How Technology Impacts Doctrine in Asymmetric Warfare

Jeremiah Rozman

Northfield Vermont

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Abstract

How does technology impact military doctrine, and how does this in turn impact political support for offensive, preventative or preemptive military action?[1] I study defensive weapons systems, specifically focusing on missile defense in the theoretical context of technology and defense-based strategies as a whole. Through the study of Israel's use of Iron Dome, I aim to demonstrate that technology can be an exogenous factor affecting military doctrine. Through careful case study analysis, I demonstrate that operationally successful defensive technologies can lead to the adoption of a defensive military doctrine by decreasing the political cost of inaction to the extent that allowing attrition becomes politically less costly than launching an offensive.

Introduction

A comparison of Israel's two recent wars in Gaza, Operation Cast Lead in 2008/9 and Operation Protective Edge in 2014, indicates that the tactical success of Iron Dome, as a defensive military technology, can effect a change in military doctrine. The goal of this study is to demonstrate the effect of an unexpectedly successful defensive military technology on military doctrine, an effect which leads to prioritizing defense, allowing attrition, and moving away from a long-standing offense-based doctrine, specifically when dealing with asymmetric conflict. This study focuses on Israel, specifically in the Gaza theater of conflict and not in the Northern theater of conflict where Israel's adversary, Hezbollah is

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[1] Preemptive war is defined as actor A launching a first strike in order to gain advantage in a situation where an attack by actor B is anticipated to be imminent. Preventative war is when actor A is worried about the possibility that actor B is increasing its capabilities and preparing for the right time to strike actor A, but the strike is not imminent although it is expected sometime in the future, and actor A strikes actor B with the goal of minimizing the risk of a future strike by actor B. Both of these actions are examples of an "offense is the best defense" strategy. I argue that successful defensive technology makes both of these actions less likely through its impact on political incentives.

considered to have strategic capabilities on par with a state actor, and is thus considered a symmetric threat by the Israeli defense establishment.[2]

Despite the specificity of this case, this study has broad implications. Iron Dome provides an opportunity to study the effect of defensive technology on doctrine while alleviating the concerns of endogeneity stemming from the possibility of reverse causality. The intuitive reasoning here is that technologies are researched and adopted in order to better carry out an existing military doctrine. This was arguably the case with the Maginot Line, which was built by the French with the primacy of defensive advantage in mind immediately following WWI, where "prevailing weaponry and means of transport strongly favored the defender" (Shimshoni 1990, 188). Iron Dome's unexpected success allows the research of its effect on doctrine by alleviating concern that it was an earlier shift to defensive doctrine that led to the creation of Iron Dome in the first place. The study of Iron Dome is a first step towards gaining broadly generalizable insights into the effect of technology on military doctrine. As military technology rapidly evolves along with the threats faced globally, understanding the political and strategic consequences is vitally important. I demonstrate that tactically successful defensive technologies can lead to defensive doctrine, which in turn can manifest itself in inaction, attrition, and ad hoc warfighting, all of which can give the initiative to the opponent. Finally, as a distinct issue for future research, how does this affect deterrence and intensity of conflict? Once the link between technology and doctrine is established, the door is opened for an examination of how a shift towards defensive doctrine can lead to prolonged conflict and increased casualties as well as other adverse political and economic consequences, thus suggesting the possibility of perverse effects of successful technology.

Theories of Technology, Defense, and Doctrine

[2] Former Chief of Staff Benny Gantz outlines Israel's strategy regarding a future conflict with Hezbollah as continuing to be swift and decisive action to bring the attack to the opponent. This is due to the conclusion that Hezbollah has the capabilities to overwhelm Israel's missile defense (Gantz 2015).

There are two ways of deterring an adversary. The first is through denial, ensuring that they cannot achieve their objectives. Mearsheimer argues that this is impossible because a determined adversary will always find a way to get around even those defenses perceived to be the tightest. (Mearsheimer, 1983). The second is the threat of punishment, imposing costs if they try to achieve their objectives. Missile defense, and defensive tactics are of the first type of deterrence. Launching an offensive is always a riskier strategy and involves the politically costly possibility of the risk of high casualties. Furthermore, when deterring a non-state adversary, the political costs of an offensive strike in terms of legitimacy and proportionality are greater than the less ambiguous necessity of self-defense against foreign aggression from another state. A state's focus on the less politically costly defensive strategy makes the punishment and cost imposition approach less attractive, especially as the defensive denial approach becomes more and more operationally successful. Thus, one likely effect of operationally successful defensive weapons systems is strengthening the hand of doves in government, making preemptive or preventative action less likely, leading to the adoption of a defensive military doctrine.[3] While a strong defense might make it seem futile and certainly wasteful for an adversary to continue armed opposition, it cannot provide a decisive knockout blow or impose further costs, other than wasted resources on the adversary and even allows the adversary a propaganda tool as they are able to continue to fire as a popular symbolic act without expecting an offensive retaliation. For a significantly weaker opponent, merely engaging in military action, regardless of its ineffectiveness, creates a powerful propaganda and recruiting potential; resistance can be an end in itself. Adding to this, if the adversary can prolong aggressive action, this disrupts the state's economy and civil order even if the defensive system is highly effective. Furthermore, if a state has a strong defense, the level of threat they will tolerate without intervening is thereby increased, allowing an adversary to become better prepared, better armed and more entrenched. Due to these factors, defensive mechanisms creating deterrence through denial are not as

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[3] This is not always the case. Note the case of Hezbollah in footnote two.

likely to be as effective as deterrence based on the threat of a strong offensive response or preventative action, and the operational success of defensive technologies decreases the likelihood of specifically that.

I argue in this respect, that there is no perfect defense. The unexpected operational success of Israel's Iron Dome anti-ballistic missile technology has boosted the political attractiveness of defense, creating a shift in Israeli military doctrine. Regarding the 2014 Operation Protective Edge in the Spring 2015 issue of Middle East Quarterly, Eitan Shamir writes,

"Jerusalem was unable to land a decisive knock-out blow… protected from the direct effects of the Palestinian missile barrage by the Iron Dome, an efficient warning system and numerous bomb-shelters, the Israelis adopted a strategy of gradual attrition of Hamas military infrastructure. However, attrition comes with a price. Instead of a short operation, the fighting lasted fifty days. Lengthy operations go against Israel's security doctrine as well as military planning. As a whole, the IDF is designed for quick and decisive operations, at least in theory" (Shamir, 2014).

Shamir suggests that Iron Dome was the decisive factor, impacting political incentives to shift Israeli military doctrine to a more defensive position. This research examines Israel's experience with Iron Dome to shed light on how technology can affect military doctrine. Upon demonstrating this, the next step for further research is to explore the hypothesis that a shift in military doctrine from offensive cost imposition to defensive denial leads to longer and more severe conflict, in which case the operational success of defensive technologies may be a hindrance to strategic success. This is an area that has not been very thoroughly studied and has substantial and currently applicable implications for states all over the world. The importance of this study will only increase as military technology advances and new types of threats emerge.

I stress that I am not suggesting that highly operationally successful defensive technologies should not be developed or used. I am attempting to bring recognition to possible adverse strategic effects of technologies which in themselves bring huge tactical advantages. Recognition of these potentially negative political effects on strategy should lead to better policy making, turning a tactical advantage into a strategic one as well and avoiding the pitfalls of a perverse relationship between tactics and strategy.

Importance and novelty of the topic (intellectually, theoretically, and practically)

What factors influence the formation of military doctrine? Realist explanations suggest structural factors. Defensive Realists discuss the security dilemma and how a state can best maximize its security without exacerbating threat, and through that increasing the likelihood of conflict. Institutionalists examine international institutions and norms. Finally, organizational theorists examine the nation instead of purely structural factors and explore the role of subnational actors, organizational structures and culture.

There is much literature, going back to Kant and Cobden, that examines conflict and concludes that military buildup in state A, even for defensive purposes, can lead to conflict due to instilling fear in rival state B, which in turn builds up its military due to this fear of offensive intentions of state A which in turn confirms state A's fear of state B, leading to costly arms races and conflict. This is known as the security dilemma. Some argue that the security dilemma can be solved if states adopt military technology which is defensive in nature and does not pose an offensive threat to another state while providing protection against and thus deterring an aggressor. (Jervis, 1978) (Glaser, 1995) (Van Evera, 1998). If you approach this dilemma from a perspective of status quo powers and revolutionary-states/aggressors, a defense-based strategy by status quo states might encourage aggressors who do not believe that the threat of a response is credible, or non-state aggressors such as those involved in global jihad who have the goal of offense as their primary motive. These hard to deter non-state aggressors are arguably the most rapidly growing modern threat. An important question is what type of doctrine is most able to deter the difficult to deter actors? Before addressing the question of what types of doctrines are best suited to maximizing security against what types of adversaries, this paper attempts to examine what factors influence a state's adoption of doctrine in the first place.

Kier suggests that structural factors are filtered through domestic politics, which provide constraints as to what type of doctrine a military can adopt, but ultimately she argues that "the military's culture intervenes between civilian decisions and doctrinal choices," (Kier 1997, 21) although she does not discuss the possible origins of military culture in her book. Kier argues against Posen, Snyder and Van Evera's assertions that "militaries almost invariably prefer offensive doctrines due to an offensive doctrine allowing the military a greater budget, greater autonomy, and greater prestige." (Keir 1997, 15). Legro examines organizational culture. He claims that, "when a type of warfare is antithetical to one side's military culture, the state will support restraint even in the face of provocative enemy incidents." (Legro 1994, 110). In Israel's vibrant bureaucratic context, where the vast majority of civilian leaders have extensive experience with the military, a separate military organizational culture is not sufficient to explain change in doctrine. Instead, political incentives are the main causal mechanism by which technology leads to a doctrinal shift.

Posen examines Balance of Power Theory as compared with Organizational Theory in an attempt to explain the emergence of military doctrine in France, Great Britain and Germany prior to WWII. (Posen, 1986). The focus of his research is closest to mine. In his analysis, technology is part of the doctrine, with the German Blitzkrieg representing offensive doctrine, the French Maginot line representing defensive doctrine and indeed stemming from it, while British air defense is deterrence based, due to the belief in the futility of pursuing airtight defense since "the bomber will always get through." Arguably Britain's focus on air defense systems, along with the French Maginot line, signaled to the Germans the reluctance of these great powers to intervene preemptively, or through offensive actions, against German aggression.

My approach attempts to disentangle the role of technology and doctrine by examining a case where the argument will be made that the success of the technology preceded and influenced a change in military doctrine. Moreover, this defensive success was unexpected, and indeed civilian Homefront

defense was not the original purpose when this system was being developed.[4] Therefore, the

development of Iron Dome must have been exogenous to the doctrinal development. This research is

novel in that it attempts to shed light on specifically how technology can affect doctrine, addressing the

chicken and egg problem of not being able to determine if technology was affecting doctrine, or if that

technology was developed in line with a specific doctrine already in place.   The latter appears to be the

prevailing line of thought: "Military organizations tend to adapt new technologies to existing doctrinal

preferences and practices. (Miller 1985, 47). "Strategic doctrine tends to mold itself to available

technology." (Mack 1975, 179).

There are numerous cases throughout history where states, convinced of the primacy of defense,

have thought that they have found a defensive weapons system, piece of technology, geographical barrier

or strategy that solves the security dilemma and also provides confidence in the ability to deter an attack.

Prior to WWI, the English Channel reinforced a feeling of invulnerability that shaped British strategy.

The British felt insulated from attack and thus did not prioritize building a military with an offensive

advantage. They had the navy to protect their interests, and a small army ill-suited and not intended for a

large-scale, land-based offensive. This insular position, incentivizing defensive over offensive based

strategy, did not deter adversaries like Germany from building up and flexing their own offensive

muscles. In fact, it signaled unwillingness to engage an aggressive adversary and also an unwillingness to

commit to the security of her allies, encouraging an aggressive Germany in 1914. In regards to WWII,

Jervis claims, "perhaps the Allies could have successfully attacked while the Germans were occupied in

Poland. But belief in the defense was so great that this was never seriously contemplated" (Jervis, 1978

p. 193).

The Maginot line had similar effects in France. What was considered a formidable defense

reflected and reinforced preexisting French dispositions but it also signaled to the Germans and to other

states in the region, that France was set on pursuing a defensive strategy, effectively signaling that

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[4] According to Yiftah Shapir, Iron Dome was originally developed to protect strategic sites, not cities.

offensive action was not under consideration and thus was "off of the table." My research question, applied to France, would ask whether France would have been much stricter in enforcing the Treaty of Versailles, specifically those limiting German military armament, had it not built what it considered a formidable defense. This same effect could be seen in similar incentives for isolationism/insularity in the American case due to being protected by two oceans, thus explaining the miniscule US army of less than 180,000 soldiers at the outset of WWII, ranking in number of men around 17th in the world, between Portugal and Romania. The development of what was considered game changing technology of the B-17, also contributed to a sense of security in isolationism, leading to an increased belief in deterrence through technological superiority.

Post-WWII America developed an army for the projection of power, and an offense-based doctrine. However, in the build up to each World War, defensive arguments and defensive priority was strengthened by defensive advantages and led to a military withdrawal from world affairs. This had far reaching reverberations. If defensive strategy possibly encourages aggressors, what are the alternatives?

Some scholars have suggested that nuclear weapons, specifically the second-strike capability which provides even a conventionally weaker state the ability to carry out a devastating response to an attack, are functionally defensive weapons. Mearsheimer, in, *Conventional Deterrence* (1983), argues that there is no such thing as conventional deterrence (some brilliant tactician will find a way to convince skeptical and/or ambitious politicians of the ability to gain victory painlessly). Only nuclear weapons provide deterrence because the outcome of incurring massive costs in a response, are politically undeniable in advance. This begs the question; why have there been numerous cases of non-nuclear states attacking nuclear states or their allies? Why did China invade Korea when the United States had an effective nuclear monopoly? Why were Egypt and Syria not deterred from launching an attack with the goal of conquest against Israel in 1973, after it was widely accepted that Israel had nuclear weapons? Furthermore, non-state actors might be impossible to deter with nuclear weapons.

According to offense-defense literature, the world is more conflict prone when states' military technology favors offense, leading to adoption of more aggressive military doctrines. Van Evera claims that conflict becomes more likely when the balance shifts from defensive to offensive advantage. He then addresses the question, "are offensive capabilities always dangerous?" His answer is that, "offensive capabilities in the hands of status quo powers may provide more deterrence than provocation if the aggressor state knows that it provoked the status quo power's hostility, if the aggressor knows that the status quo power has no bedrock aggressive intentions, and if the aggressor cannot remove the status quo power's offensive threat by force." (Van Evera 1998, 16). The Israel-Gaza conflicts fit this description with Israel as a status quo power attempting to deter aggressive adversaries aiming to revise the status quo.

Mearsheimer and Huntington argue that it is difficult or impossible to determine which weapons systems are offensive or defensive. Lynn-Jones responds that the theory is not dependent on specific weapons classification but on the overall advantage in terms of what is a more cost-effective way of providing security. (Lynn-Jones, 1995). I argue that political and diplomatic costs due to globalization, economic interdependence, and the taboo post-WWII of acquiring territory by conquest make offense usually the politically costlier strategy, even if in terms of actual operational costs in the short term, offense is cheaper.

Departing from Offense-Defense Theory, in the Israeli case in the Gaza theatre of conflict, defensive dominance in doctrine due to Iron Dome is not because offensive weapons systems do not have an advantage but because Iron Dome is so celebrated due to the tangible impact domestically among the populace. The F-35, for example, is arguably more strategically useful and consequential, but Iron Dome is understood more readily by the populace to be protecting them, thus it is more politically popular; this pushes it to prominence in terms of shaping doctrine. Since it is a purely defensive weapons system

(useful cover for attack, but cannot be used to attack itself)[5], its popularity with the public and thus also the political echelon, leads to the adoption of a defensive doctrine. Furthermore, Israeli policy makers are convinced that the international political fallout from offensive strategies against an asymmetrically weaker opponent increases the cost of offensive strategies. This is seen in Israel's meticulous care to minimize civilian casualties and humanitarian disaster while releasing footage and dedicating resources to minimizing international outrage though careful explanation of the conduct of the operation at every stage (MFA 2009). By contrast, one does not, for example, see Putin expending the resources Israel does to minimize international fallout.

My theory regarding the security dilemma is that, in essence, the security dilemma is a function of the perception of intentions, that in order to increase its security, a state increases its military capabilities and thus necessarily appears more threatening to another state, leading that state in turn to increase its capabilities, sparking an arms race. It is argued by some that the development or acquisition of purely defensive armament can allow for a state to increase its security without appearing threatening to another state. This theory rests on the assumption that defensive weapons and offensive weapons are distinguishable.

Although some weapons clearly cannot be used by themselves for offense, while others are clearly designed specifically for offense, weapons are not used by themselves so this is irrelevant. There is no such thing as a weapon that demonstrates only defensive intentions and thus alleviates the security dilemma.

The security dilemma is based on the perception of intentions, and a state is more likely to perceive a credible aggressive threat as well as aggressive intentions from a rival that is increasing its

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[5] Iron Dome is designed only to map out the trajectory of incoming missiles and target the ones that are determined to be headed towards population centers. It is not designed to target enemy infrastructure or personnel. While it is possible that anti-ballistic interceptors used by Iron Dome could be fired at enemy infrastructure or personnel, this would be incredibly inefficient in terms of cost of the interceptor, effectiveness and accuracy. One would be hard pressed to suggest a scenario in which Iron Dome would be used for targeting anything but incoming projectiles.

defensive, as well as its offensive capability, than it is to perceive a threat from a rival that is increasing only offensive capabilities. This is analogous to a boxer raising both of his hands in anticipation of landing a blow, one hand to defend from the counter strike, and one to strike with. This stance is more threatening than someone raising only his striking hand. By raising both hands, the boxer appears ready to attack because he is anticipating a counter strike. By contrast, the fighter raising only his right hand appears to be bluffing due to the assumption by his potential target that if he were serious about striking, he would be prepared to defend against the inevitable counter strike.

Defense is a necessary component of a credible offense if one makes the rational assumption that a state will not engage in offense only to be hit with a painful response. Thus a state truly preparing to launch an offensive will make sure to increase its defensive capabilities as well. This is well demonstrated by Egypt's securing of Soviet SAM batteries before launching its 1973 offensive against Israel. This is also why the Russian sale of S-300 air defense systems to Iran is perceived by Israel as a threat. Indeed, Hezbollah and Hamas's entrenchment and fortification are seen as more of a threat and a greater signal of offensive intentions than their missile arsenal, which absent defensive capabilities, would allow for a short-lived first strike and then leave the aggressor open to a devastating response. Likewise, the Soviets perceived Reagan's Star Wars missile defense program as a major aggressive threat.

This logic demonstrates why weapons designed for defense can signal offensive intentions. Likewise, offensive weapons are often a critical component of defense through deterrence created by the ability to impose costs upon an attacking state or entity. Because offensive capabilities are necessary for creating deterrence, and because deterrence is usually a more cost-effective defensive strategy than investing in the capability of absorbing attacks, states that have the intention to defend will likely invest in some sort of offensive capabilities as well. This means that although maintaining only defensive weapons could theoretically solve the security dilemma, this is almost never the case in a situation where a state is faced with the possibility of attack, because pure defense in the sense of only absorbing attacks is not cost effective, and to date does not exist in a way that can provide a truly impenetrable defense.

Because offensive capabilities are a necessary component of defense while defensive capabilities are a necessary component of offense, the security dilemma obtains with the procurement of either type of weapons and thus a state interested in maximizing security will invest in whichever combinations of weapons technology that will give it the greatest cost-benefit ratio. This will be a factor of the ability to deter an actor through the credible threat of cost imposition, the cost and operational success of a defensive weapons system, as well as domestic politics and international diplomacy and pressure.

Defensive Realists argue that the security dilemma is exacerbated when defensive weapons cannot be distinguished from offensive weapons, and when doctrine or weapons depend on surprise for effectiveness. I argue that in just about every case of conflict, surprise is advantageous. In regards to Iron Dome, the cover that this system gives against the retaliation to a surprise attack is well known by the adversary and thus the adversary understands Iron Dome to be creating more of an advantage for offense by diminishing the threat of retaliation. This is the same logic behind why the Soviets viewed SDI as a potential offensive threat. Although it was a defensive weapon, incapable of being used to launch an attack, it was still correctly perceived to create an offensive advantage and indeed a surprise attack advantage. Furthermore, especially in Gaza but in other theaters of asymmetric warfare as well, when an enemy utilizes a human shield tactic of entrenchment in a civilian population, and the leaders hide in bunkers, the advantage of surprise attack is compounded because the availability of high profile targets is severely diminished without a surprise attack. For these reasons, Iron Dome and defensive weapons in general do not differ from offensive weapons in contributing to the security dilemma and the possibility of a spiral of hostility.

Finally, in the subset of conflict that I address, that of asymmetric warfare, the security dilemma is irrelevant because the larger state is already at a huge advantage militarily over its asymmetrical rival and thus an arms increase should not change the perception of the level of threat on part of the smaller rival very much.

Traditional organization theory, when applied to militaries, suggests that militaries desire autonomy in general and that after the decision to engage in a conflict is taken, militaries will demand operational autonomy. Militaries want to avoid gradualism and restraint, which can cost lives and prolong conflict. Legro argues that organizational culture affects the militaries' preferences and can change due to technology as well as international environments, individuals and chance. The concept of culture would be useful for studying Israel's recent conflicts in Gaza. The military is hierarchical and highly institutionalized. It maintains the highest levels of expertise and respect in the Israeli decision-making process (Freilich 2012). The Gaza arena of conflict is complex, with multiple international and domestic concerns, civilian populations held captive, extensive strategic hurdles and high political stakes, and decision making cycles are short. These four factors heighten the salience of "culture on impacting national preferences and actions." (Legro 1995, 26). Legro argues that restraint will be more likely when the means of warfare do not correspond to the military's war-fighting culture (Legro 1995). This is arguably part of the story regarding Iron Dome, where Israel's dominant military culture advocates offense and innovation and the use of Iron Dome does not fit this method. However, I argue that the success of Iron Dome impacted Israeli doctrine, not through changing the preferences of the military, but through changing the preferences of the political echelon. Iron Dome's impact on the political leadership in 2014 was to reduce the autonomy of the military in the midst of a conflict and instead make it beholden to ad hoc decision making by the political leadership as will be demonstrated in the comparison of the two cases, Operation Cast Lead and Operation Protective Edge.

Shimshoni takes a nuanced approach to warfare, claiming that military entrepreneurship and preparing specific war plans for specific war aims create advantages, "driven by the interaction of technology with doctrine and war plans." He claims that, "all three factors and the manner of their interaction are endogenous, motivated and manipulated by decision-maker." (Shimshoni 1990, 189). Furthermore, states simultaneously have different advantages on different fronts, or on the same front at different moments. "At any level above the lowest tactical level, operations are a mix of offensive and

defensive components." For example, the Egyptian offensive in 1973 rested on successful Russian SAM defense. (Shimshoni 1990, 191). Shimshoni endogenizes technology, doctrine and war aims and claims that the political leadership determine these, but that armies are prone to conservatism, inertia, and risk aversion as well as domestic politics. I demonstrate that in a democracy, due to the political gains from using a wildly popular defensive technology, this technology will incentivize the adoption of a doctrine intended to fit the technology, instead of developing technology specifically for dealing with strategic threats. As military technological innovations advance, the effectiveness of these technologies should be measured not only by their operational performance, but also by their effect on strategy and on doctrine.

Broader Puzzles: What puzzles does the study of Iron Dome shed light on?

Specifically, my question is whether and how the unexpected operational success of Iron Dome affected Israeli military doctrine. Most broadly, my question is about how technology impacts a state's adoption of doctrine, and how a state's adoption of a defensive doctrine can effect overall strategy. Does there exist a weapons system or defensive technology that provides the perfect defense? My answer is no, or at least not yet. Assuming the wrong answer to this question and basing national defense strategy and military doctrine on it has had profound strategic implications for states historically and in the present. Understanding the perverse strategic implications that a tactically successful defensive system can create through the incentives it provides is important to choosing a national security strategy that minimizes both conflicts and the duration and intensity of those conflicts.

Hypotheses:

Both hypotheses aim to demonstrate that Iron Dome has been a major factor in shifting Israeli military doctrine.

H1: *Iron Dome, due to its operational success, has precipitated a shift in Israeli doctrine through its impact on political incentives, making Israel more defensive and less likely to mount a decisive offensive in 2014 in the Gaza theater of conflict.*

H2: *Iron Dome has increased the level of threat tolerance, decreasing the likelihood of preemptive or preventative actions short of war, allowing for a greater military buildup and entrenchment of Hamas in Gaza in 2014.*

In this research the dependent variable is Israeli military doctrine, with the standard, historical baseline offensive doctrine in 2008/9 pre-introduction and success of Iron Dome and a defensive military doctrine in 2014 post-introduction and success of Iron Dome. Confirmation of these hypotheses would generate a hypothesis for further research beyond the scope of this paper, where the independent variable is defensive doctrine and the dependent variable is conflict outcomes. The hypothesis would be: the shift to a defense-dominated doctrine based on highly operationally successful defensive technology diminishes the persuasiveness of preemptive action because it gives the state the ability to more successfully defend against the aggressor without the need for politically difficult, and materially costly offensive operations. This not only increases the level of threat that a state is willing to tolerate, but also decreases that state's ability to deter an aggressive actor, leading to longer, costlier and deadlier conflicts.

Method

In order to demonstrate that it is indeed the new military technology, in this case, Iron Dome, and not other underlying factors, promoting a change in doctrine, I examine the effects of Iron Dome in Israel using a longitudinal comparative case study of Israel pre-and post-Iron Dome. I use the method of difference to compare the background, domestic and international context, military goals, tactics, political debates and decision-making in each of these conflicts. I demonstrate that the crucial difference impacting the divergent political decision-making regarding the conduct of these conflicts was the

operationalization and installment of the Iron Dome missile defense system. Through this side by side comparison as well as interviews with military and political experts, I show how the success of Iron Dome created political incentives for inaction which led to a shift in doctrine.

I employ interview data to demonstrate that Iron Dome was taken into account by politicians, policy makers, and advisors regarding the level of threat tolerance from Hamas in Gaza. Ample evidence will be presented to demonstrate that in contrast to an offensive military doctrine throughout Israel's history, including the war with Gaza in 2008/9, the highly surprising success of Iron Dome led to a transformation in Israeli military doctrine (at least regarding Gaza), from an offensive to a defensive doctrine, from a doctrine emphasizing the need for imposing swift and decisive victory to a doctrine where gradual escalation and attrition was deemed to be to Israel's strategic advantage.

I organize my collected data from interviews according to the information it provides in determining a step by step analysis of how defensive technology, in this case missile defense systems, and specifically Iron Dome, has impacted Israeli military doctrine. In organizing my interviews, I first attempt to ascertain what has been the original and long standing Israeli military doctrine. Next I attempt to find evidence for a break with doctrine between the past up until and including Operation Cast Lead in 2008/9, and Operation Protective Edge in 2014. Finally, I attempt to find evidence that it was indeed the operational success of Iron Dome missile defense that precipitated that change in doctrine between 2008/9 and 2014.

First and foremost, I attempt to reveal Israel's historic military doctrine before the development of missile defense systems in order to uncover a baseline from which I argue that doctrine has changed in light of technological developments. I asked experts how they would describe Israel's military doctrine historically and today and in what respects has it changed. Second, without referring to Iron Dome, I attempt to discover differences in doctrine through examining how Israel conducted Operation Cast Lead which occurred before Iron Dome was operational and Operation Protective Edge, which was launched

when Iron Dome was fully operational and somewhat battle tested.[6] To examine the doctrinal differences, I ask what actions, events or series of events led to the decision to launch a ground campaign in both of these skirmishes. I follow up by asking what factors were the main political debates centered around regarding the pros and cons of launching a ground invasion in each of these cases as well as what the major similarities and differences in the political and security situation were in 2008 versus 2014, both domestically and internationally. Undertaking a ground offensive is costly in terms of domestic as well as international political capital, economic wellbeing, and lives. In both 2008 and 2014, Israel launched a ground campaign in Gaza, but the way these campaigns were conducted shows substantial differences in doctrine.   By examining the political and strategic similarities and differences between the lead-up to each of these operations, I demonstrate that Operation Cast Lead was decided upon and fought in accordance with Israel's original and longstanding military doctrine of swift and decisive victory with an aim to avoid attrition at all cost. Just six years later, Operation Protective Edge demonstrated a break with longstanding doctrine. In this operation, political and military leaders followed a strategy that was more ad-hoc, more based on tit-for-tat gradual escalation, had less clearly defined goals, allowed for a higher level of threat tolerance before it was launched, and most importantly, reflected a realization that, with the operationally successful Iron Dome, attrition was no longer to Israel's severe disadvantage as it had been historically, but was now to Israel's advantage.

After demonstrating an original and longstanding doctrine, and showing that Operation Cast Lead followed this doctrine while Operation Protective Edge broke with it, I finally asked the experts specifically about Iron Dome in order to help confirm my hypothesis that Iron Dome was the most important factor that led to a change of doctrine in 2014.

To address the question of reverse causality, I ask what the reasons were for the adoption of missile defense as a military technology project, and what the alternatives were. To make sure that the

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[6] Iron Dome was somewhat tested with only a few batteries and limited incoming missiles during the 2012 Operation Pillar of Defense, but was then more rigorously tested in the opening days of Operation Protective Edge where it greatly impressed military and political echelons as well as the public.

success of Iron Dome was indeed surprising, beyond assessing the ample media acclaim and journalistic reports claiming that it was, I ask strategy experts about the expectations for the success of Iron Dome, and whether they were met and/or surpassed. Finally, I directly address my hypothesis by asking for the experts' assessment of the tactical success of Iron dome and the impact of Iron Dome on strategy. I intend to discern from the interviews that there was indeed a shift in military doctrine, that this shift greatly coincided with the success of Iron Dome, that other factors were relatively similar during the two wars, and that the success of Iron Dome was directly linked to this change in doctrine.

In regards to theory, I intend to demonstrate that the unexpected tactical success of a new technology can precipitate a shift in military doctrine itself. If the new and successful technology is defensive, this can lead to the adoption of a more defensive military doctrine, even if the leadership had been convinced of the utmost necessity of an offensive doctrine for the majority of its history. This technology-inspired shift in doctrine leading to the reliance on what is believed to be a formidable defense, is a necessary cause of allowing the growth of an external threat beyond the level of threat which would have sparked a preventative action in the past. Specifically, with this research I intend to demonstrate that in Israel, consideration of the Iron Dome missile defense system had the unintended adverse effect of permitting Hamas to achieve high levels of armament and entrenchment as well as precipitating a slow, attrition-based approach that allowed Hamas to set the pace for most of the 2014 conflict. I examine two close cases where the major significant difference between the second and the first is the operationalization and installment of the Iron Dome missile defense system. I demonstrate this by comparing other possible explanatory variables such as government leadership, foreign and domestic pressure, and the overall strategic situation.

The unanticipated level of success of Iron Dome helps alleviate concerns of endogeneity. One could say that states adopt military doctrine from existing predispositions and then create and employ technology to serve this purpose, such as the building of the Maginot Line. In the case of Iron Dome, its operational success surprised both American and Israeli experts, demonstrating that it was the

technological aspect and not a predisposition for defense (Israeli doctrine has always been explicitly offensive) that impacted military doctrine. Indeed, Iron Dome mastermind Gen. Gold directed Rafael -a private sector weapons manufacturer- to begin full-scale development of the Iron Dome project when Rafael had no order to do so, according to the Israeli comptroller's audit report." (Levinson, Entous 2012)

In response to the unanticipated and surprising success of Iron Dome, Israeli military policy shifted from its prevailing offensive stance to one that was uncharacteristically defensive. This is a major departure from its accepted, tried and true strategy.

Sources

I conducted in-person and over-the-phone interviews with Israeli policy makers, strategists, advisors, political and military experts.

Gabi Siboni is the director of the Military and Strategic Affairs Program and Cyber Security Program at INSS and editor of the journal Military and Strategic Affairs. Colonel (ret.) Siboni served as a fighter and commander in the Golani Brigade and completed his service as the brigade's reconnaissance unit commander. Within the scope of his reserve service, he served as the chief of staff of the Golani Brigade. Siboni as a brigade commander has intimate knowledge with military doctrine, strategy and tactics. Dr. Shaul Chorev is the former head of the Israel Atomic Energy Commission. He served as the head of one of three agencies directly under the authority of the Prime Minister and is thus my interviewee with the highest level of political access and experience. Yehuda Ben Meir is head of the National Security and Public Opinion Project at INSS. Dr. Ben Meir served as an assistant professor and chairman of the Department of Psychology at Bar Ilan University. He was a member of the Knesset from 1971 to 1984 and was deputy minister of foreign affairs in the Begin and Shamir governments. His insights into public opinion and their impact on the political decision making immediately before and during the conflict were invaluable. Finally, Yiftah Shapir is the head of the INSS Middle East Military Balance project. Currently he is in charge of the quantitative military balance section on the INSS

website. Mr. Shapir also follows issues of modern military technology, including ballistic missiles, space technology and Ballistic Missile Defense (BMD) in the Middle East. Before joining the JCSS Mr. Shapir served as a career officer in the Israeli Air Force (from which he retired as a Lt. Colonel). Mr. Shapir has extensive background in information technology and operations research.

Boundaries

This is not an exhaustive study of all defensive technology in all states and pertaining to all actors. Nor is this a grand theory of conflict and peace, although it does raise some questions regarding the offense-defense notions discourse on likelihood of conflict. My broader proposition is that, *ceteris paribus*, defensive technological breakthroughs can strengthen the political incentives for inaction, precipitating a change a military doctrine to be more defensive, even in the context of a longstanding predisposition to offense, making preemptive and preventative action less likely and raising the tolerated threat level in the case of asymmetric warfare. My approach allows for an in-depth study of Israel and the effects of Iron Dome. Because this is a specific case, I cannot readily apply the findings to other situations with different circumstances and mitigating factors. This does not, however, take away from the value of my thesis. Many countries today are looking to technological innovation as a way of fighting terror and enhancing national security. Understanding how technology can impact doctrine, and the possibility that doctrinal shift might perversely influence strategy, is crucial to implementing successful national security policy in an age of rapidly expanding non-state threats as well as rapidly increasing technological innovation. Israel is respected as being in the forefront of counterterrorism and as having the critical necessity for a clear-eyed strategic policy in an arena where mistakes can be deadly. If these adverse effects of technology on strategy are demonstrated in Israel, this case will certainly be illustrative of what to pursue and what to avoid for other states facing non-state threats. This thesis should inspire expanded research that brings in more cases beyond Israel, as well as expanded research for application of this thesis to non-state versus state actors with applications to counter-terrorism studies.

The Cases

Operation Cast Lead:

Operation Cast Lead took place for a total of three weeks, from December 27, 2008 until January 18, 2009. This operation was fought between Israel and the Islamist militant group Hamas as well as other groups including Palestinian Islamic Jihad, PFLP and DFLP, with the fighting taking place in the Gaza Strip and missile fire hitting the surrounding Israeli territories as far north as the city of Ashdod, some 32 miles from the Gaza Strip.

Background

Beginning in 2004 and ending on September 12, 2005, the Israeli government under Prime Minister Ariel Sharon began the Disengagement which forcibly and unilaterally withdrew all Israeli citizens from the territory of the Gaza Strip and ceded complete political sovereignty to the Palestinian Authority (CAMERA 2009). After winning a large majority in the new Palestinian parliament in 2006 (Wilson 2006), Hamas took control of Gaza by force in a 2007 military coup. On June 25, 2006, Hamas fighters infiltrated Israel from the Gaza Strip, killing two Israeli soldiers and kidnapping Gilad Shalit (CAMERA 2009).

In the Spring of 2007, the Islamist militant group Hamas, militarily took control of Gaza, destroyed Fatah headquarters and replaced Fatah as the de facto ruler in Gaza (Erlanger 2007). In 2007 alone over 890 rockets and 700 mortars were fired by Hamas into Israel from the Gaza Strip. On June 19, 2008, Egypt brokered a six-month ceasefire between Israel and Hamas (Walker 2008). This ceasefire was repeatedly violated by Hamas rocket fire and infiltrations into Israel, and Israeli retaliatory attacks against Hamas military infrastructure including weapons factories, training sites and rocket launch sites. On December 14, 2008, Hamas leader Khaled Mashaal went on Lebanon's Al Quds television and said that the truce would expire after 6 months, and announced that Hamas would not be renewing the truce. On

Dec. 19, 2008, Hamas declared the tahdia (ceasefire) officially over. Throughout the six-month truce, 223 rockets and 139 mortar shells were fired from Gaza into Israel. Hamas enhanced it arsenal of Qassam rockets with a maximum range of around 10 miles, with larger payload and longer range Grad rockets capable of hitting the large Israeli cities of Ashkelon, Ashdod and Beer Sheba for the first time. (CAMERA, 2009).

From Hamas's perspective, part of the Egyptian-brokered ceasefire was the stipulation that Israel end its closure of Gaza's border crossings and end the naval blockade. Israeli officials dispute this and claim that Hamas's violations and refusal to recognize Israel or renounce violence necessitated a defensive blockade to prevent armament (IMEU 2012).

By the time Operation Cast Lead was launched on December 27th 2008, approximately 15% of Israel's population was within the range of fire (Globalsecurity 2015). On Dec. 25, 2008, following the launch of 60 rockets and mortars against Israel in a single day, Israeli Prime Minister Ehud Olmert demanded that Palestinians stop the attacks and threatened a powerful response if they did not. The rocket attacks continued in the days that followed, culminating in Israel launching a massive surprise attack as the opening of hostilities of Operation Cast Lead.

Finally, Operation Cast Lead took place after a strategic victory, but domestically billed as catastrophic conflict, over Hezbollah in Lebanon in 2006. The lessons of the 2nd Lebanon War were determined in the Winograd Commission, leading away from a focus on policing style counterterror to a "reemphasis on integrated joint air ground-ISR capabilities similar to those used against conventional adversaries, but at a reduced scale." "The single most important change in the IDF between the 2006 Second Lebanon War and the recent operation in Gaza was the clear understanding by senior Israeli political and military leaders that ground operations are an essential component of military operations. They no longer believe standoff attack alone, principally by air, can create success" (Johnson 2010, 97). Over 100 Israeli soldiers were killing in Lebanon and Israel's military performance was largely seen as a failure by the Israeli public and political echelons (Siboni 2009). Furthermore, although Israeli deterrence

appears to have been established and held against Hezbollah in Lebanon, anti-Israel militias including Hamas, Hezbollah and PIJ, consider the 2nd Lebanon war to be a victory for Hezbollah and a stunning defeat of Israeli power. It is from this domestic context of perception of defeat, the necessity to "return to the roots" of interstate style combat and training, against hybrid and highly advanced asymmetric adversaries, that Israel entered into Operation Cast Lead. The operation was meant to be decisive and to regain deterrence against all adversaries, who would be closely monitoring and drawing lessons from Israel's performance against Hamas.

Domestic context

Ehud Olmert was the Prime Minister of Israel leading up to and during Operation Cast Lead. His center-left Kadima party had the largest number of seats in a stable center-left government (Knesset 2006). In 2006, the Israeli public was highly critical of the way the political leadership conducted the Second Lebanon War. Olmert was still in power throughout Operation Cast Lead until March 31, 2009. Sandler of the Begin-Sadat Center for Strategic Studies argues that, "in light of these experiences one would have expected hesitation on the part of Israeli leadership in entering a military operation in the Gaza Strip. The fact that this decision came on the eve of an election could have augmented this wavering" (Sandler 2009).

The Israeli media and the majority of both the Israeli Right and the Israeli Left supported a full scale ground operation in Operation Cast Lead. "Minister of Defense Ehud Barak and Foreign Minister Tzipi Livni undoubtedly feared electoral punishment if the IDF had continued to abstain from retaliating to the daily shelling of Israeli towns in the south… Both feared that Likud leader Benjamin Netanyahu would take advantage of the government's failing to react" (Sandler 2009, 2). Incidentally, Netanyahu did indeed win the elections following Operation Cast Lead, demonstrating that although Olmert was given credit for a successful campaign, the lessons of this hard hitting campaign reinforced the Israeli public's support for a strong, more right wing government to protect their security. During the 2014 conflict an

even more right wing government was in power, however this government pursued more dovish, less offensive policies, underscoring the impact of the unexpected success of Iron Dome on policymaking.

The Israeli media could not ignore the daily rocket attacks on southern Israel and the public demanded action. Olmert was not running for reelection but he did not want to leave office being seen as the leader who abandoned southern Israel to daily bombardment. It is critical to note that Iron Dome did not yet exist and the only defense in the case of rocket attacks was to run to bomb shelters when the domestic service sounded a "red alert" warning siren signaling an incoming rocket.

The Israeli public, characteristic of democratic publics, lose support for a war if it drags on without obvious prospects for success and leads to many casualties among its soldiers. Israel conducted Operation Cast Lead with the goal of minimizing the length of conflict and of casualties through decisive and well planned actions. Siboni argues that Israel's adversaries changed their goals due to Israel's lack of strategic depth, from trying to capture territory, to a strategy of long term attrition. Siboni claims that the Second Lebanon war taught the IDF the necessity of a destructive strike of firepower against the enemy's core assets; quick maneuver to damage the enemy and paralyze its launching capabilities in the area of the maneuver; and the need to increase stamina and defensive capabilities on the civilian front: this entailed better bomb shelter infrastructure, a better early warning system, and the development of missile defense systems. (Siboni 2009)

International context

The most important feature of the international context, due to Israel's close political ties with the United States, was that George W. Bush was about to end his second term in office. President Barack Obama was elected President just prior to the launching of Operation Cast Lead. and was inaugurated on January 20, 2009, two days after the announcement of a unilateral ceasefire and withdrawal from Gaza, ending the operation. There are many who speculate that Israel used the US distraction and George W. Bush's final month in office to launch a large scale and devastating attack on the Gaza Strip in order to

minimize international pressure to bring the hostilities to an end. This would give Israel more time to degrade the capabilities of its adversaries in Gaza and reinstate effective deterrence (Chossudovsky 2009).

Timeline of the conflict

Unlike the gradual escalation and tit-for-tat strikes in the lead up to and indeed the opening weeks of Operation Protective Edge, Operation Cast Lead began with a pre-planned massive strike on over 100 targets simultaneously.

A large-scale military operation to degrade Hamas and other factions in the Gaza Strip, was seen as being inevitable by the Israeli political leadership. The military was given instructions to prepare for this eventuality, even while pursuing peaceful alternatives including a cease-fire and negotiations. Hamas and other factions, most prominently PIJ, were also planning for what they considered and still consider inevitable conflict with Israel, conflict their very charter calls for (Yale Law School 2008).

Israel's meticulous planning puts this operation in stark contrast to Operation Protective Edge which took place over five years later again between Israel and much better prepared Gazan factions led by Hamas. While Operation Protective Edge unfolded slowly, with the pace of acceleration set by Hamas, Operation Cast Lead was the result of "long-term planning, meticulous intelligence-gathering, secret discussions, visual deception tactics and disinformation." Defense officials claim that the disinformation campaign took Hamas leaders by surprise and greatly increased casualties. Sources in the defense establishment said Defense Minister Ehud Barak instructed the Israel Defense Forces to prepare for the operation six months prior to its launch, "even as Israel was beginning to negotiate a ceasefire agreement with Hamas." According to Ravid, "on December 18, Prime Minister Ehud Olmert and Ehud Barak met at IDF Kiryat headquarters in central Tel Aviv to approve the operation. However, they decided to put the mission on hold to see whether Hamas would hold its fire after the expiration of the ceasefire" (Ravid 2008).

Then Prime Minister Olmert convened a cabinet meeting obscuring the purpose of the meeting from the media by only briefly mentioning Hamas in the description of the agenda, buried in a discussion concerning the outlawing of 35 Islamic organizations (Ravid 2008). Importantly, the ministers at the prewar cabinet meeting that laid out in great detail the plan of action for Operation Cast Lead, unanimously agreed to the operation. This is in sharp contrast to the cacophony of publically voiced opinions among Israeli ministers regarding plans of action during the 2014 conflict.

Operation Cast Lead was launched with a well-planned surprise attack on Hamas training facilities, command centers and police stations. Over 100 targets were hit in the opening hours of the conflict (Fogelman 2010). In Operation Cast Lead, Israel's first strike, lasting for three minutes and forty seconds, killed a third of all the militants killed during the entire operation (Paz, Pollack 2014).

The following week saw the sustained aerial attacks on preselected targets in Gaza as well as a heavy artillery barrage intended to soften resistance and destroy enemy surveillance capabilities before a January 3rd ground invasion involving four of Israel's five infantry battalions, tank battalions, naval forces and naval commandos, and combat engineers including sappers and D-9 armored bulldozers to clear mines and booby-trapped structures. After two weeks of intense fighting, with the ground invasion and aerial surveillance creating more targets for precision air force strikes, Israel announced a unilateral ceasefire and withdrawal on January 18, 2009. This withdrawal followed intense international pressure, including UN security resolution 1860 passed on January 8, 2009. (CRS 2009). Hamas later announced its own ceasefire, which held with sporadic violations until 2012. Hamas remained in power after Operation Cast Lead despite suffering heavy losses, which have since been recouped. Many Hamas military leaders were killed and over 1,300 Palestinians lost their lives. Israel lost nine soldiers and four civilians (Btselem 2011).

Military goals, tactics, decisions, political debate

Operation Cast Lead was intended to degrade Hamas's capabilities and to reestablish deterrence. Toppling Hamas is speculated to have been one of Israel's goals but this was never stated explicitly. Israel also wanted to negotiate from a position of strength after the conflict in order to obtain international guarantees against Hamas rearmament although this was not achieved (CRS 2009).

Operation Cast Lead was planned to involve three stages, a heavy aerial assault, a swift and decisive ground invasion to degrade rocket launch capacities and destroy weapons factories, tunnels, and weapons caches, and finally a third stage which was not implemented which would have involved reconquering the Gaza Strip and ousting Hamas. It was estimated by the Israeli military leadership that this would have been costly in time and casualties and was not desirable (Farquhar 2010). Rocket launch capabilities were drastically reduced but not fully thwarted by the final days of the conflict (CRS 2009). Attacks were still launched following the ceasefire and Hamas was able to rearm and rebuild their ranks and infrastructure.

Israeli tactics included counterintelligence campaigns, an air of secrecy and deliberate misinformation, and the establishment of complete intelligence domination, enabling Israel to compile a "mosaic of Hamas targets" (Farquhar 2010). The opening airstrikes were devastatingly effective due to the element of surprise and the compilation of targets well in advance. The second stage of the operation, which combined ground troop advances with aerial and artillery bombardment, was designed to achieve its objectives of degrading Hamas's capabilities quickly. In fact, "the blueprint endeavored to restrict this phase to less than 10 days" in order to minimize negative consequences including troop and civilian casualties and regional instability (Farquhar 2010, 29). The element of surprise was limited by Israeli humanitarian efforts, which included leafletting neighborhoods threatened by imminent attack, telephone calls to residents, and the implementation of a period of humanitarian ceasefire during each day of the ground operation following the first few to bring in food and medical goods (MFA.gov.il 2009)

Some Israeli reserves were called up, but not for more than a few days. They took up regular infantry posts to free up regular infantry for front line combat. Some reserves limited action in the final

days of the conflict. The minimal use of reserves is important because the majority of Israeli men serve in reserves until the age of 45; that is, the longer they are called up, the longer they are not working but being compensated by the government. Long term mobilization of reserves is considered unsustainable for Israel's economy and is one of a few reasons why Israel has always preferred to fight very short wars.

Hamas's military wing was estimated to be around 15,000 strong, although PIJ and other factions fought in their neighborhoods as well. Israeli infantry troops were slightly more than a division but the use of combined air, naval, UAV, armor artillery and infantry, connected through high-tech computerized technology was a major innovation from the Second Lebanon War (Farquhar 2010). Hamas and other factions suffered heavy losses and demoralization, with desertion among Hamas fighters estimated to be as high as 90% in some areas. (Spyer 2009)

A few reasons why Israeli casualties were low and the operation was short was due to advanced planning, use of disinformation and secrecy, no gradual escalation which would have negated these two advantages, but swift decisive attacks into previously determined locations. The ability to use these aforementioned tactics stemmed from unity at the political level. The Israeli ministers from the coalition and opposition parties were united in agreement for the necessity of this operation and for how it was to be carried out. As will be seen in a discussion of Operation Protective Edge in 2014, the lack of political unity, which I argue in large part stems from political incentives created by the operationally successful Iron Dome missile defense system, was a hindrance to the adoption of the tactics that made Operation Cast Lead so successful.

Operation Protective Edge:

Operation Protective Edge took place for a total of 51 days, from July 8, 2014 until August 26, 2014. This operation was fought between Israel and Hamas as well as other groups including Palestinian Islamic Jihad, PFLP and DFLP, and various Salafi groups, with the fighting taking place in the Gaza Strip and missile fire striking deep into Israel, with rockets landing as far North as Haifa, over 95 miles from

Gaza. Hamas's rocket capabilities in terms of payload, rate of fire, camouflage of launch sites, and distance, was greatly improved since both Operation Pillar of Defense in 2012 and Operation Cast Lead in 2008/9, the last large scale Israeli ground incursion into Gaza.

Background

Although Operation Protective Edge officially started on July 8, 2014, the immediate context was dominated by US led peace talks between Netanyahu's Likud led Israeli government and the Palestinian authority. "On May 14, 2014, in a move that caught both Israel and the U.S. by surprise, Israel's negotiating partner, the PA announced the formation of a national reconciliation government with Hamas" (Goodman 2015, 9).

This unity government alleviated much of the repression of Hamas organizations in the West Bank, which had been clandestine since the Hamas coup in Gaza in 2007. On Israel's northern border, al Qaeda affiliate Jabhat al Nusra and other Jihadist groups were in control of the Syrian-controlled Golan Heights and were battling Assad. In Gaza, Hamas was being squeezed by Egypt's new President Abdel Fattah el-Sisi, who had begun to crack down on Hamas's smuggling tunnel network, thereby making it harder for Hamas to obtain, smuggled goods, weapons, gain tax revenues and pay its operatives (Goodman 2015).

It was under this pressure that Hamas began to escalate rocket fire into Israel during early June 2014, ostensibly to get Israel to ease restrictions it had imposed on Gaza after its last purely aerial conflict, Operation Pillar of Defense in 2012. Israel's policy throughout early June was one of restraint and not retaliation against Hamas rocket launch sites or military facilities. Some of these rockets threatened Israeli cities on the Gaza perimeter and were shot down by Iron Dome. (Yashar, 2014)

On June 12, 2014, Hamas Operatives kidnapped and killed three Israeli teenagers, Eyal Yifrah, Gilad Shaar and Naftali Frenkel in the West Bank. The kidnappers were brothers who were accused of operating under Hamas orders. "Saleh Arouri, a senior leader of Hamas, boasted at a conference in

Turkey that the group's military wing was behind the 'heroic action'" (Booth, Eglash 2014). In a joint operation conducted by the Shin Bet, police forces and the IDF, backed by aerial UAV surveillance, security forces entered the West Bank and conducted an extensive operation called Operation Brother's Keeper in order first to find the missing, and later learned to be killed, teenagers and capture the perpetrators.

Israeli forces were met with stiff resistance and uncovered numerous Hamas and Palestinian Islamic Jihad cells. 419 Palestinians were arrested during this operation. 59 of the suspects were previously released in the Gilad Shalit deal, and 279 were Hamas operatives (Zitun 2014). This is important to the domestic context, during which Israel refused to release a fourth batch of Palestinian prisoners from jail due to the public backlash from releasing three batches of prisoners convicted of murdering Israelis with no negotiating results from the Palestinian Authority (Connolly 2014). The arrests on terror charges of previously released prisoners demonstrated to the Israeli public the negative consequences of releasing convicted terrorists. The roundup of Hamas operatives further pressured Hamas in Gaza, leading to an increase in rocket attacks towards the end of June and Israeli responses including strikes on Hamas facilities in Gaza (Zilber 2014).

On July 2, a reprisal murder was committed by Israeli extremists, who captured and burned Palestinian teen Abu Khader alive. Israeli Suspects were arrested July 6 by Israeli police and Shin Bet. In response to the growing tensions due to Egyptian pressure, Israeli roundups of Hamas operatives in the West Bank, and tit-for-tat escalation in Gaza, with rocket launched throughout June and Israeli responses towards the end, from June 1 through June 6 Hamas fired 180 rockets into Israel. On July 6 Israel called for resuming its 2012 truce with Hamas. "On July 6 seven fighters from Hamas' special Nukba force entered a tunnel and were killed by a landslide" caused by one of the Israeli bombardments aimed at cutting off the unknown entrance of the tunnel based on Shin Bet intelligence of the threat of an immediate infiltration attempt (Harel and Kohen 2014). Hamas reacted to the men killed and launched a

heavy bombardment of rockets at Israel. On July 8 Israel announced the start of Operation Protective

Edge, ostensibly to stop rocket attacks (IDC Database, 2014).

The IDF estimated that Hamas had as many as 10,000 medium-to long-range rockets and many

more short-range mortars (IDC Datebase, 2014). The tunnel threat was largely unknown and the decision

to launch a land invasion was due to a surprise discovery and not long-term planning as in Operation Cast

Lead.

The impetus to a ground invasion came on July 17 when The IDF thwarted a major attack on

Israeli civilians near Ein Hashlosha on the Gaza border. The length and complexity of this tunnel,

reaching far into Israeli territory was given as the reason Israel launched the ground phase of Operation

Protective Edge. In the following days and weeks, a complex tunnel network reaching into Israeli

territory was revealed (Kirshner 2014). Defense minister Ya'alon and Prime Minister Netanyahu were

originally against any sort of ground invasion into Gaza. Pressure from right wing Bet haYehudi

Economy Minister Naftali Bennett led to the launching of Protective Edge after the Hamas's attempted

invasion of Kibbutz Sufa through an offensive tunnel. Bennet had been pushing for a ground operation a

week prior to the beginning of Operation Protective Edge (Harel, 2014).

Domestic context

Netanyahu was the leader of the Likud/Yisrael Beitenu Party, which was a merger of two parties,

Likud led by Netanyahu and further to the right, Yisrael Beitenu led by Liberman (Freedomhouse, 2015).

The governing coalition was weak and tested by the Kerry brokered peace talks leading up to the conflict.

Naftali Bennet, leader of the right wing religious party Beit Hayehudi had even threatened to leave the

governing coalition, which would collapse the coalition and spur a vote of no-confidence (Ravid 2014).

Demonstrating the government's vulnerability, The Knesset did eventually fall when Netanyahu fired

Justice Minister Tzipi Livni and Finance Minister Yair Lapid on December 2 of that year, months after

the end of Operation Protective Edge, leading to new elections which Netanyahu went on to win for the

Likud party by itself, thus allowing it to form a stronger coalition (Eglash and Booth 2014). Although the government did not fall due to Operation Protective Edge, the tensions during this operation were severe and impacted the conduct of the operation in stark juxtaposition to Knesset unity during Operation Cast Lead.

The Hawkish Naftali Bennet pushed for preemptive action[7] in Gaza on June 30 following the revelation of the Hamas hand in orchestrating the kidnapping and murder of the three Israeli teens. Bennet wanted to use the kidnapping and murder as an excuse to launch a surprise preemptive strike against what was known to be a dangerous tunnel threat, although the extent of the danger was not known until the actual ground operation was launched in response to the Hamas infiltration into Kibbutz Sufa. The tension between Bennett on one side and Netanyahu/Ya'alon on the other continued throughout the war. Bennett blasted their threat tolerance and fear of risk. Ya'alon considered Bennett to be to risk tolerant (Harel 2014).   Bennet relentlessly pushed the tunnel issue in cabinate meetings. Defense Minister Yaalon claimed; "the tunnel threat is one we can live with, it need not be defined as a target, at least not in this round of fighting" (Ronen 2014).

The domestic support for Operation Protective Edge was high, and continued to be high, even after dozens of Israeli casualties in the first days of the ground operation. Usually the Israeli public's threat tolerance is low. The 92% support for the war by its conclusion demonstrates that, "The sense that there is no choice is an important condition in preserving national fortitude in an intractable, protracted conflict" (Gida 2014) (Inbar 2015). Furthermore, "the achievements of the Iron Dome system contributed significantly to the ability of the home front to function almost normally" (Inbar 2015).

International context

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[7] Bennet argued that a major Hamas assault was imminent. This was later revealed by PM Netanyahu to be the case (Ronen 2014)

As is always the case in Israeli asymmetric interventions, international support is always important and international pressure builds quickly. "The majority of the international community supported Israel's right to self-defense. Part of the international credit was thanks to Jerusalem's readiness to accept every ceasefire and partly due to the somewhat reserved U.S. support" (Inbar 2015).

The regional situation in 2014 was very different from that of 2008/9. On the northern front, instead of a cold peace with a stable Syria, the Syrian civil war was ongoing and Syrian rebels, along with the al-Qaeda affiliated Nusra front were pushing towards taking control of the Syrian controlled portion of the Golan heights (Cowell 2014). The Lebanese front was for the most part quiet, a sign of continued deterrence vis a vis Hezbollah from the Second Lebanon War as well as Hezbollah's deep embroilment in the Syrian Civil War. In contrast to the stable and calm Sinai Peninsula under Mubarak's rule in 2008/9, in the spring of 2014, along Israel's long border with the Egyptian Sinai Desert, groups such as Ansar Bayt al Maqdis (now the Islamic State in Sinai) posed a threat to Israel and had indeed carried out sporadic rocket fire against Israel. These groups posed a threat against Egypt as well and have been accused by current Egyptian leader al-Sisi as working with Hamas to carry out attacks against Egyptian targets (Nashashibi 2015). The rise of ISIS in Iraq and Syria, the Houthi rebellion in Yemen and the anarchy in Libya and full scale weapons bazar of Gadhafi's massive arms depot all demonstrate a much more unstable region.

According to Dr. Efraim Inbar, "the regional political alignment was also convenient for Israel." He claims that the regional instability led to "conspicuous restraint among conservative Arab states such as Egypt, Saudi Arabia, Jordan, and the Persian Gulf monarchies (excluding Qatar), all of which were keen to see Hamas hit hard." Furthermore, the ability to work with the Egyptians as a go between for Israel and Hamas, allowed for negotiations to be conducted (Inbar 2015).

In a more global context, the EU, UN and United states were quite preoccupied with the regional turmoil in the Middle East as well as the crisis in Ukraine. On July 17 Malaysia Airlines Flight MH17 was shot down by Russian separatists in an ongoing conflict in Europe's backyard.

US support has been crucial to Israel for much of its recent history. The Israeli perception is that the Obama administration is not as supportive of Israel's defensive operations as prior administrations had been. The US ban on flights to Israel and the decision to reexamine weapons transfers as well as constant pressure to accept Qatari and Turkish truce proposals, both countries being sponsors of Hamas and providing safe haven support to Hamas leaders, particularly demonstrated to Israel the lackluster US support in this conflict (Entous 2014). Nevertheless, the US did resupply Israel's Iron Dome batteries and strategic weapons stockpiles and President Obama did unequivocally reaffirm Israel's right to self-defense during this conflict. European diplomats generally affirmed Israel's right to self-defense while issuing requests for proportionality and minimizing of civilian casualties (Inbar 2015).

Inbar notes that "it is noteworthy that great powers such as China, India, and Russia showed understanding toward Israel's situation." Furthermore, "despite international criticism of the supposed use of disproportionate force, generated by images of destruction from Gaza, Israel was able to operate militarily for fifty days" (Inbar 2015).   Similar to the backlash to Operation Cast Lead, there were major populist demonstrations against Israel, especially in Europe.

Except for the somewhat reserved US support, the global situation, due to regional instability, great power distraction, and an increase in the level of regional threats and threats from Gaza, an intense and decisive ground operation should have been more warranted in 2014 than in 2008/9. In fact, the US resupply of weapons, which was questioned and suggested to be reevaluated, would arguably not have been needed had the conflict not escalated and dragged on for more than twice the length of Operation Cast Lead.

Timeline of the conflict

Although there are certainly many important events throughout this 50-day conflict, this overview will focus primarily on important political and strategic developments. The most important events leading up to Operation Protective Edge are mentioned in the background section. The US brokered

peace talks between the Israelis and Palestinians, the reconciliation between Hamas and Fatah, the Hamas kidnapping operation on June 12[8], Israel's launch of Operation Brother's Keeper in the subsequent weeks, an uptick in Hamas rocket fire and Israeli retaliations and an uptick in Israel arrests of Hamas operatives in the West Bank all set the stage for Operation Protective Edge. On July 7 Israeli airstrikes collapsed a tunnel killing several Hamas operatives in an attempted tunnel infiltration. On July 8 Israel announced the commencement of Operation Protective Edge.

The escalation to war had been slow and Israeli retaliations had been measured, striking very limited targets in direct response to each rocket attack. Prime Minister Netanyahu is quoted as saying "Experience has shown that during moments like these, one must act in a levelheaded and responsible manner and not hastily," (Goodman 2015). This tit-for-tat escalation destroyed any possibility of an element of surprise. In the weeks leading up to the war, Hamas had already launched for the first time rockets including the M-302 with a range of 160 km, and the M75 with a range of 75 km, as well as the shorter range Grad and Qassam which were also utilized during Operation Cast Lead. The massively increased range put over 70% of Israel's population within range, including the only international airport, and the two largest cities, Jerusalem and Tel Aviv (IDC Database 2014).

When Operation Protective Edge was officially launched on July 8, with the targeting of the homes of many Hamas leaders, these leaders had already abandoned their homes and taken shelter in a complex underground tunnel and bunker network. This stands in sharp contrast to the disinformation campaign and highly damaging surprise attack launched to open Operation Cast Lead (Shamir and Hecht 2014). Following the official start of the conflict on July 8, Israel launched an air campaign consisting of targeting launch sites and other strategic assets of Hamas on a large scale. On the first night Israel hit 50 targets, including the homes of senior Hamas commanders (IDC Database 2014). The following days saw an intensification of air strikes, with the IAF hitting approximately between 150-200 targets per day.

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[8] The identities of two Hamas suspects, the Kawasme brothers were released by the Shin Bet on June 26, 2014

Throughout the air phase of the conflict, Hamas maintained a high level of rocket fire, with over 100 rockets fired per day, many long range. Iron Dome shot down dozens of rockets headed towards populated areas each day (IDC Database 2014). On July 14 Hamas launched a drone into Israel in a first time development. "The IDF intercepted it with a Patriot missile above Ashdod" (Rubenstein 2014)

On July 18, following a Hamas attempt to infiltrate Kibbutz Sufa from a previously undiscovered tunnel, Prime Minister Netanyahu announced the beginning of a ground invasion to "destroy the underground tunnels built for carrying out attacks in Israel." The operation would continue until the goals of "restoring quiet for the long term while inflicting significant damage on Hamas and the terror organizations" was met (IDC Database 2014).

In the first two days of the ground operation, the Israeli Defense Forces uncovered more than 30 tunnels, including "a labyrinth of tunnels dug 20 meters deep and running over two kilometers towards Israeli territory with multiple exits. The IDF Corps of Engineers detonated and demolished the discovered tunnels." Israeli forces continued to operate to destroy the tunnel network, launching invasions of the well-fortified neighborhoods of Khan Younis, Shajaiyeh, and Jabalya were they met stiff resistance. On July 25 Israel rejected a ceasefire proposed by John Kerry and proceeded to eliminate the Leader of PIJ's military wing as well as eight senior Hamas operatives. On August 3 Israel withdrew the majority of its ground forces after destroying 32 tunnels into Israeli territory (IDC Database 2014). On August 4 Israel resumed its pre-ground invasion strategy of standoff airstrikes. "Finally, on August 26, Hamas agreed to a month-long ceasefire with no preconditions" (Shamir and Hecht 2014). Throughout the conflict 11 ceasefires were proposed, most were violated by Hamas, or by other factions in Gaza including Salafi groups and PIJ (MFA 2014).

Military goals, tactics, decisions, political debate

As in Operation Cast Lead, Israel's stated military goals were modest. At the start of Operation Protective Edge, Israel's goals were even more modest. While the stated goals in Operation Cast Lead

were to degrade Hamas's capabilities, the stated goals at the outset of this conflict "can be summed up in one word – containment, that is a quiet border" (Shamir and Hecht, 2014). This goal changed due to intense political pressure from the right wing Naftali Bennet to counter the tunnel threat. On July 17 drone footage was publicized by the IDF spokesman of the emergence of 13 armed Hamas fighters from a tunnel just meters from Kibbutz Sufa. "This profoundly shocked the public and the political leadership" (Harel and Cohen 2014). The Israeli cabinet up until the point had been in relatively unified opposition of any ground invasion into Gaza. Following the publication of the Hamas infiltration, "Eshkol Regional Council head Haim Yellin[9], usually a moderate man, demanded in television interviews that the government order the IDF to act immediately to destroy all the tunnels" (Harel and Cohen 2014). Notably, while prior to and during Operation Cast Lead, the rocket attacks unified domestic support towards a well-planned out operation in Gaza, in this operation it was not rockets which were relatively well dealt with, but the threat of underground infiltration that galvanized public support for further military action. On July 18, following domestic and political pressure, Prime Minister Netanyahu announced the new goal of "destroying attack tunnels," "restoring quiet," and "inflicting significant damage on Hamas and the terror organizations" (IDC Database 2015).

The tactics pursued by Israel were much more ad hoc as noted in the timeline of this conflict. An important difference between the opening strikes of Operation Protective Edge and those of Operations Cast Lead was that the latter had surprised Hamas. "Surprise enabled the IDF to kill and destroy a significant number of personnel and equipment before the Palestinians employed them, shortening their endurance. This time, the Palestinians had the initiative, and the initial strikes by the IDF were less successful" (Shamir and Hecht, 2014).

These attrition tactics were a notable shift from longstanding Israeli doctrine. Maj. Gen. Sami Turgeman, "who served as southern command chief in the Gaza war," said in 2011 in regards to a future

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[9] The Eshkol region is immediately bordering Gaza.

conflict in Gaza: "We will do everything to shorten the duration of the campaign and will conduct a fast, lethal ground maneuver" (Inbar 2015).

Goodman's analysis suggests the doctrinal impact of Iron Dome from a political incentive perspective: "Between the successes of the Iron Dome system and the relative lack of damage caused by the increasingly regular rocket attacks, given the complexities of mounting a major military operation in Gaza, and despite growing internal criticism for seeming inaction, the Israeli security cabinet, on the strong advice of the military-security establishment, opted to continue a policy of restraint vis-a-vis Gaza. The hope was that ultimately diplomacy would resolve the Gaza issue." (Goodman 2015, 14).

Dr. Inbar criticized the conduct of Operation Protective Edge, claiming that "deterrence depends on military might but also on the willingness to employ force," and that "the image of Israel merely reacting to Hamas's moves, waiting each time until the last minute to see whether the terror group would oblige and extend the ceasefire, is not conducive to Israeli deterrence" (Inbar 2015).

Regarding the level of threat, a Haaretz investigation has called for a serious probe into the Israeli military and intelligence apparatus' failures to train and strategize appropriately for countering the tunnel threat, as well as political failings to take the strategic threat of Hamas tunnel seriously (Harel and Cohen 2014). Not only the tunnels, but also the level of Hamas armament, training, and cohesion, demonstrate a significant increase in threat from 2008/9 until 2014. In this conflict "Hamas displayed a wide range of combat capabilities, including new offensive and defensive tactics" (White 2014).

Finally, from a political perspective the Knesset was not nearly as unified as they were during the lead up to Operation Cast Lead. If they were relatively unified, it was towards inaction. Both Prime Minister Netanyahu and Defense Minister Ya'alon supported a policy of restraint and measured response to increased rocket attacks in the build up to the conflict, and were against any ground operation throughout the opening weeks of the conflict.

The Israeli military and Shin Bet were somewhat aware of the tunnel threat and had already uncovered 3 tunnel entrances throughout the previous year. Bennett was decidedly for using the murder of three Israeli teens by Hamas operatives as an excuse to move against the tunnel threat. "At every discussion Bennett kept hammering away "like a little Cato [the Roman orator]," but found himself in the minority." Meanwhile, "His partner on the hawkish side of the cabinet, Foreign Minister Avigdor Lieberman, was all for occupying the Gaza Strip, or part of it, and was less interested in the problem of the tunnels" (Harel and Cohen 2014). It was not until the events of July 17 that the Israeli political echelon unified behind, formed and implemented a ground invasion into Gaza, an invasion which was much more ad-hoc than the long and meticulously planned invasion in Operation Cast Lead.

A Comparison of the Conflicts

The Conflicts	Operation Cast Lead (2008/9)	Operation Protective Edge (2014)
Background	Gaza Disengagement 2004-2005. Hamas forcibly takes power in Gaza 2007. Sporadic rocket fire, retaliations, 6-month ceasefire June-December 2008. Hamas ends ceasefire December 18.	Kerry Peace initiative April 2014. Hamas-Fatah reconciliation May 14 2014. 3 Israelis kidnapped in June sparking Operation Brother's Keeper in West Bank. July 2 Arab murdered by Israelis. July 6 attempted Hamas infiltration. Throughout first week of July escalating rocket fire and tit-for-tat "measured" responses.
Domestic context	Olmert center-left Kadima party. Unpopular conflict in Lebanon 2006. Media and full political spectrum supported ground operation.	Netanyahu leader of joint Likud/Beitenu party. Weak coalition, threats to leave from the right. High public support for operation.
Regional context	Stability in Sinai (Mubarak in control in Egypt). Cold but durable peace with Syria. Hezbollah deterred in Lebanon. Pre Arab Spring.	Instability, militants in Sinai, Sisi in Egypt post Arab Spring and Morsi era. Civil war in Syria, al Nusra nearing Syrian Golan. Conflict in Yemen. ISIS in Iraq and Syria. Hezbollah involved in Syria. Anarchy in Libya, proliferation of weapons.
International context	George W. Bush still in office, Obama elected. General global lack of crises.	Obama in office, Arab Spring instability, Syrian Civil War, conflict in Yemen, ISIS, Ukraine crisis.
Timeline (major events)	Hamas ends ceasefire Dec.18. Israeli ultimatum Dec. 25. Israel launches surprise attack on over 100 targets starting the operation Dec. 27.	Hamas kidnapping June 12. Operation Brother's Keeper. Attempted infiltration by Hamas on July 6. Launch of operation after weeks of gradual escalation on July 8. July 14 Hamas drone launched for 1st time. July 18 infiltration by tunnel broadcast to media

	Large scale ground invasion January 3. Israel declares unilateral ceasefire Jan. 18 after declaring completion of strategic objectives.	leading to immense right wing pressure to launch ground invasion. August 3 Israel withdraws ground troops after destroying 32 tunnels, resumes airstrikes only. August 26 ceasefire.
Threats	15% of Israeli population within rocket range. Gaza factions able to fire up to 100 per day, mostly very short range. Hamas somewhat entrenched, small arms, anti-tank weapons, mortars, defensive tunnels, minimal tunnel threat into Israel.	75% of Israeli population within rocket range, increasing to over 90 during the conflict. Gaza factions able to fire from underground, up to 200, medium to long range. Rockets reach all of Israel's major cities and only international airport. Well entrenched Hamas with "commando units" drone capabilities, naval fighters, guided anti-tank weapons. Critical tunnel threat, severity of which discovered during conflict.
Military goals, tactics, decisions, political debate	Long planned offensive. Political unity. Political secrecy/ successful misinformation campaign allowing surprise attack. Swift military action carried out in coherent stages. 1/3 of all militants killed in opening 4 minutes. Goals to degrade Hamas capabilities and reestablish deterrence.	Originally to maintain calm, not to escalate, measured response. Eventually, to reinstate deterrence through heavy aerial bombardments. Intense political fractionalization regarding necessity and scope of ground invasion. Eventual unplanned decision to launch ground invasion due to political pressure,
Length and casualties	21 days, 1300 killed in Gaza (civilian vs. military casualties are debated), 13 killed in Israel (9 soldiers and 4 civilians).	51 days, over 2000 killed in Gaza (civilian vs, military disputed), 72 killed in Israel (66 soldiers and 4 civilians).
Defensive systems	Bomb shelters, rocket warning system (Code Red).	Bomb shelters, rocket warning system, Iron Dome (multiple batteries).

The data

In a 2015 report for the U.S. Army War College, Samaan claimed that successful missile defense

did not change Israel's offensive doctrine. He defends this conclusion by claiming that deterrence and the

Dahya principle of disproportionate offense still guides Israel Doctrine. Two of the examples cited by

this author were both pre-development of Iron Dome. The other two actually demonstrate my thesis

about a change in Israeli military doctrine from offensive to defensive in the Gaza theater of conflict. The

actual conduct of Operation Pillar of Defense and Operation Protective Edge show the opposite of what

Samaan claims about a continuing offense-based doctrine. For the former, there was no ground invasion

despite the largest concentrated and sustained volley of rockets from Gaza to date. For the latter, as

reviewed in the comparison of cases, and demonstrated by the interviews regarding the decision making

process throughout the war, Protective Edge was fought as a war of attrition, with Hamas setting the pace, and Israeli decisions regarding ground invasion being ad hoc.

Samaan agrees that Israel was historically skeptical of defensive posture and of missile defense, that Iron Dome was surprising, and the perception of its success overwhelmingly influenced the public and politicians and affected their decision making. The author states, "the apparent successes of the system in the past campaigns triggered swift passion, if not infatuation, for the whole enterprise." (Samaan 2015, p.28). He claims that this reflects the current mindset among the pundits and among both Israeli and American politicians.

Samaan also echoes the opinion of those interviewed in this study, that the strategic rationale behind Iron Dome is that effective missile defense systems provides decision makers with new options against an attack.

The interviews I conducted systematically demonstrate that Iron Dome, as a successful defensive technology, in addition to the rise of asymmetric threats, was the decisive factor that led to a change from longstanding offensive doctrine to a defensive doctrine in the Gaza theater of conflict. Other factors include: The push from developers, political considerations, and the military establishment's preferences. However, these other factors are neither necessary or sufficient for doctrinal change, and only in conjunction with the surprising success of Iron Dome does a sufficient condition for doctrinal change arise.

First, I ascertain what the long-standing Israeli military doctrine was. Second, I look for evidence for a break with doctrine in 2014 by comparing the 2008/9 operation in Gaza with the 2014 operation. Third, I explore the historical motives behind the original adoption of missile defense as a strategy. Fourth, I examine the expectations and outcomes of Iron Dome's operational success. Finally, I address the main topic of this research; Iron Dome's impact on strategy, showing a change of military doctrine in the Gaza theater of conflict.

The original Israeli military doctrine

All of the experts interviewed clearly view Israel's original military doctrine, dating back to pre-statehood and persisting through its major interstate wars and until very recently, as being offensive, with an emphasis on swift victory and avoiding attrition.

Yiftah Shapir claims that Israel has had an offense-based military doctrine for decades, in order to bring the fighting to the enemy as soon and quickly as possible, win as quickly as possible. This doctrine yielded excellent results in 1956 (Sinai Campaign) and 1967 (Six Day War). The war 1973 was a break with doctrine somewhat, as Israeli relied too much on intelligence and alert. However, 1973 was the greatest victory. This is because the IDF managed to impose offensive doctrine even after being caught by surprise.

Shapir asks, why does Tzahal (the IDF) always win? Referencing Clausewitz on friction, he proposed that the IDF excels because of culture, not doctrine, which relies on the improvisation of lower echelons. An early example of the success of improvisation is that during the War of Independence, the Egyptian military was stopped in 1948 at Ashdod by the first bombing by the IAF Messerchmidts.[10] It is not logical that two aircraft stopped a brigade. The Egyptian brigade was stopped due to Egyptian doctrinal rigidity. Israeli commanders would engage based on the situation. This is unique to Israel.

Yehuda Ben Meir also contends that early doctrine was offense based, with the intention of imposing quick, decisive victories. He claims that the early concept of a war of attrition was considered the worst possible strategy. This resonated with public opinion as well.

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[10] This case was put forth by Shapir to illustrate the juxtaposition between Israel's military culture of improvisation with Egyptian rigidity. Israeli agents purchased the Avia S-199s Messerchmidts from the Czechoslovak government, defying an arms embargo. The first two arrived on May 20, 1948, six days after Israel's declaration of independence and five days after Egypt's invasion. These aircraft formed Israel's first fighter squadron and were sent into combat for the first time on May 29 1949. They proved their worth by attacking the Egyptian army south of Tel Aviv. On June 3 Modi Alon used them to shoot down a pair of Royal Egyptian Air Force C-47s that had just bombed Tel Aviv. (Norton 2004) (Aloni 2001).

Former head of the Israeli Atomic Energy Commission, Shaul Chorev, claims that in the 1950s, and 1960s there were three elements of defense doctrine: alert, deterrence (conventional deterrence meaning the threat of cost imposition), and the limited window for quick victory due to expected diplomatic pressure. In the 1990s after the Gulf War scud attacks, a 4th element was introduced, missile defense. Arrow 1 became operational in the late 1990s. Chorev claims that the IDF establishment has traditionally been against missile defense although higher political echelons introduced missile defense and the systems were subsequently integrated into military strategizing.

Evidence for a break with doctrine in 2014 (comparing the 2008/9 operation in Gaza with the 2014 operation)

Retired Colonel and former commander of the Golani Brigade, Gabi Siboni, claims that Operation Cast Lead was the result of two things: A perception issue of the Second Lebanese war; the army was accused for not being focused enough, having poor maneuverability, and of poor combat performance. This he claims was a psychological issue. The second reason the operation was launched was to decay the launch capabilities of Hamas. Air raids did not achieve the final goal of decaying launch capabilities, so a ground invasion was launched. This shows a continuance of an offense-oriented doctrine that favors preventative action against a perceived buildup of threats. In Protective Edge the decision was to wait for the air force, which again could not achieve the goal of decaying Hamas's launch capabilities as well as the decision to deal with cross border tunnels and to try to break the resistance of Hamas.

Whereas the decision to launch a ground invasion came in the opening week of Operation Cast Lead, the decision to launch a ground invasion came much later in Protective Edge, arguably due to the success of Iron Dome in protecting the home front. The level of threat from Gaza was much higher than in the previous operation, with Hamas much more entrenched and with far greater offensive capabilities including more and longer range missiles. Siboni agrees that "in 2014 the capabilities of Hamas were much greater, including: enormous force build-up, tunnels, firing capabilities, and new tactics."

Operations in the air and on the ground were more reactive and ad hoc than in Operation Cast Lead, where Israel opened the conflict with a critical blow, an attack on Hamas military academy and police academy, killing around 500 Hamas and PIJ operatives. In Protective Edge, proportional responses to rocket fire, and no opening blow, allowed Hamas to set the pace in a tit for tat escalation following the West Bank Operation Brother's Keeper which targeted Hamas members involved in the kidnapping and murder of three Israeli teens on 12 June 2014.

It is important to note that there were no specific political events that led to the use of ground forces in Cast Lead. Political pressure from the right led to the use of ground forces in Protective Edge. This implies a unified political decision making process when it came to making the costly decision to send ground troops into Gaza in 2008/9, showing the dominance of an offensive military doctrine. In the 2014 conflict the decision to launch a ground invasion was politically contentious and due in large part to pressure from the right. The government was actually more hawkish in 2014 under Netanyahu than in 2008/9 under Olmert but the decision to take offensive action was more contentious. This again could arguably be due to the existence of an alternative to degrading Hamas's launch capabilities, namely the ability to quite successfully protect the home front with Iron Dome

There was no Iron Dome in Operation Cast Lead. It was first operational in Pillar of Defense (2012). Yiftah Shapir states that in 2008/9 a ground operation was launched due to the threat of rockets. At this point the offense doctrine was not yet abandoned. The idea was that a ground offensive can eliminate rocket launching capability. Another reason for the ground offensive was attacking in order to build up deterrence. "Conventional deterrence works very differently than nuclear deterrence. It must be maintained, and is never as absolute as MAD." Yiftah claims he can only assume that the IDF had contingency plans for the Cast Lead invasion. However, in regards to Operation Protective Edge, he claims that no one wanted a ground invasion in this war, not Israel or Hamas, events led to it, then there was a quick escalation. Yiftah states that this operation was probably more ad hoc than Cast Lead. In

2014, planned attacks on communities from tunnels was a new revelation which was used by the Israeli right wing to exert political pressure in favor of launching an offensive.

According to Yehuda Ben Meir, Iron Dome made attrition more to Israel's advantage, a complete reversal of the strategic reasoning behind Israel's past doctrine.

Chorev also contends that Iron Dome gave more freedom to delay a ground offensive until they gained justification from the international community. He claims this is similar to gas mask distribution after the Gulf War, in that it allowed the decision makers freedom not to take decisive action in response to every initial attack. He claims that this freedom of action minimized casualties on both sides of the conflict and minimized international fallout.

Chorev explains, that between 2008 and 2014 there was a gradual change in threat tolerance due to other escalations which allowed testing, operational evaluation and the green light to continue developing Iron Dome batteries, as well as a generous budget from the US. In essence, the success of Iron Dome allowed for continued funding, especially American funding, and an increase in the level of threat tolerated from Gaza.

Adoption of missile defense as a strategy

According to Yiftah, the last true example of offense based doctrine was the first Lebanon war (1982). Doctrine is no longer offense based. Israel never had defensive systems until the 1991 Gulf War Scud attacks. Scuds led to Patriot battery acquisition.

Yiftah recounts that the Arrow missile defense research and development began in 1984 as Israel joined the project of SDI defense with Reagan. The IAF did not want this. American money pressured Israel to design the Arrow. The IAF was offense-based, and did not think missile defense necessary. This parallels the British decision against attempting to develop a method of shooting down V2 missiles from Germany during WWII. (Stocker, 2004). The opponents of the systems even within the establishment always said that defensive systems are limited.

Ted Postal (Physics professor in MIT) argues against missile defense in the US context. Moti Sheffer used to work for Rafael as a missile engineer. He claims that Iron Dome does not work at all. According to Yiftah this is a conspiracy theory. "He developed a different system which was rejected in favor of Iron Dome. He then quit, was bitter etc., he is an expert in missiles though."

Yiftah compares the nuclear threat and the conventional threat in terms of deterrence. "The US missile defense argument is: in the context of nuclear warfare, since there is no real defense, and since against the nuclear threat you need 100%, not 99.999999999, defense is not worthwhile, so deterrence should be pursued as the main strategy. The mainstream consensus in Israel is that there is no 100% defense against missiles, however, when dealing with a conventional missile threat, it is good to have a system that works somewhat."

Chorev recounts: former Defense Minister Amir Peretz approved the Iron Dome project in 2006/7 as a solution to solve the threat of short range rockets, on the basis of cost-benefit analysis. The arguments against it from the military were that it led to a tradeoff between attack and defense, that it would take money from other units, and that it was not a perfect solution. According to Chorev, today the minority of military leaders are against missile defense after its operational success in Operation Protective Edge.

Expectations and outcomes of Iron Dome's operational success

Demonstrating that at least in the general public as well as in the political echelons, Iron Dome exceeded expectations, is critical to showing that it was not pursued as a technology due to an already existing defensive doctrine, but rather that its surprising success led to a shift in doctrine. Chorev claims that Iron Dome's success clearly exceeded expectations.

Siboni claims that Iron Dome exceeded expectations. This means the system exceeded expectations in its overall ability to influence the operational situation.

Shapir claims that most observers expected Iron Dome to work. The political echelon celebrated Iron Dome's success, but Yiftah does not know if they had prior expectations. The higher IDF echelons probably assumed that Iron Dome would be about as successful as it was, probably a bit less.

According to Shapir, the success rate is around 76%, "this is wonderful." "Even with such good results, the damage from the rockets is the same in the bigger picture, regarding damage to the economy, tourism, investment, etc. So, the total damage is just the same.[11] The solution is either offense or peacemaking." Even highly operationally successful missile defense does not, in Shapir's view, provide a solution to the damages of being under fire. If the damage from rockets is about the same but Iron Dome forestalls the decision to undertake either an offensive to reestablish deterrence and degrade capabilities or pursue a peace treaty, these possibly perverse effects demonstrate the political impact of a successful defensive technology.

Iron Dome's impact on strategy showing a change of military doctrine (in the Gaza theater of combat)

Siboni contends that Operation Protective Edge went on for so long due to a reduction of internal political pressure by a successful Iron Dome. Iron Dome generated more degrees of freedom for the decision makers, not only in the case of defense, but also through reducing political pressure. "Iron Dome will not be able to supply this operational or political freedom in a war with Hezbollah." Iron Dome is not expected to be able to contend with the level of fire from Hezbollah and thus Israeli strategy in this case is much closer to original Israeli doctrine, no gradual escalation, and immediate maneuver and fire with the goal of imposing a decisive blow on their capabilities as quickly as possible. It is important to note that this implies that if Israel did have a defensive technology capable of contending with Hezbollah's arsenal and providing the political degrees of freedom that Iron Dome provided in 2014 in

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[11] The damage to the economy through impacting tourism, mobilizing reserves and the home front, and inability to operate businesses, especially in the southern part of Israel, meant that even with a highly successful missile defense system, the damage to Israel's economy makes inaction an unsustainable option.

the Gaza theater of operations, then the impact on doctrine might be similar as well. As of now no such system exists, although success of missile defense in Gaza as well as successful trials of other complementary systems such as David's Sling and Arrow III, point to more research and development of defensive systems in the future.

Shapir also emphatically claims that Iron Dome gave the political echelon more breathing room, making a ground offensive less likely. Shapir agrees with Gabi about the political and military calculation of Iron Dome's ineffectiveness against Hezbollah's arsenal, and the current Israeli contingency of dealing with a war on Hezbollah according to offensive doctrine with the aim of imposing a quick and decisive defeat and avoiding an attrition scenario.

Siboni further notes that, in his opinion, technology normally shapes doctrine. "Defense contractors push force users to introduce technologies. In most of the cases the technology is created and the need is identified before the doctrine shifts. Doctrine adapts to technology. Big contractors are more influential and have more power than the actual officers and soldiers who develop doctrine."

Chorev also addresses the issue of development incentives. The armed forces establishment trained on past equipment, which is an impediment to technology innovation (e.g., the debate over the need for manned aircraft). "The Israeli experience is that the establishment is against new technologies such as UAVs, and the Arrow project. Promoters push technology, if they get funds they promote their profits and reputation, this effects decision makers, taking into account the motivation of technology companies (industries) and impediments from the branches of the armed forces." There are conflicting motivations for the defense and weapons industries versus the military establishment. Because the military establishment is skewed against the adoption of these new technologies, their operational success is crucial to whether they are adopted and thus influence doctrine.

Shapir discusses how Gadi Eisenkot (now chief of staff), when interviewed in 2010 said, we now have two batteries of Iron Dome, stationed and deployed according to necessity, to defend strategic assets

(bases, power stations etc.)[12] The political reaction to this deployment was overwhelming. Mayors went to the Knesset, and within a month Iron Dome was deployed to defend cities. Shapir claims that this shows that "these systems are political more than they are military." "A leader cannot say there is a technical capability to defend but strategy suggests to do otherwise. Such a leader would not withstand the next elections."

Iron Dome is a critical component of a new five-layer defense doctrine against missiles: 1. shelters and alert, 2. Iron Dome, 3. David Sling, 4. Patriot, and Arrow, and 5. offense as the upper layer of defense.

Shapir claims that Iron Dome has had an impact on Israeli military doctrine. There were plans to buy more, the number of batteries were rushed into operations and increased.

New recruits wanted to volunteer for Iron Dome. Shapir recounts, "In my time people wanted to become paratroopers." The military budget has shifted towards closing down reserve, infantry, and armor. Iron Dome and home defense is growing, and new units are being opened. The emphasis is becoming more and more on defending the home front.

Ben Meir claims that people criticize Iron Dome, saying that had it not been for Iron Dome, Operation Protective Edge would have been shorter. Yehuda calls this a stupid argument. He contends that while this is indeed true, Iron Dome enabled Israel to end the war with minimal cost. This is critically important because it shows a clear break with longstanding doctrine dominated by the early concept that war of attrition is the worst possible option. This was not only longstanding military doctrine but public opinion as well. With the success of Iron Dome, the IDF changed this doctrine because now attrition was costlier for Hamas than for Israel.

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[12] Iron Dome was originally developed with the intention of protecting hard targets, including strategic assets such as: oil rigs, chemical facilities, air bases and command and control centers. Iron Dome's use after being shown to successfully shoot down incoming missiles has been to protect soft targets, specifically population centers.

Yehuda claims that the majority of the population were against reoccupying Gaza in 2014. They were for stronger military action but not reoccupation. He alluded to the argument that the natural endpoint to an offensive might be reoccupation, which would be costly and undesirable. He also claims that Protective Edge and Cast Lead were not wars like interstate wars, only minor military operations. While it is true that these wars were not interstate wars, the level of fire, coordination, tactics and entrenchment in Gaza as well as duration, economic disruption, mobilization and casualties for Israel, especially in 2014, are indicative of a costly large scale operation if not a war. The latest war in Gaza lasted eight times longer than the Six Day War, and the home front was exposed to more fire.

Ben Meir claims that north of Ashdod life continued as normal. This is only partially true, considering the major impact on tourism, reserves mobilization and even the temporary closing of the only international airport, all of which affected the entire country.

Ben Meir claims that doctrine has indeed changed due to the success of Iron Dome, but he contends that this is a change for the better in terms of overall strategy. He bases this on the fact that Hamas accepted Egypt's resolution from beginning of the war, a resolution that they originally rejected. The reluctant acceptance of terms they previously rejected, after 50 days of fighting, demonstrates that Hamas was forced into submission due to the 50 days of attrition hurting them far more than it hurt Israel.

Ben Meir further claims that strategically, it would have been better when fighting a war of attrition, to temporarily evacuate regions directly bordering Gaza, within mortar range. Political decisions such as not to evacuate the areas in the range of mortar fire from Gaza (which Iron Dome cannot protect against), are due to long held normative beliefs against abandoning any land, beliefs that influenced how Israel fought its interstate wars since the 1948 War of Independence. "Public opinion takes time to adjust. Now the majority of Israelis are against a war of attrition, in time this will change."

Chorev contends that if there were not those who realized the need to bring in missile defense to doctrine, Iron Dome is showing that this fourth element is justified. This could however lead to a change

in tactics on part of the adversary. We cannot ignore motives of adversaries. Tunnels were developed as a response to Iron Dome as an additional option to impose insecurity on Israeli civilians.

Furthermore, it must be noted that in asymmetrical warfare, more should be invested in defense, (not just missile defense but all defensive elements). Keeping in mind a limited budget, this might affect offensive capabilities, but there is no state entity in the region that required better offensive technologies because decisive victory is no longer on the table. In essence, the rise of asymmetric warfare greatly influences the new doctrine. The adoption of missile defense as a new component of doctrine does not belie the need for a political solution, nor does it make a political solution less likely. The defense apparatus continues to increase in cost. However, it is important to note that 2008/9 and 2014 are both cases of asymmetric warfare.

Conclusion

The interviews with the experts confirmed an Israeli original and longstanding offensive military doctrine that emphasized quick and decisive victories and the avoidance of attrition at all cost. They provided evidence for a break with doctrine in 2014 by comparing the objectives and political considerations as well as the strategies employed in 2008/9 operation in Gaza with the 2014 operation, clearly showing that in 2014, post-operationalization of Iron Dome and its demonstrated success, policymakers had more leeway and less pressure to launch or even prepare a decisive offensive. This was the case even though the government was arguably more hawkish in 2014 under the right wing leadership of Netanyahu then in 2008/9 under the centrist Olmert. The interviews also suggested that, historically, missile defense was pursued without doctrinal consideration due to American collaboration, and was originally fought against by military leaders.

The experts interviewed generally agreed that Iron Dome's exceptional performance was unexpected, although more so to the political echelon and the public than to its developers, which should

not be surprising. The political echelon makes the ultimate decisions on strategy, and the fact that Iron Dome impressed them and their constituents, drove its further development and incorporation into doctrine. Finally, Iron Dome has been shown to have had a substantial impact on strategy, showing a shift in Israeli military doctrine in the Gaza theater of conflict towards a defensive doctrine where Israeli policy makers deems a war of attrition to be in its advantage for the first time in its history.

By demonstrating that Iron Dome's operational success was surprising, and that longstanding doctrine changed in the aftermath of its induction into Israel's strategic arsenal, the cases of Operation Cast Lead and Operation Protective Edge clearly demonstrate the ability for technology to affect doctrine in asymmetric warfare. Although this is only one case, it establishes that an exogenous change in technology can influence doctrine. Although states still must be prepared for interstate wars between symmetric rivals, this finding is critically relevant to the present, where rapid advances in technology, as well as the rise of asymmetrical threats, make longstanding doctrine less relevant to the modern battlefield. The rapid advancement in the development and deployment of drones in the American-led War on Terror has arguably impacted strategy as well, and further research could be conducted to demonstrate how this case of technological innovation has impacted doctrine. Demonstrating how Iron Dome has shaped Israeli doctrine opens the door for research into how missile defense and other types of technology can effect doctrine in varying circumstances, and how a change in doctrine can impact strategic outcomes such as likelihood, duration and intensity of conflict.

Appendix

Interview questions

1. How would you describe Israel's military doctrine historically and today? Has it changed in any respects?
2. In Operation Cast Lead, what actions, events or series of events led to the decision to launch a ground campaign?

3. In Operation Protective Edge, what actions, events or series of events led to the decision to launch a ground campaign?

4. What factors were the main political debates centered around regarding the pros and cons of launching a ground invasion in Operation Cast Lead?

5. What factors were the main political debates centered around regarding the pros and cons of launching a ground invasion in Operation Protective Edge?

6. What in your opinion were the major similarities and differences in the security threat situation in 2008 versus 2014?

7. What in your opinion were the major similarities and differences in the political situation both domestically and internationally in 2008 versus 2014?

8. Why was missile defense chosen as a military technology project, what were other alternatives?

9. What were the expectations for the success of Iron Dome, and were they met? Where they surpassed?

10. What is your assessment of the tactical success of Iron dome?

11. What is your assessment of the impact of Iron Dome on strategy?

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