

**Is the Pen Mightier than the Sword:
Do literacy rates help predict cooperation or conflict?**

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Abstract

Education is considered an important component of social cooperation and peace, but does the way we measure educational attainment actually describe cooperation and conflict? We will explore three major theoretical drivers of conflict, human needs/identity, governance, and economics, explaining strengths and weaknesses of each. Since none of the three exclusively describes conflict, we will use Robert Axelrod's concept of the 'shadow of the future' to analyze them as three parts all acting together to drive cooperation or conflict in a society. Since education is critical to all three components operating effectively, we will test how literacy rates, a standard measure of educational attainment, statistically describes the shadow of the future. To close the paper we will look at where the standard definition of literacy is sufficient, and what techniques and theoretical approaches could help us expand the definition of literacy to better describe contexts where the shadow of the future is non-existent or only starting to grow.

Introduction

Education is considered a critical component of peace and stability, but how well do our indicators of educational success describe peace and conflict? Human needs, governance and economic stability are indicators of cooperation and peace, and propagating these three factors in a society requires citizens to be educated and literate. We will start with an in-depth review of how these three sectors affect stability and conflict, addressing strengths and weaknesses of the theories. Since all three of these factors play a role in the likelihood of peace and conflict, we can assume that when all three are working well, cooperation can be expected, and peace will persist. Robert Axelrod refers to this expectation of future cooperation and interaction as the shadow of the future (2006). When this shadow is longⁱ, a population has the capacity to maintain social cohesion, has good governance systems and has a stable economy; a long shadow of the future contains the descriptors of cooperation and peace in a state. When the shadow is short, non-cooperation and conflict is more likely since there are limited expectations of future interaction between people or institutions. We will use the shadow of the future as our conceptual description of the likelihood of stability or conflict. This serves a dual purpose; the first is that it represents a sphere in which all three indicators of peace or conflict are actively shaping community behavior, and setting a foundation onto which we can lay out the value of education and literacy within this sphere.

Since education is foundational to the social, governance and economic factors inherent to the shadow of the future, this study will take literacy rates, a traditional indicator of educational attainment, and will test how it describes our shadow of the future. The first four analyses will address the relationship between literacy rates and societal, governance and economic indicators, and a quantitative value of risk of engaging in violent conflict. The fifth

test will be a logistical analysis of whether literacy rates effectively describe short and long shadows of the future in a state.

After completing the statistical analysis, we will discuss how well the current definition of literacy describes the shadow of the future. We will then address how the field of contextual literacy can help inform the design of an educational indicator that encompasses the individual and group capacities needed to lengthen the shadow of the future in restive or post-conflict regions to achieve reliable cooperation and sustain peace. We conclude this paper with a set of proposals for how to move forward with educational development policies in conflict-affected settings.

The Causes of Conflict and Peace: Theories and models

By organizing the theories of what drives conflict, a more effective analysis of how educational indicators could predict stability can be undertaken. This paper focuses on constructivist and materialist sources of conflict. Constructivist sources of conflict tend to be varied and are more qualitative in nature; these include competing histories, identity and culture, and to a certain degree governance. Materialist drivers include access to natural resources, economic interests, territorial gains and access to licit and illicit markets. The first source of conflict or stability we address is the ability of individuals and groups to form positive societal identities, and is very constructivist in nature. Governance, the second source of stability or conflict, has both materialist and constructivist facets. The final area of focus, economics, is primarily materialist in nature.

Human needs and identity

A core component in conflict theory involves the ability to self-actualize, to find a place in society and a means of living that is both materially and spiritually satisfying. At the root of this concept is Maslow's needs hierarchy, a pyramid depiction of what people need to live at varying degrees of satisfaction (Maslow, 1943).



Figure 1. Maslow's Needs Hierarchy

At the foundation, we find basic needs like food, water and material goods. These basic elements are needed for survival. Above these are safety and security; as long as we have the ability to meet the material needs of survival we need to know that we can rely on a safe environment. It is self-evident that life is better when one knows that food stores are not going to be pillaged, and marauders will not burn down one's house. As we move up the pyramid, we encounter an area called 'self-actualization.' When our material and security needs are met, we then have the chance to find education and work that satisfies our material and security needs, but also nourishes one's soul, so to speak. At this level of the needs pyramid an individual experiences existential satisfaction and 'peak experiences'; very few people achieve this level of satisfaction and are often left perpetually searching for more (Maslow, 1943).

From Maslow we move into early concepts in peace studies that focused on human behavior. Relative Deprivation theory addressed lateral inequalities between groups of people, where one group within a society was systematically given access to the material needs of life while another group was excluded from equal access (Gurr, 1970). This theory assumes the excluded group will rise up violently. While the theory itself was discarded in its original form in the 1970s due to problems with proving it through empirical means, it is still considered valuable to social psychologists that study conflict and was significantly modified later by Gurr (Brush, 1996). The inherent thinking in relative deprivation theory, as it explained collective violent behavior, is still useful and has been adapted to inform more modern concepts of Human Needs theory (Brush, 1996). Later adaptations of Relative Deprivation focused on minorities and violence, and on empirical research of what drove them to protest or act out violently. A mix of defending identity, lateral material inequalities and a loss of autonomy created high-risk grievances (Gurr, 1993). How government and institutional change addressed these grievances was determinate in the outbreak of either non-violent protest or violent rebellion (1993).

Though Gurr moved away from Relative Deprivation in its original form, the concept of meeting human needs continued to be explored through a social psychological and humanist lens. While balancing asymmetries in access to material and economic means can lead to stability, it is not sufficient in and of itself; social reforms also must address human needs and create space for people to be active citizens (De la Rey, 2000). This desire for active citizenship could be explained using the ontology of Revolutionism. People will make an effort to break away from the inadequate standards of the immediate to form a new order that meets the possible needs of society (Said and Collier, D., 1971). Revolution is an effort to rapidly remove the

vestiges of the past, so that an approach to governing that meets immediate and future needs can be put into effect (Said and Collier, D., 1971).

From Relative Deprivation and Revolutionism, we begin to see the foundation for Human Needs Theory. Similar to Relative Deprivation, the thinking focuses on collective action-based conflicts, but is more akin to Revolutionism in how it focuses on human needs, such as inclusion. In combining these, it creates a basic systematic foundation for development and conflict resolution. An important distinction between Human Needs and Relative Deprivation is that Relative Deprivation derives from a rational choice framework, and focuses on why groups descend into violence. Human Needs explores where conflict can occur when peoples' needs are not met, but also provides analysis of the means and methods for building and maintaining peaceⁱⁱ.

Conceptualizing cooperation and peace humanistically allows development to occur with the end goal being the improvement of life for the client, as opposed to program design and management as an end in itself (Galtung, 1990). When development occurs in a way that allows the recipients of aid to begin living improved lives independently, conflict risk goes down as people can meet their own needs as they go through the process of self-actualization (1990).

Identity also plays a role in human needs theory. How groups interact can be based on how groups perceive their position relative to one another (Fisher, 1991). The relationship between two groups can be positive if things such as mutual respect, recognition of minorities, and cooperative problem solving structures that reward movement toward shared goals is in place (Fisher, 1991). Interestingly, there is a facet of rational choice built into this; the manipulation of the costs and benefits of cooperation need to be arranged so that cooperation and mutual respect create the most utility for the groups involved. This would lead to a question

about whether the social psychological aspects of these positive interactions are ‘hard wired’ into the nature of the actors, or whether exogenous conditions create an environment where cooperation is the better option vis-à-vis conflict.

As Brush notes, in spite of the empirical problems with Relative Deprivation and Human Needs Theory, social cohesion and identity generally are a significant factor in the outbreak of violent conflict and the creation of sustainable peace (Brush, 1996). However, human needs are a part of the equation, not the sole descriptor of why conflict occurs. Because human behavior is difficult to quantify, alternative analyses began to focus on the exogenous factors in conflict areas.

Governance or lack thereof

Governance and government are important factors in conflict and peace building. The quality and nature of governance adds a helpful linkage between the human and economic drivers of violence. Governance can be an explanatory variable for uprisings focused on human needs or economic failures. For example, the mere existence of lootable resources does not predict violence; but a government that is unable to equitably distribute wealth from the sale of those resources, or control who is extracting and distributing them could soon find itself being driven out of office violently.

A classic concept of how stability and peace are maintained is the democratic peace, or liberal peace, theory. Early observations of parties involved in all the wars from World War I through 1963 showed that non-elective governments were more likely to be involved in violent conflict, leading to a conclusion that having more elective governments would lead to greater instances of peace (Babst, 1963). Liberal peace theory describes these interstate wars well, but

does not describe modern intrastate conflict. Anocracies are consistently shown to be prone to violence and civil war. Fearon and Laitin define Anocracies as states with central governments that are too weak and/or corrupt to administer their territory, while displaying some autocratic and democratic features (2003). An example is the Democratic Republic of Congo (DRC). The DRC has a central government, but it cannot control vast amounts of its territory due to institutional weakness and a lack of state infrastructure.

Without getting into a debate about the efficacy of Democratic Peace theory or the contentions that anocracies do not predict civil wars, it is reasonable to assume that well implemented representative governments are generally stable, and weak, corrupt governments are generally unstable, creating opportunities for rebellion and civil war, or regional instability and interstate conflict.

Two continental neighbors, Botswana and Democratic Republic of Congo (formerly Zaire), are examples of the good governance/bad governance comparison. Since independence, Botswana's government focused on making sure their diamond trade has benefited the population and supported infrastructure development. During Apartheid in South Africa, Botswana was not involved in civil or intrastate wars when all its immediate neighbors were. Conversely, in the DRC (Zaire), Mobutu Sese Soko maintained a corrupt, weak government that never developed the country; during his 30-year reign, there were two large-scale rebellions in the Shaba region and a civil war finally unseated him from rule (Ndikumana and Emizet, 2005). While governance is not the sole descriptor of conflict outbreak in this case, it remains an important factor.

Economic and material drivers of conflict

Economic and material drivers of conflict fall into a more rationalist, positivist definition of how conflicts start and are sustained. As the risk of interstate symmetric conflict has decreased since the 1950s, theories of what drives increasingly common civil conflicts have become more challenging for political scientists to rationally model (Levy, 2007).

Recent models of conflict behavior focused instead on non-human variables that exist in the localities of violence, as opposed to trying to define and quantify human decision-making. Human behavior models focusing on deprivation of needs, which proved problematic to empirically support, gave way to economic and material analysis. Much of this modeling is based on the accessibility of extractable, or 'lootable' resourcesⁱⁱⁱ, access to funding from diasporas, and the development of criminal enterprises that emerge within the conflict as economic players which are then difficult to unwind when wars end (Collier, P. and Hoeffler, 2001). In this respect, these efforts are an alternative way of measuring rational decision-making; combatants make ad-hoc cost-benefit analyses of whether they will derive greater utility from continuing to fight or coming to the peace table.

Land and geography also play a significant role in the way conflicts start and continue. A great deal can be predicted based on distances to borders from capitals, population density and ethnicity, and the location of extractable resources (Buhaug and Gates, 2002; Buhaug and Rød, 2006). In terms of the drivers of civil wars, secessionist or revolutionary intentions are often correlated with whether the insurgency is based near a state border or capital city (Buhaug and Gates, 2002). Revolutionary efforts, where the goal is to unseat the government are often based near the capital, while secessionist efforts usually operate closer to borders where the reach of the government is more limited and self-governance might be preferred (Buhaug and Gates,

2002). These predictive factors form a foundation of thinking about violence and war from an instrumental standpoint, which has been shown to be most often associated with economic drivers, such as control of natural resources and funding from diaspora populations.

While these aggregate models and state-level studies provide good information on conflict behavior, there are microeconomic drivers at work in war zones too. Fighters make decisions about whether to join a militia based on opportunity costs; if there is nothing else to do and your options are to continue running or to fight and be fed, it is likely that one would find positive utility in joining a group and fighting. Fisher's (1991) social psychological concept of finding acceptance within groups could in this case be an argument for why an individual stuck in a war zone would make a choice to join a militia, as opposed to finding peaceful means of conflict resolution; if not for material satisfaction, there is something to be gained from *esprit du corps*.

A case of choosing to fight due to lack of alternatives can be seen in the eastern DRC. The conclusion that young men fight for lack of better alternatives can be seen in the case of Ngoy Mulunda, a pastor in eastern DRC who trades bicycles and housing materials for guns (BBC, 2006). Mulunda was successful in convincing fighters to turn in their weapons, while the United Nations mission had encountered resistance to their forcible disarmament program (BBC, 2006). While there are a number of analytical problems with assuming this example is a universally descriptive (fighters could be handing in stolen or redundant weapons, or could be turning the bikes around to buy a new weapon upon arriving in a new locale), it is an example of how changing an individual's economic decision-set can lead to the fighter potentially using a bicycle or housing materials to settle into a non-violent lifestyle.

Integrated conflict theory and the shadow of the future: framing education and literacy's role in the process

The three theories of conflict are all recognized as important factors in analyzing the outbreak of conflict as well as where peace and stability will be sustained. However, they do not explain everything in and of themselves. This point is critical, since in all cases researchers have been able to find fault in all the assumptions about Relative Deprivation/Human Needs theory, economic and environmental drivers, and government type as they relate to violent conflict and peace.

Thus, one could conclude that there is no panacea, no silver bullet, which describes violent conflict perfectly. All three of these areas describe different, integrated factors in a population's shadow of the future, the likelihood of cooperation or potentially violent non-cooperation. A combination of the three variables acting in concert with one another could help tie together the three theories of conflict. Below is a visual image of the shadow of the future containing social, governance and economic variables. We can call it the Peace Theory Cyclical (PTC) model. Below the model are the definitions of the four steps.



Figure 2. PTC Model

The three variables above represent the three aspects of conflict theory expanded upon: 'HumHap' represents human needs aspects of peace and conflict, 'Gov' represents governance,

and 'Econ' represents economic factors that relate to conflict. This model is defined in the following four sections:

1. Human Needs Theory takes into account not only instrumental needs, which Deprivation Theory focuses on, but also on needs related to identity (Fisher, 1991). A group with a positive identity then develops general needs which can be met by a governing structure. Imposed government structures are unlikely to work effectively (Ottaway, 2007), as seen in Iraq and Afghanistan, and during the Arusha Accords process in Rwanda in 1994 (McDoom, 2009).
2. A functional government that exists based on organic development from a group with a positive identity provides security and services, meeting peoples' basic needs on the Maslow hierarchy; assuming that positive identity in population includes popular participation in government, then instrumental needs will be met, satisfying Gurr's relative deprivation theory. This is a continuous loop; basic needs are met by the government and positive identity within the population leads to active involvement in governance.
3. When basic and identity needs are met, the opportunity to move toward economic growth becomes possible. Governance allows people to feel secure enough to innovate; this is important within the framework of peace and conflict theory, since Collier and Hoeffler's data showed that countries with non-diversified economies that were heavily reliant on the rents associated with primary commodity extraction and export were at higher risk of violent conflict (1998). Should a market for a commodity decrease, so too do the number of jobs that come with extraction and export, lowering the opportunity costs of joining a militia or insurgency.

4. A functional economy creates revenue for the government in the form of taxes. This revenue can then be used by the government to provide security, safety and social services that are best dealt with as group needs, which allows citizens to continue being economically entrepreneurial and individually creative, helping support positive personal identity. Revenue for a government also guarantees a structure for conflict resolution and law making in a way that reflects peoples' identities and inter-group relationships.

All three of these drivers must be operating to sustain peace and when one falls out of equilibrium, the risk of violence increases. In place of assuming that one theory describes violent conflict and the others are inherently flawed, we assume that they all describe important factors that lead to violent conflict or cooperation. Since this model describes a cycle of events, all of which provide a means for increased interaction between groups and individuals, the more this cycle can occur the more likely the manifestation of cooperation and peace (Axelrod, 2006). Inherent to this cycle, which represents our shadow of the future, is the need for an educated population.

In deeply divided societies where warfare has been normalized, historical narratives that are attached to identity can pose a serious threat to peacebuilding efforts. Education and the development of history curricula that address these competing historical narratives can be a strong indicator of the role that education will play in post-conflict stability (Cole and Barsalou, 2006). Histories of conflict often lead to de-humanization of the other and existential conflict, where the in-group's identity can only survive if the out-group is eliminated (Zartman, 2008; Maiese, 2003). Normalizing how the teaching of history manages the ways that all sides are victimized during violent conflict can be critical for breaking down

these existential barriers between different identity groups. When groups become cohesive, governance must be established.

Education is valuable within a liberal government framework because it empowers the *whole population* to be involved in the governing process. Once people are literate, they become empowered; since this empowerment is based on decision-making ability (Abadzi, 2004), the ability for those who become literate to effectively participate in government should increase, increasing the quality of governance generally. As government provides safety, security and means for addressing group needs, economic opportunity can grow.

Economic opportunity provides opportunities for cooperation, but without an educated population, the pool of workers is limited. Providing educational opportunities for all ages and skill sets is critical to having a diverse and able workforce. Different educational tracks should also include non-academic tracks, such as vocational education. By maintaining diversity in educational tracks, we can help maintain diversity in the labor force and avoid the trap of relying on one sector for economic growth.

Across the three sectors that make up the shadow of the future, we see that education plays a critical role in all three, and is inherent to a population's capacity to perform the different facets that make up a state or region's shadow of the future. Based on this theoretical analysis it is apparent that education is important to sustained cooperation and peace, so the question we now address is whether a primary indicators of educational success, literacy rate, effectively describes the components of the shadow of the future, as well as the shadow itself.

Assumptions and Statistical Analysis

This section is a statistical analysis of the relationship between stability as defined by the PTC model and the levels of literacy. Literacy rate is selected as the proxy for education because it describes educational attainment across the population as a whole, rather than the school-age population alone. Literacy promotion is often the focus of educational reform and development projects designed by the Peace Corps, World Bank, UNESCO and other development organizations. Since these projects are meant to enhance education and learning, and education is assumed critical to the success of peacebuilding efforts, the goal of the statistical tests is first to explore how literacy rates relate to the three variables in the risk model that defines the shadow of the future. We will then test literacy rates against predictive indices of future risk and the actual occurrence of conflict. The question we aim to analyze, knowing that education should be a critical factor in peace and stability, is whether the risk of violent conflict decreases as literacy rates increase.

Data sources and methodology

Data on literacy rates were initially collected from UNESCO's statistical database using a customizable online table, where the user selects data for literacy rates, years and countries and the UNESCO software produces a chart of the information (2009). We searched for literacy rates from the year 2007 but found that there were a large number of countries that had not reported literacy rates for that year. To try to avoid a large number of missing values in our primary variable of interest, we rebuilt the UNESCO table entering a request for literacy rates from 2005-2007. The data in this set provided us with some of the missing values, but at a recognized cost to accuracy. The most recent observation was selected as the stand-in value for

a country's literacy rate^{iv}. The final missing values, which were associated with a number of the highest risk countries, many of which were recently or are at war, were derived from the Central Intelligence Agency's (CIA) World Factbook (2009). Again, there is a cost to accuracy since these numbers are from a different source and the CIA's data was comparably older than UNESCO's, but for practical purposes the difference between the CIA and UNESCO data are not significant; the mean UNESCO literacy rate is 79% while the CIA's literacy rate mean is 77%. Literacy data is titled 'AggLit2007' in the dataset, reflecting the fact that the many of the observations were from UNESCO's 2007 surveys. Previously noted were the three drivers of peace and conflict; human happiness, governance and economics.

Human happiness was proxied with the Human Development Index (HDI) values from 2009. The Human Development Index is a composite of the averages of three dimensions of human development; these are length and health of life, knowledge, and how much of the population lives at a minimum local standard (2009).

Hypothesis 1: Literacy rates should correlate positively with higher HDI scores, since access to education should mean that quality of life and social cohesion should increase.

Table 1: Bivariate fit, aggregate literacy and HDI score

	B	SE B	t
Constant	0.84	0.29	2.97*
Aggregate literacy	0.79	0.03	23.75**

Note:

$R^2 = .79$

$F = 453.70$

* = $p < .01$

** = $p < .001$

Given the high R^2 value of the relationship between human development and literacy we can see that higher literacy rates have a positive relationship with higher HDI scores. As literacy rates increase, so too does the capacity to meet human needs, which supports our assumption that higher literacy rates should predict stability.

Governance is a more challenging variable to test, since the Polity IV Index defines government type on a scale from -10 through 10 (Marshall and Jaggers, 2008). Since the highest risk group of countries, anocracies, fall in a range between -5 and 5 in the Polity IV index, when tested against the linear variable literacy rates, the line of best fit should be a quadratic curve. Since we are using the PTC model as the basis for ordering these tests and government forms to support an identity group in the model by bolstering public services such as education, we assume that government type should predict literacy rates. When a stable government is in place, the school system should be better and literacy rates should be higher, leading to a civically and economically active populace.

Hypothesis 2: As government type becomes either more democratic (< 7.5 on x -axis) or authoritarian (> 2.5 on the x -axis) the aggregate literacy rate should increase.

Table 2: Quadratic fit, Polity IV score and aggregate literacy

	B
Constant	10.17
Polity IV score	-1.36
Polity IV score (quadratic)	0.13

Note:

$R^2 = .63$

$F = 89.54$

* = $p < .001$

Again, we see that the relationship between literacy rates and the highest risk range in the PolityIV Index is reasonably well correlated. Because the highest risk portion in the adjusted PolityIV numbers lies between 2.5 and 7.5 on the X-axis^{vi}, the best non-linear fit used a 2 quadratic equation, which produced an R^2 of .63. Once again, the data supports our assumption. The values for political regime type are lagged by one year. This test operationalizes ‘government’ in a rudimentary way, only testing a numerical score for government type, but does not provide data on public perception of government performance. A later test addresses a more nuanced operationalization of governance.

Economic stability was proxied using the United Nation’s values for GDP per capita in 2008.

Values for GDP are displayed in 1000s of dollars.

Hypothesis 3: Collier and Hoeffler have shown that sustained economic decline can lead to conflict and that a stable, diverse economy can lead to sustained peace (1998). Since education plays a role in the quality of a workforce and the ability to be entrepreneurial, we expect to see a positive correlation between literacy rates and increased GDP per capita.

Table 3: Exponential fit, aggregate literacy and GDP per capita

	B
Constant	0.007
Aggregate literacy (exponential)	0.465

Note:

$R^2 = .54$

$F = 142.86$

* = $p < .001$

This result is interesting because the relationship between literacy rates and economic performance is most active when a country has a literacy rate of just over 80%. After about \$15,000 per capita, the literacy rate has flattened at close to 100%. This result is supportive of the assumption that education and literacy rates are positively correlated with economic performance measured by GDP per capita. This model is a good exponential fit, and demonstrates a significant relationship between literacy rates and economic performance. The independent variable, literacy rates, is lagged by one year.

Given the statistical relationship between literacy rates and the three conflict drivers tested individually, we should expect to see a similar relationship between a combined quantitative measure of actual conflict risk and literacy rates. Should this relationship be equally strong, then we should also observe a correlation between the occurrence of war and literacy rates.

To test the relationship between educational indicators and conflict risk, we collected the most current observations from the University of Maryland's Center for International Development and Conflict Management's (CIDCM) Peace and Conflict Instability Ledger (Hewitt et al., 2010). We then gathered historical data from the Uppsala Conflict Data Project's

Armed Conflict dataset and Conflict Termination datasets (Kreutz, 2010) to test the actual observed occurrence of war in a country relative to the observed literacy rates.

Hypothesis 4: Since the relationship between literacy rates and the individual drivers of conflict correlated well, we should expect that literacy rates should correlate negatively with the scores from the Peace and Conflict Instability Ledger, which combines these variables into a composite number which defines a state's risk of violence.

Table 4: Bivariate fit, aggregate literacy and risk index score

	B	SE B	t
Constant	40.41	1.76	22.64*
Aggregate literacy	-3.96	0.20	-19.46*

Note:

$R^2 = .76$

$F = 392.56$

* = $p < .001$

As expected, we see a strong correlation between literacy rates and the risk level in the Ledger. The correlation is negative, since a lower number corresponds with lower risk in the Ledger.

This result is particularly valuable since the ledger uses different proxies for human development, economic development and governance to determine their risk scores, and we still find a correlation between literacy rates and conflict risk. To proxy human development Hewitt et al used infant mortality rates instead of HDI, since this indicator implicitly includes information about the strength of the healthcare system, government ability to provide services, and societal stability (Hewitt et al., 2010). They also add a proxy for government stability that goes a step beyond defining government type, and defines stability of power transfer between administrations (2010). This more nuanced operationalization of governance adds to test #2

where we used the basic Polity IV index values. Economically Hewitt et al measure GDP per capita, but also have proxies for the openness and robustness of a country’s economy (2010). The independent variable, literacy rates, is lagged by one reporting period, two years. The relationship between risk and literacy rates is a good indicator that literacy rates should be tested against the historical occurrence of war. We should expect that literacy rates should provide a reliable probability for a country’s likelihood to experience an outbreak of war as it is defined by the PRIO database^{vii}. The response variable is coded as 1 = war and 0 = no war. We have selected this response variable as a proxy for short (1) and long (0) shadows of the future

Hypothesis 5: Since the three drivers of conflict correlate well with literacy rates and a quantitative measure of risk, we can hypothesize that using logistic regression methods there should be a high level of probability between actual incidence of war and lower literacy rates.

Table 5: Logit test, aggregate literacy and war occurrence

	B (SE)	95% CI for <u>exp b</u>		
		Lower	<u>exp b</u>	Upper
Included		.559	.673	.809
Constant	-2.17* (0.76)			
Aggregate Literacy	-0.40** (0.09)			

Note:

R² = Cox and Snell .12, Nagelkerke .18

Model Chi-square = 19.58, p < .001

*p < .01

**p < .001

It is interesting that while the equation is not quantitatively a good fit and literacy rates do not describe the outbreak of war well, they appear to describe the existence of stability at a significant level.

This result leads to an opportunity to ask a new set of questions, since the drivers of conflict which make up the shadow of the future all correlate well with literacy rates while actual war occurrence is not well described by literacy rate. Literacy rates as defined in the dataset are a good descriptor of extant cooperation and states with robust, long shadows of the future. The problem is that the definition of literacy in the dataset does not describe the breakdown of the shadow of the future or how to grow it after violence. If literacy programs can be more holistically designed to give learners the skills to break cycles of conflict and extend shadows of the future, literacy's value to the field of conflict resolution would increase significantly.

Contextual Literacy, Local Context and the Shadow of the Future

Since literacy rates do not describe how to grow the shadow of the future, we can look to the field of contextual literacy to find analytical tools for developing a conflict-sensitive definition of literacy. The difference between what we find in UNESCO's definition of literacy and a more nuanced view comes down to a difference in values. UNESCO's definitions fall within the 'technocratic' category of how we define literacy; they are structural and set up to be repeatable statistically. There is recognition that this definition lacks nuance in favor of consistency (Castelle et al., 1981). The other broad definition of literacy is the 'progressive' approach to analyzing literacy; in this realm, cultural carriers define literacy instead of repeatable quantitative indicators (1981). Essentially the difference is one of statistical science versus ethnographic survey.

In between the technocratic and progressive views is functional literacy. Here, literacy can be treated as a system for understanding arguments and persuasive media. One area that is directly applicable to the governance driver of conflict we explored was how literacy provided

the ability to participate fully in the civil and political realm (Levine, 1986). This civil and political realm is shaped significantly by when historically, literacy becomes broadly necessary; in small tribal societies there is a fairly narrow definition of literacy whereas in industrial societies it plays a pervasive role in all aspects of life (1986). In a simplified way, literacy becomes a tool for the distribution and analysis of information (1986). The level and amount of information that must be conveyed could be a determinate of how literacy develops within a society. The combination of both content developed by a literate society and the skills of the members of society to interpret and make use of the content creates the basis of a critical-cultural concept of 'functional' literacy (1986).

The University of Massachusetts at Boston's Boston English Literacy Program dealt effectively with cultural norms of Hispanic students (Auerbach, 1989). In the Boston school system, literacy is not a culturally relative construct, but is something that must be acquired to succeed in a prescribed academic environment (1989). Culturally though, the demands of daily life in a Hispanic family were seen as a distraction from literacy acquisition and not compatible with the demands of success in school (1989). Taking an inclusive view of how lifestyle and culture shape home life for parents and students, the Boston English Literacy Program was able to inform how literacy efforts could be better designed; these programs took into account the real-life needs of students and give them skills that had value in their day to day activities (Auerbach, 1989). They would develop literacy skills that were meaningful to them and the teacher would be able to connect new skills to the needs of the students (1989). The more inclusive approach is one worth exploring when considering educational approaches in conflict-affected communities.

We can take the concept of functional literacy and the lessons from the Boston English Literacy Program and apply them to a conflict affected setting. Our goal is to reinforce the three major functions that make up our shadow of the future; human needs/identity, governance, and economic stability. In a country like the Democratic Republic of Congo, where war has been a constant since 1998, the shadow of the future between groups and individuals is very short. Internally displaced people move regularly, limiting long-term repeated interaction and thus limiting the likelihood of cooperation between individuals and groups. In this context, we must measure literacy not as a set of capacities to achieve in a prescribed academic environment but as a set of skills that reinforce day-to-day activities and interactions between groups and individuals.

Conclusion

By approaching literacy as a means for reinforcing the likelihood of repeated interactions in a cultural context, we can then treat literacy rates as an indicator that can be modified to reflect success in lengthening shadows of the future and lowering the risk of violent conflict. Instead of using a definition of literacy that statically demonstrates existing cooperation and a long shadow of the future, we should look at what is locally extant and available in terms of social norms, governance styles and economic opportunities. In a deteriorating or post-conflict setting, a better understanding of what factors will increase the likelihood of repeated interactions between people can help us identify the individual and group skills needed to encourage increased interaction. The three drivers of conflict or stability, human needs, governance and economic indicators, are all proxies for ways people and groups can interact; by defining literacy as the ability of groups and individuals to increase the regularity of these

interactions, educational development can help lengthen the shadow of the future, encouraging cooperation and lowering the risk of violent conflict.

Endnotes

ⁱ In the parlance of iterated gaming, we would say that the discount rate is large.

ⁱⁱ Samuel Lewis, former president of the United States Institute of Peace, notes the disparity in knowledge between why wars start versus how peace is built in the introduction to *Conflict: Human Needs Theory* (1990), edited by John Burton.

ⁱⁱⁱ Examples of a ‘lootable’ resource could be alluvial diamonds, copper, coltan and in some cases oil. ‘Lootable’ describes the fact that a criminal network, insurgency or corrupt government could extract these products and sell them to support a war-fighting enterprise or patronage networks.

^{iv} These observations are marked with a ** in the dataset

^v See appendix for statistical comparison

^{vi} While coding the data from the PolityIV Index, I adjusted the data so that it would not have negative values. The data starts with a range from –10 to 10; I added ten to all the values, then divided those observations by two in order to create a range of 0 to 10, which was easier to manipulate and analyze with the other data which were all composed of positive numbers.

^{vii} PRIO defines a war as an event where at least one belligerent is a government and there are at least 1,000 battle-deaths during the course of a year. A battle-death is defined as a fatality that is corroborated by more than one actor (government, media, UN, etc.) to have occurred as a direct result of fighting.

Appendix: Full statistical results

Test #1: Human Development Index and Literacy rates

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	376.792	1	376.792	564.266	.000 ^a
	Residual	96.825	145	.668		
	Total	473.617	146			

a. Predictors: (Constant), Literacy rates

b. Dependent Variable: HDI Score

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.892 ^a	.796	.794	.81716

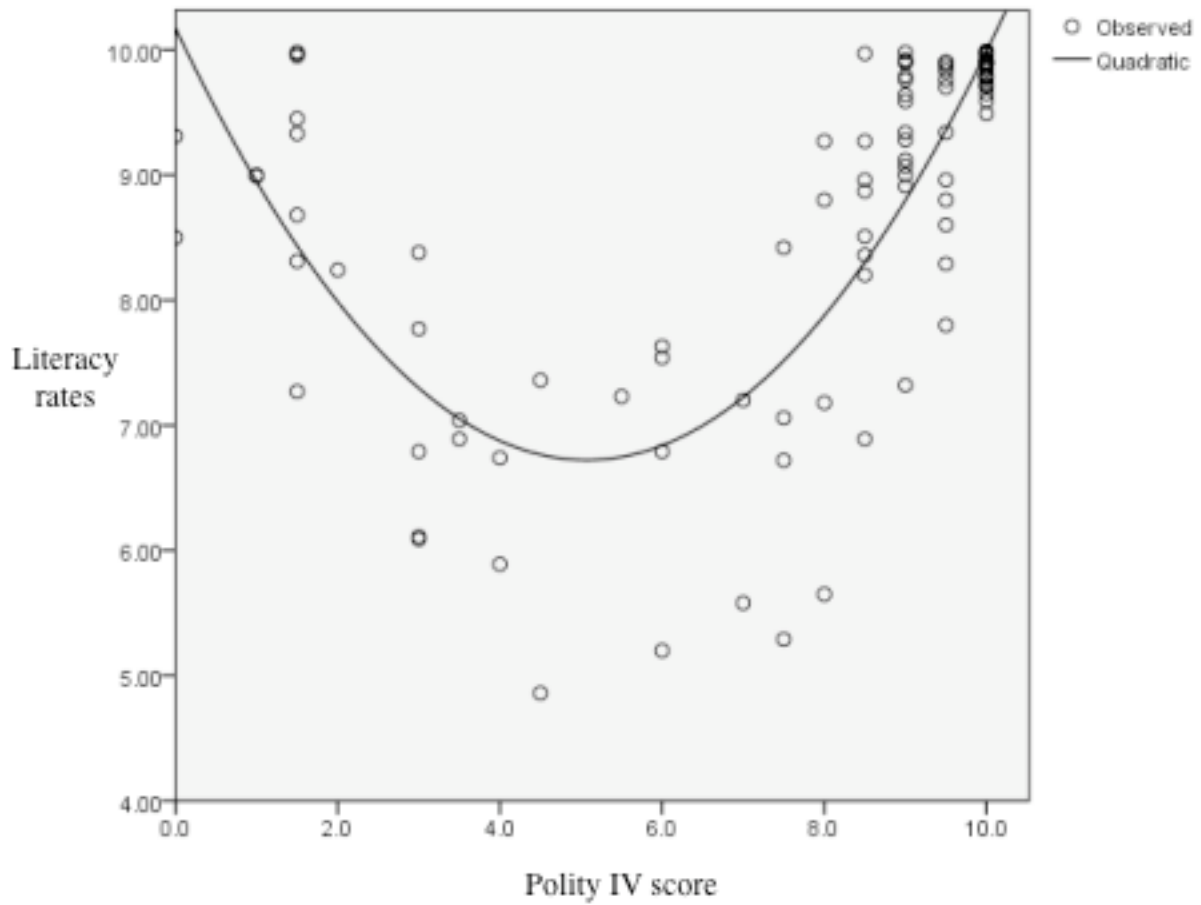
a. Predictors: (Constant), Literacy rates

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.844	.285		2.965	.004
	Literacy rates	.791	.033	.892	23.754	.000

a. Dependent Variable: HDI Score

Test #2: Polity IV government type score and Literacy rates



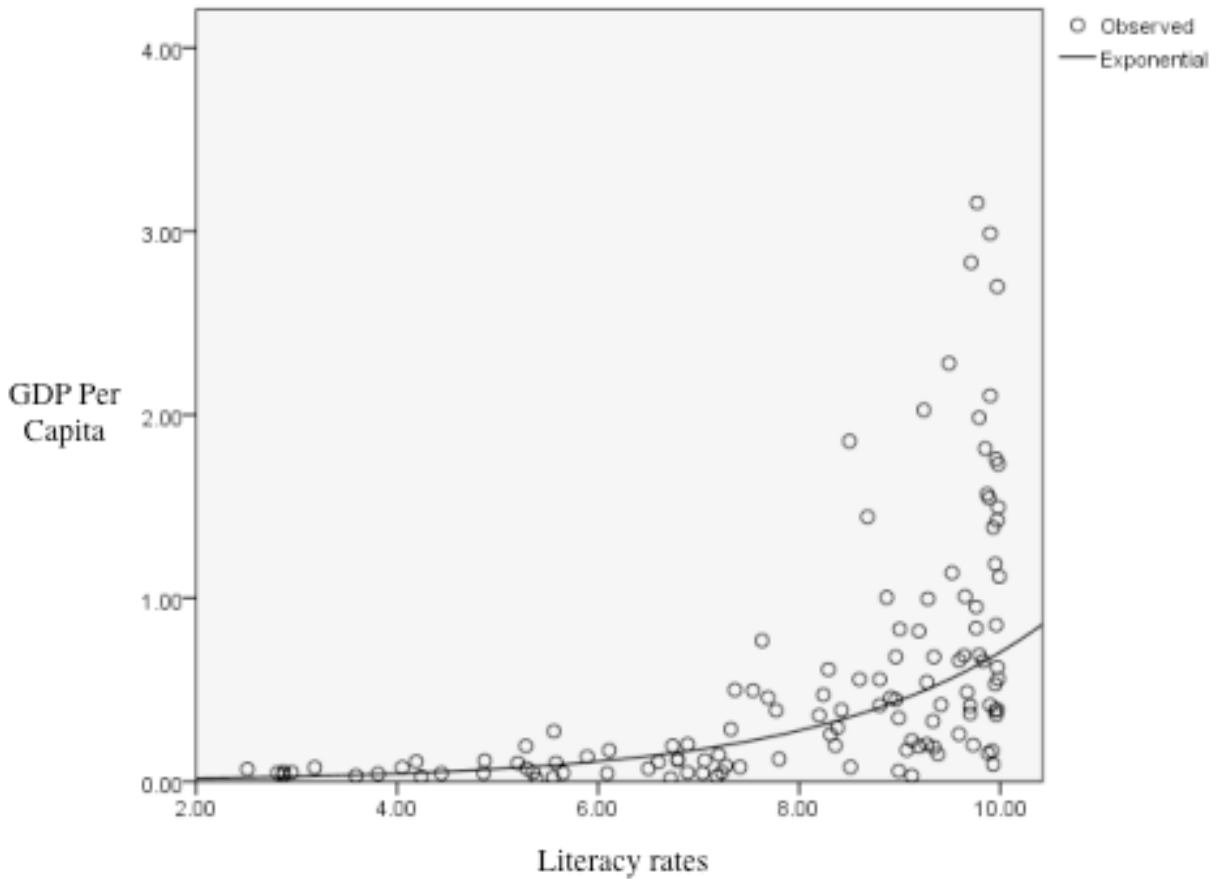
Model Summary and Parameter Estimates

Dependent Variable: Literacy rates

Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	Constant	b1	b2
Quadratic	.637	89.541	2	102	.000	10.173	-1.361	.134

The independent variable is Polity IV score

Test #3: GDP Per Capita and Literacy rates



Model Summary and Parameter Estimates

Dependent Variable: GDP Per Capita

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Exponential	.541	142.866	1	121	.000	.007	.465

The independent variable is Literacy rates

Test #4: CIDCM Peace and Conflict Instability Ledger and Literacy rates

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5712.296	1	5712.296	392.562	.000 ^a
	Residual	1746.160	120	14.551		
	Total	7458.456	121			

a. Predictors: (Constant), Literacy rates

b. Dependent Variable: CIDCM Peace and Conflict Instability Ledger

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.875 ^a	.766	.764	3.81462

a. Predictors: (Constant), Literacy rates

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	40.417	1.757		22.999	.000
	Literacy rates	-3.959	.200	-.875	-19.813	.000

a. Dependent Variable: CIDCM Peace and Conflict Instability Ledger

Test #5: War occurrence and Literacy rates

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	19.583	1	.000
	Block	19.583	1	.000
	Model	19.583	1	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	154.392 ^a	.122	.178

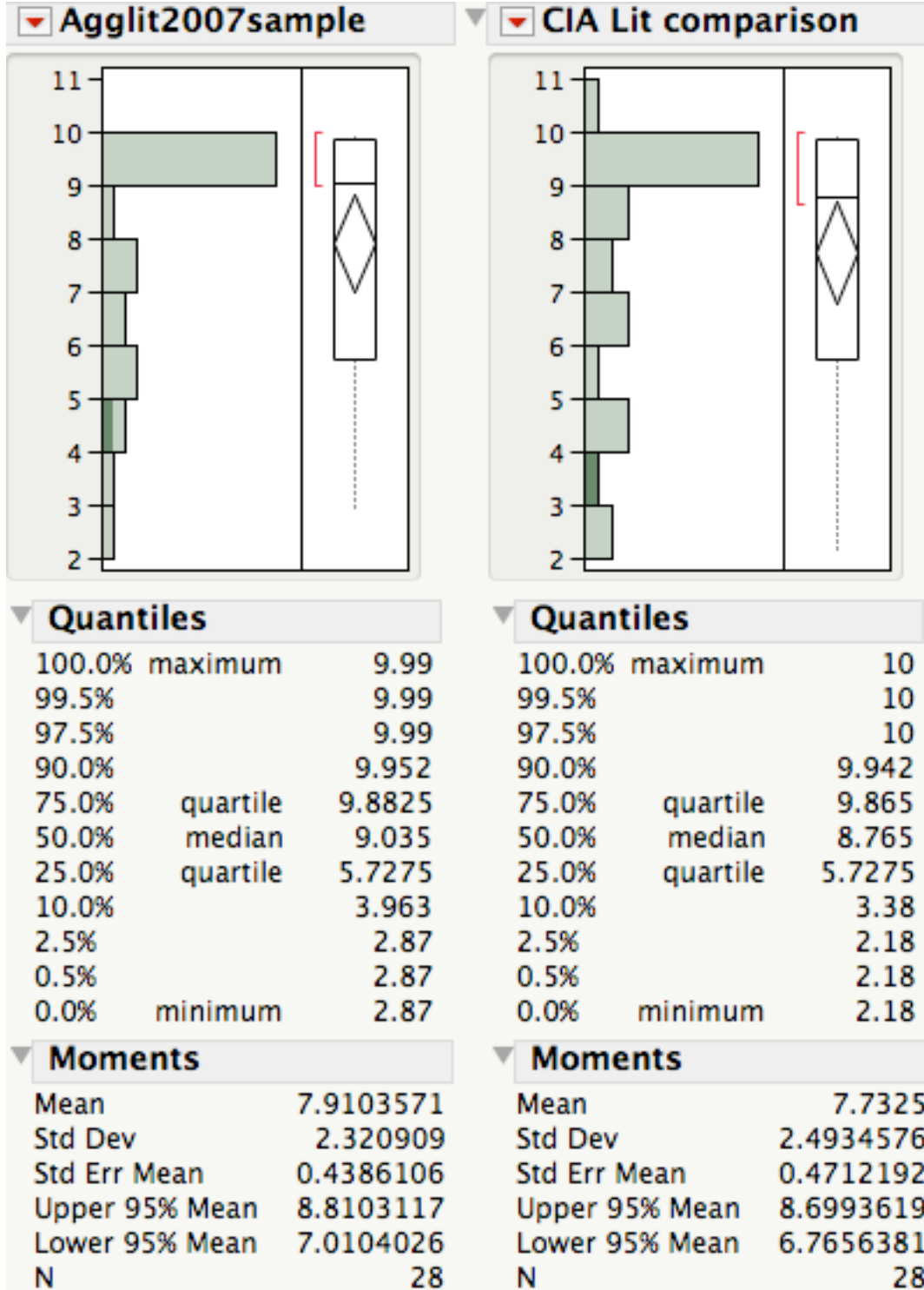
a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1 ^a	Literacy rates	-.397	.094	17.672	1	.000	.673	.559	.809
	Constant	2.169	.767	8.008	1	.005	8.753		

a. Variable(s) entered on step 1: Literacy rates

Literacy rate comparison: CIA and UNESCO



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