 90.

[57] Whaley and Aykroyd, 76–78.

[58] Bennett and Waltz, 161.

employees how to cheat. See Figure 1 for the different methods of counterdeception build upon each other.



		Description
General theory	Categories of detectables	Pattern, players, intention, payoff, place, time, strength, style, and channel
	The plus-minus rule	A single false characteristic—either one the real entity does not possess (a plus) or one it lacks (a minus)—is sufficient to prove the entity is fake.
Decision making under uncertainty	The congruity-incongruity rule	Real entities are completely congruent with all of their characteristics; therefore, every false entity will display at least one incongruity.
	Locard's exchange principle	A perpetrator always leaves some physical evidence at the crime scene and always takes some away.
	Verification	It is always possible to find a way to verify a hypothesis.
	The law of multiple sensors	Multiple sensors will almost always prove more effective than a single one, even when each is less precise.
	Passive and active detection	Deception may be detected by analysis (passive) supported by active intervention aimed at collecting missing key facts. This intervention takes the form of defining new collection requirements or by running controlled experiments, including the use of traps and tripwires, to trick the adversary into betraying himself.
	Predetection	Predicting an adversary's deception plans by analysis of his deceptive style, capabilities, and goals.
	Penetration and counterespionage	The adversary's deception plans can be discovered through the use of *espionage*, penetrating the adversary's organization with human agents or technical collection devices, and *counterespionage*, discovering the deceiver's double agents within one's own organizations.
	The prepared mind and intuition	The ability to not only discover the meaning of chance events but to also make effective use of that knowledge depends wholly on systematic mental preparation. Such mental preparation also makes intuition possible.
	Indirect thinking and the third option	The goal of indirect thinking is to come up with an indirect answer—the third option that the adversary was not expecting.
	Busby's ombudsman	"The essence of the Ombudsman Method is to force one to confront straight on that nagging, almost subliminal, sense of unease about a situation or person that somehow does not seem quite right, that does not quite fit as it should those little incongruities that signal a deception in progress" [66, p. 217].

Figure 1. The Busby-Whaley theory of counterdeception[59]

There are generally two different approaches to detecting deceptions, technical and non-technical. While the methods of deceptions and deception detection remain the same, it is the types of information or data analyzed which differ. The technical approach is the tools involved in the means of detecting deceptive signals such as photographs, radar signatures, signal intercepts, or espionage. The technical aspect accounts for the bulk of analytical approaches to counterdeception. The non-technical aspect of counterdeception is viewed as preparing analysts and observers to search for deceptions, and enable their mental fortitude to sort through information, signals, and cues and still

[59] Source: Bennett and Waltz, 161.

accurately assess a correct rendering of reality versus deception's attempt to alter perceived reality.[60]

D. CONCLUSION

Counterdeception has many aspects to it and many approaches that have been attempted to provide analysts and decision makers with the ability to detect and defeat deceptions. One of the most relied upon methods not mentioned above is espionage or spying. While espionage is an effective method for detecting deception because you gain inside intelligence that an organization is waging a deception, it does not intrinsically assist in detecting deception in the absence of privileged insider information. Instead, Busby's Ombudsman Method hints at the fact that humans, as individuals and/or animals have evolved within themselves indices, cues, and signals which are consciously or subconsciously picked upon which trigger a response that indicates a deception is present.

Acknowledging that humans can deduce that they are being deceived without understanding the source of the deception harkens back to our mammalian past, instead of our technical developments or increase in knowledge. Animals have been interacting with each other and other species since life evolved on earth. Animal signaling suggests through time and evolution methods or mechanisms to detect deceptions are developed because the basic instinct of survival and reproduction requires that ability.

[60] Bennett and Waltz, vii.

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IV. CASE STUDY: OPERATION MINCEMEAT

A. BACKGROUND

Prior to Operation Husky, the Allied invasion of Sicily in 1943, the allied forces mounted a large-scale deception plan to prevent the Axis powers from discerning the location of the allied invasion across the north Mediterranean coastline. Capitalizing on ongoing guerilla operations getting the attention of German high command, along with decoy placement in the eastern Mediterranean led the German high command to conclude that the eventual invasion was likely to be in Greece or the eastern Mediterranean rather than in Sicily.[61]

One of the sub-operations executed that had a traceable impact as part of the larger deception plan was Operation Mincemeat. Operation Mincemeat was the use of false correspondence between two British commanders delivered to the Spanish coastline via a human corpse, disguised as a deceased British naval officer. The briefcase carrying the fake correspondence was affixed to the corpse and set to float onto the shore from a submarine. Following the drop, the corpse was discovered and delivered into Spanish intelligence's hands who then subsequently passed the correspondence to the German intelligence as authentic. The Germans accepted the provenance of the documents as legitimate and so this operation served the lie that the pending allied invasion was going to Sardinia and Greece instead of Sicily.[62]

B. ENGLISH DECEPTION

The challenge for the English was how to insert the deceptive documents without Spanish or German intelligence services suspecting them as false. To make their deception believable, the corpse they were delivering had to be convincing as a British

[61] Barton Whaley, *Stratagem Deception and Surprise in War* (Boston: Artech House, 2007), 349.

[62] Whaley, 348–349.

naval officer, the correspondence had to appear genuine, and the explanation of how the intelligence was acquired could not be too suspicious.[63]

The first task to accomplish was establishing a persona for the corpse. The British planners built a backstory for it as a Royal Marine officer who was on loan from the central headquarters to the Mediterranean theater as an amphibious warfare expert. He was additionally, supposedly serving as a courier flying from Britain to the Mediterranean and carrying correspondence from Lieutenant General Archibald Nye, vice chief of the Imperial General Staff, to General Harold Alexander, commander of the allied forces in the Mediterranean who was planning the invasion against the southern European coast. To appear legitimate, they created fake official-looking paperwork and named the man "Major William Martin." After a search, the planners found a naval officer who resembled the corpse, enabling them to take a photograph of a living individual for the paperwork for an added back story (photographs of the corpse were obviously of a deceased individual).[64]

In addition to the paperwork, the planners also thought about what appropriate contents for the briefcase that carried the deceptive correspondence. So, they included items that would normally be transported in a briefcase that the Spanish and Germans would expect.[65] The correspondence was between two Generals, so to assist in creating the fake correspondence, Lieutenant General Nye wrote the letter that was intended to be from him, giving indicators of identity such as voice, hand writing, and signature legitimacy to the document.[66] The advantage that gave was another mechanism to make the inorganic communication appear organic, or real.

To create appropriate pocket litter (random clutter that a person would acquire in their pocket during daily life) the planners spent a night out and retained their pocket litter to put into Major Martin's pockets. Accumulating pocket litter to place in the

63 Whaley, 349.

64 Ben Macintyre, *Operation Mincemeat: How A Dead Man and a Bizarre Plan Fooled the Nazis and Assured an Allied Victory* (New York, NY: Broadway Books, 2020), 135.

65 Macintyre, 69–72.

66 Macintyre, 118–119.

corpses uniform gave legitimacy to the ruse around the corpse since the expectation is people always had some odds and ends which they kept in their pocket.[67] Additionally, they gave Major Martin a girlfriend, placing a photograph of a woman and letters from her amongst his belongings to add another layer to the Major Martin persona, that an investigator may relate to.[68]

Of course, the corpse had to be kept cool so that it would not decompose while also not being frozen upon discovery. As such, it was transported via submarine to the coast of Spain where it was released at a point where the corpse would be taken into land by the tides.[69] The secrecy around the mission itself was maintained, so that only the officers knew what they were doing, and only then they still did not have the full backstory as to why they were deliberately placing a corpse that was intended to wash up in Spain. On 30 April 1943, the corpse was found by a Spanish fisherman and turned over to the Spanish admiralty. After being identified as a British officer the local British vice-consul, Francis Haselden, was notified.[70]

Once the corpse was discovered and Haselden notified, pre-scripted communication between the British government and Haseldon (the British knew the communications method was compromised) which instructed him to, and the importance of, recovering the suitcase that was carried by Major Martin.[71] Crucially, knowing that the corpse had not died of drowning and was nearly three months old (kept in cold storage), Haselden was present at the autopsy and before a thorough post-mortem could be done he convinced the doctors to go with him to lunch. So, they wrote that the assumed cause of death as "asphyxiation through immersion in the sea," and the next day the corpse was buried with full military honors.[72]

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[67] Macintyre, 72–73.

[68] Macintyre, 77–79.

[69] Macintyre, 189–191.

[70] Macintyre, 195–196.

[71] Macintyre, 195–196.

[72] Macintyre, 199–200.

The Spanish maintained possession of the briefcase that was with Major Martin for several days, they inspected the content and, after pressure from the Germans, accessed the sealed documents without breaking their seals, photographed them, then returned them to their still sealed envelopes. The Spanish then handed over the photographed copies of the paper documents to the German Abwehr, the German intelligence apparatus, which were then transported to Germany. Following the capture of the materials, the Spanish placed the documents back into their respective envelopes and returned the briefcase to a British representative, who sent the briefcase back to Britain in a diplomatic bag.[73]

When the briefcase reached Britain, the British inspected the bag and wired (again, via known compromised communications) that the briefcase was safely returned and the contents had not been tampered with; convincing the Spanish their intrusions were undetected and confidential British communications appeared uncompromised.[74] The planners also put out a death notice in the British newspaper for Major William Martin, and maintained the ruse of his existence.[75] The British also used their intelligence apparatus to monitor broken German communications which confirmed the false documents were believed to be authentic and reenforced German perceptions the allied Mediterranean invasions were going to be against Greece and Sardinia, instead of Sicily This led to a misallocation of troops and resources by the Germans which aided in the successful invasion of Sicily, and eventually the end of the Second World War.

C. THE OPERATION DISTILLED

The British mounted their deception based on known intelligence and some assumptions:

- The Germans believed that Greece and Sardinia were more likely spots for the allied invasion than Sicily.

[73] Macintyre, 243.

[74] Macintyre, 246–247.

[75] Macintyre, 259.

- The Spanish had conduits into German intelligence.
- Existing operations would reenforce preexisting German perceptions and assist in deception.

The signals that the English used during Operation Mincemeat:

- Uniform on the corpse
- Paperwork supporting identity of the corps
- Pocket litter to provide a backstory to persona to appear legitimate
- A photo of a "girlfriend" and correspondence
- Personal letter between two generals discussing sensitive aspects of operations
- Manuals that the Royal Marine would be expected to carry as an amphibious landing expert
- A situation of discovery (plane crash) that explained the windfall of intelligence
- Official communication channels that were known to be compromised
- Use of usual normal casualty announcements
- Use of (both deliberately and incidentally) real-world events to provide false context for the deception

Concealed costly signals:

- Cause of death of the corpse
- Time of death of the corpse

D. CONCLUSION

The British were able to take advantage of the cognitive biases of the Germans, their placement and access within Spain, and their intelligence and counterintelligence operations to enable and protect their deception operation. The signals they provided appear to have successfully passed off a corpse as the fake persona, Major Martin, and allowed fake correspondence to provide deceptive intelligence to the Spanish and then the Germans to inform how they would array themselves in their southern defense along the Mediterranean. The advantage the British had in this mission was the protection of their deceptive vehicle: the corpse. Had Haselden not been present at the autopsy the doctors may have pried and discovered that the corpse recovered did not drown and had been dead for far longer than 24–48 hours. His presence allowed him to influence the outcome of that investigation and prevent discovery of a flaw in the story the deception planners were attempting to present. The time of the autopsy, before lunch, may have been a stroke of luck. Haselden would have likely sought another avenue to distract the doctors had the circumstances been different, but those circumstances and methods can only be speculated.

Lesson: If analyzing a complex situation that is potentially deceptive, look for the costly signal to start the first determinations of reliable or suspect. If the cause of death had not been covered and assumed away by the Spanish, with British assistance, the deception of Operation Mincemeat, and supporting operations, may have collapsed.[76]

[76] Whaley and Aykroyd, 47–48. Barton Whaley called the time and method of death "incongruities," along with the fingerprints that would have been found on the items in Major Martin's possession. While in this scenario, the terms "incongruities" and "signals and cues" are almost interchangeable in terminology, the thought to analyze fingerprints on a corpse's possessions would require suspecting the items on a corpse did not originate with it. While fingerprints would have also served to undermine the British deception, the signals (or incongruities) fingerprints provide would have been irrelevant in this case.

V. CASE STUDY: OPERATION SPARK

A. BACKGROUND

Following the Six-Day War in 1967 Israel had gained control of the Sinai Peninsula from Egypt, the Golan Heights from Syria, and the West Bank from Jordan. The surprise victories of the Israelis over the Syrian, Egyptian, and Jordanian armies stunned the World and left Egypt and Syria seeking a path to regain their lost land from the Israelis. In order to protect the new western border, now at the Suez Canal, the Israelis built a series of fortifications known as the Bar Lev Line, which included a string of bases and a large sand barrier oriented along the canal.[77]

In 1970 the Egyptian president Nasser died and was replaced by his vice-president Anwar Sadat. Sadat knew that the Egyptian military could not seize the entirety of the Sinai from the Israelis because the Israeli air force was superior to the Egyptians, which would leave ground forces exposed outside of air-defense support from land. The Israelis were also known for their wide use of tanks to counterattack against ground forces which made defeating the Israelis in wide maneuver warfare difficult without air superiority. To find a solution Sadat decided that a limited war to breach the Bar Lev line and get a foothold on the Sinai, still within the supporting range of Egyptian air-defense batteries and maintaining the foothold would be enough of a victory to force the Israelis to the diplomatic table to discuss guarantees of peace for land.[78]

B. EGYPTIAN DECEPTION

To accomplish the aims of the limited incursion, the Egyptians needed to be able to gain the element of surprise. The bulk of Israeli forces is maintained in their reserves and require roughly 48 hours to mobilize in response to a crisis situation.[79] Knowing this,

[77] Yigal Sheffy, "Overcoming Strategic Weakness: The Egyptian Deception and the Yom Kippur War," *Intelligence and National Security* 21, no. 5 (2006): 812, https://doi.org/10.1080/02684520600957746.

[78] Sheffy, 812.

[79] Sheffy, 814.

amassing the required number of troops, equipment, resources, and operational orientation, Egypt would need a way to mass their forces close enough to the Suez Canal but not raise Israel's threat level so they mobilize or launch a spoiling attack (as they did in 1967).[80]

To accomplish this, Egypt needed to shorten the time between when Israel realized that an attack was imminent and the time that Egypt was prepared to launch offensive operations and cross the Suez Canal. If the element of surprise was attained, the mobilization of reserves and counterattack against Egyptian forces would be mitigated because they would have the time to breach the Bar Lev line, seize territory they needed, and then establish defenses prior to the Israeli counterattack. In this endeavor, the Egyptians planned to lull the Israelis into a state of normalcy and complacency so that cues that indexed that an attack was likely imminent would be disregarded. But, to accomplish this ploy would require altering Israel's expected outcomes. The Egyptians needed the Israelis conditioned to see a mass of Egyptian forces and not expect an imminent attack.[81]

The Egyptians used several factors to their advantage. The first and primary was that they had been conducting large military exercises on a regular basis.[82] Through the practice of having annual large-scale military exercises the Israelis became accustomed to them, along peaceful rhetoric from Egyptian government and officials, and became part of the expected norm. Initially the Israelis mobilized in response to Egyptian exercises, but after conducting needless mobilizations on numerous occasions the Israelis began to discount the threat of perceived Egyptian exercises.[83] In effect, the Egyptians had provided an explanation for movement and massing of military forces.

The second factor was Israeli biases against the Egyptians' military capability. The Israelis, through their victories, had developed a bias against Arabs as being unable

[80] Sheffy, 813.

[81] Sheffy, 815–816.

[82] Sheffy, 824.

[83] John Amos, "Deception and the 1973 Middle East War," in *Strategic Military Deception*, ed. Donald C. Daniel and Katherine L. Herbig (Elmsford, NY: Pergamon Press, 1981), 323.

to keep secrets, inept and conducting military operations and maintaining discipline, and having a general inability to coordinate any military action effectively.[84] The Egyptians knew the Israeli biases and decided to play into and reinforce them.

To accomplish this, when it came time for the execution of the deception the Egyptians lied to their own soldiers about the nature of their deployments. The government officially stated the operations were exercises, and through diplomatic channels that Egyptians stated they were exercises. The Egyptians also tasked units to act with a general demeanor of peacetime normalcy[85]—conducting leisure activities along the Suez Canal such as swimming, fishing, and in some instances, ordered not to wear body armor or helmets.[86] The intent of these actions were to reenforce the perception that they were not presenting a threatening posture or displaying aggressive behavior that the Israelis would interpret as a threat. Maintaining the ruse as long as possible was critical for the Egyptians to amass the required forces to be successful in their attack.[87]

Furthermore, during the mobilization, the Egyptians did things that would not have been normal for an exercise. They secretly forward positioned stockpiles of ammunition and concealed bridging equipment in crates to conceal what was being moved.[88] They repositioned air defense assets to cover the Suez Canal, mobilized the Egyptian reserve, mobilized civilian watercraft, and forward deployed medical facilities, which are generally abnormal for a military exercise. But the Egyptians still pretended that it was all for an exercise and the Israelis chose to disregard the discrepancies because they continued to choose to believe that an attack would not happen.[89]

When the mobilization began on the 25th of September, with the "exercise" to take place sometime between 01–07 October 1973, the Israeli intelligence detected all of the indicators of the Egyptian mobilizations, deployments, and troop movements, but

[84] Amos, 322.

[85] Sheffy, 817.

[86] Amos, 328.

[87] Sheffy, 815–816.

[88] Amos, 327.

[89] Sheffy, 823.

attributed them to the exercise. In an assessment created by Israeli intelligence, "The information about the expected exercise and the call of reserve soldiers for a limited time, implies, therefore, that the advancement of forces and additional preparations that are underway or will be done in coming days, such as completion of fortifications, mobilization of civilian fishing boats, and check of the state of readiness of units, which, at first sight, can be seen as alert signals, are, in actuality solely connected to the exercise."[90] Israeli intelligence clearly saw the signals but discarded them in preference for the preferred belief that Egypt was not mobilizing for war.

To further compound Israeli intelligence fallen victim to cognitive biases and Egyptian deception, Syrian forces had moved into and fortified, apparently defensive, positions oriented on the Golan heights, which was assumed to be simply a show of force.[91] While this should have triggered alarm—because Israel believed Syria would not go to war without Egypt, and vice versa[92]—the Egyptian exercise deception led to the dismissal of the deployments of both country's military forces.[93]

When Israeli officials were finally convinced that they were about to be attacked, it was too late to mount an effective defense against the Egyptians. Mobilization barely began by the time the Egyptians and Syrians initiated their attack.[94] Other aspects surprised the Israelis, such as the use of water drills to carve through the Bar Lev Line fortifications, a technique used by the Egyptians during the construction of the Aswan Dam.[95] Tactically, the Egyptians used Soviet provided Sagger anti-tank missiles as part of their defenses against Israeli armored counter-attacks, which the Egyptians had not employed before and the Israelis had not yet developed a countermeasure.[96] Combined

[90] Sheffy, 823.

[91] Amos, 327.

[92] Sheffy, 821.

[93] Sheffy, 823.

[94] Michael C. Jordan, "The 1973 Arab-Israeli War: Arab Policies, Strategies, and Campaigns," GlobalSecurity.org, 1997. https://www.globalsecurity.org/military/library/report/1997/Jordan.htm.

[95] Amos, 327.

[96] Jordan,

with the effect of the deception, the Egyptians initially enjoyed significant battlefield success.

C. OPERATION DISTILLED

- Egypt knew Israeli biases.
- Israelis believed Egyptians, and Arabs at large, were militarily incompetent.
- Israel believed that Egypt and Syria would not go to war without each other.
- Israel believed their intelligence services would be able to spot an attack, were one to take shape.
- Egypt conditioned Israel through repeated annual exercises.
- Egypt Lied to their troops about mobilizing for an invasion.
- Egypt kept the goal of the deception scoped, knew they had to achieve goals within 48 hours.
- Egypt signaled through official and diplomatic channels that mobilization was only an exercise.
- Some Egyptian units were tasked with looking unprepared, unprofessional, and lacking in urgency along the Suez Canal so-as not to present a threating posture towards the Israelis.
- Egypt employed techniques to speed up their ground operations (water cannons).
- Egypt broadcast deceptive radio communications to reenforce the ruse.
- By the time Israel was aware an attack was imminent, it was too late.

Concealed signals:

- Deployment of medical facilities
- Maintained mass deployment of forces
- Movement of special material (bridging equipment, water cannons, ammunition)
- Protected official communications
- Limited individuals with knowledge of the deception

D. CONCLUSION

The Egyptians exploited what their knowledge of the Israelis and the cognitive situation they had created. Through conditioning the Israelis through annual exercises, and knowing Israeli biases towards Egyptians, they presented signals and behaviors that would reenforce Israeli misperceptions. At the same time, when deviations from expected behavior was detected by Israeli intelligence Egyptian officials would reiterate it was only and exercise, and Israeli cognitive biases would accept the expected explanation. Even though the Israelis detected the indicators to conclude they were about to be attacked, their cognitive biases proved too great to overcome, especially when it came to explaining away the massing of Syrian forces with the Egyptian deception as the justification for risk being low.

The war continued long after the conclusion of the deception, however within the scope of intent and accomplishing the objectives that they set out to accomplish, this deception operation was a complete success. Egyptians were able to rapidly maneuver on the Israelis, and effectively withstand the Israeli counterattack because of the time and space they bought themselves with the deception.

Lesson: Scoping the goals of a deception, like the Egyptians then, guided the manner in how they approached their deception planning. For a successful operation the Egyptians knew how much time they needed to gain for themselves it did not matter when or if the Israelis discovered the deception. Knowing an adversary's biases and

assumptions allows planners to craft messaging and operations to reenforce those preconceived notions, while simultaneously disregarding evidence to the contrary. The indicators were there for the Israelis to discover the pending attack, their biases allowed them to ignore them until it was too late.

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VI. CASE STUDY: Q-SHIPS

A. INTRODUCTION

During the First World War, the world got the first glimpse at industrialized warfare. A key aspect of that warfare involved the significant consumption of materials by the Allies and the Central Powers. At the outset of the war, the British began blockading the North Sea to deprive Germany of any shipping that could aid in their war effort.[97] To retaliate, the Germans sought to employ the concept of a blockade by attacking and sinking shipping bound for the Allied war effort. To accomplish this the Germans employed the German submarine force, referred to as U-boats, to interdict and sink merchant shipping, both enemy and neutral, while it was on its way to support the Allied war effort.[98] Since submarines and submarine warfare were relatively new, the British attempted several different countermeasures to the U-boat operations and settled upon using deception to attempt to defeat or deter the U-boats from sinking commercial traffic bound for Britain. The solution they attempted became known as Q-boats.

B. ENGLISH DECEPTION

The British has been studying ways to defeat the U-boats because they had been engaging British warships with success, however the Q-ship concept did not come about until the Germans had changed their focus to targeting merchant shipping. The British analyzed the tactics that the Germans were using when they attacked merchant vessels in order to find an opportunity to ambush them. They noticed the Germans generally followed the "cruiser" rules of naval warfare, which outlined the rules for interdicting neutral merchant vessels and provided safe passage for the merchant crew before sinking their ship. Observing these rules, the Germans afforded the merchantmen that courtesy

[97] Deborah Lake. *Smoke and Mirrors: Q-Ships against the U-Boats in the First World War*. (Stroud: The History Press, 2009), 70–71.

[98] Lake, 83–84.

before sinking their ship using the deck gun or a boarding party scuttling it.[99] A practice which the British saw as an opportunity to exploit, as the Germans saw merchant vessels as low threat.[100]

Many British officers had experience sailing in on Arab dhows in the Indian Ocean and Red Sea, which had a practice of holding hidden weapons which were deployed against pirates and slave raiders attempting to raid presumably unarmed civilian vessels.[101] This concept was adapted and applied to the U-boat problem, of creating ships to mimic and appear as merchant vessels to lure in German U-boats and ambush them when they were too close to submerge and escape.

Ships selected for Q-ship duty ranged between 200–4,000 tons because they needed to present an attractive target for German U-boats, but not be so large that a U-boat would choose to sink the ship by torpedo, as opposed to scuttling or use of the deck gun.[102] The ships were selected based upon their ability to conceal weapons while simultaneously being able to look like merchant ships. Selected ships were outfit with a variety of mechanisms such as hinged bulwarks and gunwales, dummy lifeboats, empty cargo crates, and disappearing mounts—all meant to present the appearance of a merchant ship while concealing the presence of the ship's weaponry. The armaments on Q-ships varied from 12, 6, and 3-pound guns amongst other small arms weapons which had the firepower to incapacitate or sink U-boats while being small enough they were maneuverable and concealable on the ships they were mounted.[103]

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[99] Robert L Nelson and Christopher Waters, "Slow or Spectacular Death: Reconsidering the Legal History of Blockade and Submarines in World War I," *University of Toronto Law Journal* 69, no. 4 (2019): pp. 473–496, https://doi.org/10.3138/utlj.2018-0041, 9–10. Merchant vessels were viewed as non-combatants however, interdicting neutral ships was allowed to search for potential contraband by a belligerent nations. It was accepted that a merchant vessel from a belligerent country was allowed to flee and resist, provided accommodations were still made for the crew. At this time U-boat crews carried limited torpedoes so engaging with deck guns or scuttling was a preferred method of interdiction.

[100] Lake, 81–82.

[101] Lake, 82.

[102] Barbara J. Coder "Q-Ships of the Great War." (master's thesis, Air Command and Staff College, 2000), 9, https://apps.dtic.mil/sti/pdfs/ADA425342.pdf

[103] Coder, "Q-Ships of the Great War," 10.

The Q-ships were designed to appear as merchant vessels administratively, matching names and paint schemes of legitimate merchant ships to appear as such should the Germans reference publicly available information regarding merchant ships, their owners, and identities.[104] Additionally, while underway the Q-ships flew the flags of neutral countries and non-combatant vessels. The ships would not raise the battle flags of the British navy until the last minute before ambushing a U-boat.[105]

The tactics that the British would employ as part of the lure, or display, would involve feigning attempts to flee. Once the ship was either fired upon or "caught," a portion of the crew would appear panicked and abandon ship (while hidden crewmembers manned the guns). When the U-boat was close and in a vulnerable position, the British would drop the neutral flag they were flying, raise the imperial British naval flag, and open fire on the unsuspecting U-boat.[106]

After the Germans learned of the Q-ships and how the British were employing them, they adjusted their tactics for dealing with neutral merchant ships, until 1917 when after it was deemed too risky for U-boats to approach apparent merchant vessels and abandoned the "cruiser" rules and began unrestricted submarine warfare against merchant vessels, meaning attacks without warning.[107] The change in German submarine tactics and the development of other anti-submarine practices, such as convoying, lead to the retirement of the use of Q-ships in the first world war (the practice was adopted again in the second world war by the Allies).[108]

C. THE OPERATION DISTILLED

- The British knew the Germans were observing the "cruiser" rules while interdicting neutral flagged merchant ships.

[104] Coder, "Q-Ships of the Great War," 11.

[105] Lake, 83–84.

[106] Coder, "Q-Ships of the Great War," 18.

[107] Coder, "Q-Ships of the Great War," 18–19.

[108] Coder, "Q-Ships of the Great War," 27–28

- British knew the detection system the Germans had was visual while on the high seas.
- British assessed the size and type of ships the Germans chose to sink with the deck gun or scuttling and turned those sized ships into Q-ships.
- British crafted fake cargo and screens to hide weapons.
- Once German U-boats were close and vulnerable to the deck guns, the neutral flag was lowered and the British naval flag was raised.
- Once the Germans became aware of Q-boats and how they operated, the "cruiser" rules were no longer observed.
- Once the cruiser rules were not followed Q-ships ceased to be of use.
- Other anti-submarine tactics and procedures also became more successful that the Q-ships, such as convoying.

D. CONCLUSION

While the British has some success with the Q-ships, their overall impact was limited and may have done more harm than good with regards to merchant sailors' safety. Grand total the Q-ships independently sank and estimated 14 U-boats (kills where Q-ships were present but not the lone friendly combatant were not included in the numbers), while losing and estimated 27 Q-ships to U-boats.[109] Those numbers over the course of the three years of their employment are small, and the result of the employment of Q-ships contributed to the Germans deciding to engage in unrestricted submarine warfare since they no longer trusted the flags of neutral countries as a result of the Q-ship tactics; A practice which cost the lives of many merchant sailors and civilians.

Lesson: Signals are only useful if your adversary trusts them. If your adversary realizes a trusted signal's meaning has been usurped, the behavior following that signal will change to reflect the victim acting in their best interest. Application or use of

[109] Coder, "Q-Ships of the Great War." 2, 21.

protected symbols as part of a deception, such as the red cross, take on additional importance upon that consideration. In this case, neutral flags no longer meant neutral treatment. Flags of neutral countries no longer represented neutral civilian merchants, but potential British traps; the signal of neutrality was no longer trusted.

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VII. ANALYSIS, CONCLUSION, AND FUTURE STUDY

A. ANALYSIS

In the three case studies of deception in warfare, signals and cues were applied to deceive their desired targets in various manners. In all of the cases the use of signals was the most prominent part of the deception. Deceptive cues were involved in operations MINCEMEAT and the Q-ships, but the signals were the primary purveyor of the deception.

Signals can be truthful or deceptive, cues are where deceptive signals are detected. In the case of Operation MINCEMEAT, decomposition and cause of death were cues, avoided only because a British agent interfered in the autopsy so the deceptive signals (fake letter) could be discovered and transmitted to the German high command as legitimate communication. Had the doctors conducted a thorough investigation of the corpse the cause and date of death would become incongruous with the rest of the ruse. The signal the letter was communicating appeared legitimate, but the signal would have been undercut by the incongruous cues. The oversight, and openness of the doctors to interference may come down to the cost of the oversight. The explanation of how the corpse had died did not carry a significant weight to the Spanish or the doctors, so accepting the assumption and British pressures did not cost the Spanish anything.

The English signaling in compromised cables, the behavior of the British, and the active reenforcing signals around the fake letter allowed then gave the Germans no pause to question the conclusion of the Spanish doctors, or the legitimacy of the papers they were allowed to see. This is almost of the inverse of the success of the Great Tit's false alarms regarding danger around birds who react as if it is legitimate. The birds react because they ignore the times it is true it could cost them their lives, and the Great Tit uses the alarm truthfully enough times and the occurrence of false alarms few enough times, that the other birds still trust it when sounded. In this instance, the Spanish had no reason to doubt what appeared to have happened: the drowning of a downed airplane passenger. The cost of them getting that wrong did not affect the situation of the doctors

or the Spanish in any way, so looking at the situation more closely was of little consequence. This is also the first and only documented use of this deceptive delivery method; there was no previous experience to seek to verify the authenticity of the situation being presented to them. Additionally, the cost of transmitting the deceptive documents to the Germans did not impact the Spanish either. The Spanish unwitting participation in the deception allowed a trusted partner to provide legitimacy to a deceptive signal and led Germans to come to the wrong conclusion about the invasion sites of the Allies.

In Operation Spark, the Egyptians signaled exercise through every channel they could the entire time, but the cues of invasion were present had the Israelis chosen to view them outside of their cognitive biases. Through the practice of ritualizing exercises and consistent signaling around the exercises, the Israelis associated the exercises as a non-threat over time. Combined with their cognitive biases against the Egyptians, and Arabs, they set themselves up for failure. Even with the altering cues that indicated the Egyptians were about the launch and invasion, the Israelis chose to ignore them in preference for the idea that peace would be maintained and that the exercise was not a deception. This is consistent with the data on non-human animal signaling systems and not solely a human misconception. When presented novel signals or cues but are closely related to previous trusted signals and cues, the tendency is for the new interpretation and reaction to the altered signals and cues will be related to the previous understanding.[110] While cues themselves can evolve into signals, the incongruous cues did not lead to suspicion on the side of the Israelis, they became attributable to the already trusted diplomatic and internal signals.

The example of the Egyptians' conduct is very similar to more recent examples of cues being correctly called out and indicators of an invasion, rather than part of an exercise. In the Russian invasion of Ukraine in February of 2022, the American government released intelligence that indicated that the Russians had forward positioned medical facilities and deployed stockpiles of blood. The deployment of blood was

[110] Smith and Harper, 77.

determined to be a costly enough cue that in and of itself, it became a signal of pending combat operations. Even though for days afterwards Russian and Belorussian official messages and diplomatic signals were that of an exercise, the cues correctly indicated the cover story of troop deployments to be false.[111]

The Q-boats were overused and made neutral merchant signals (naval flags) and appearances untrustworthy for German U-boats. The established signals delineating between nationality and nature of ships using flags and appearances were what dictated the behavior of warships. The established "cruiser" rules then guided the conduct of the Germans as they conducted their anti-material operations against enemy and neutral merchant vessels. The British use of Q-ships became common enough that German U-boats no longer trusted the nature of the neutral flag being flown on a presumed merchant ship. Since the occurrence of ambush became more common and the number of Q-ships increased, the cost of risking the submarine became too great for the Germans to continue to adhere to the previously agreed to rules. Result was the Germans no longer gave warning to merchant ships it intended to sink. They torpedoed the ships without warning, making the concept of a Q-ship moot.

The value of trustworthy signaling and cues in the animal kingdom is allowing cooperation, competition, or hierarchy to be communicated and trusted without expending too many resources or risking physical harm in competition. In cooperative situations, such as treaties, punishment is intended to ensure compliance.[112] In the case of merchant ships flying flags of their affiliation to determine their alignment, and thus treatment by warships, the British rendered following the rules high risk. With the Germans already under blockade and encountering Q-ships on a common enough basis, continuing within the cooperative agreement on how to treat neutral merchant ships was now too expensive for the Germans. The Q-ships method of deceiving the German U-boats, flying the flag of neutral countries and concealing weapons, altered German

[111] Phil Stewart, "Exclusive Russia Moves Blood Supplies near Ukraine, Adding to U.S. Concern, Officials Say," Reuters, January 29, 2022, https://www.reuters.com/world/europe/exclusive-russia-moves-blood-supplies-near-ukraine-adding-us-concern-officials-2022-01-28/.

[112] Smith and Harper, 99–100.

behavior to make neutral signals irrelevant and collectively punished all merchants and removed the signal-driven behavior the Q-ships were taking advantage of.

B. CONCLUSION

The deceptions, Operations MINCEMEAT and SPARK were detectable and identifiable as deceptions had the victims keyed in on the discrepancy between the deceptive signals and the incongruous cues. The false signals preyed upon the cognitive biases and desired outcomes of the victims of their deceptions. The ability for the victims to detect the deceptions was there in the form of cues. The movement of air defense systems, medical facilities, and continued mobilization of reserves served as indicators that the exercise was more than it seemed. The corpse had indicators that it had long been dead before it had entered the water. Those indicators were detectable and should have led to analysts taking a second look at the signals they were presented, and the cues should have been what they cross referenced with.

The case of the British Q-ships their deception hijacked trusted signals that was developed to preserve lives of non-combatant merchant marines as their vessels were interdicted. While their use of different flags was not a violation of the rules of war, as they raised the British naval flag before engaging in combat, it undermined the "cruiser" rules which had guided German actions beforehand. The deception was successful so long as the neutral flags remained a trusted signal by the Germans. Once the signal was no longer trusted it was no longer exploitable. While cues may have existed to detect the Q-ship deception, such as visual aspects of the collapsible cargo, the deception itself failed to be effective because of the loss of trust in the signal. In effect, the counter to that deception was disregarding the signal all together.

Deceptive signals remain effective if they are believed. When there is a discrepancy between signals and cues analysts should use that opportunity to challenge assumptions about what is happening. If a signal is repeatedly given, and cues increasingly suggest the signal is misleading, a deception is likely afoot. If the signal you are receiving is misleading often enough, no longer trusting a signal, or rendering it moot,

aids in mitigating potential risk to becoming a victim. Especially if becoming a victim of a deception could result in death or significant loss.

C. FUTURE RESEARCH

To continue analyze signaling in the animal kingdom and its application towards deception and counterdeception would be to explore how cooperative groups compete against other cooperative groups for territory, resources, and mating. How to the groups seek to gain advantages over each other, and where is deception or concealment used to gain an advantage. This may offer a closer analogy to combat between humans and see how animals may use deceptive signaling to gain an advantage.

Additionally looking at how to organize an organization to best harden itself against deception. Diffusion models suggest that initial entry to be the key to detecting false signals as disinformation.[113] If the ideas enter an organization the filters for skepticism of the information drops. At that point countering being deceived becomes more difficult because beliefs of an idea need to now be changed instead of assessed and adjudicated.

The global framework of communication and human interactions is becoming more complicated. Analogizing other human problems with how nature has solved similar problems through evolution may offer insights that otherwise may not have been considered. Deception will continue to be used both politically and militarily to gain an advantage over an adversary. Detecting that deception and not becoming a victim of it are important in achieving a relative advantage. As technology continues to evolve it the means and mediums of deception will change, however the principles behind it will remain the same.

[113] Everett M. Rogers *Diffusion of Innovations*: *5th Ed.* (New York, NY: Free Press, 2003), 359.

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