# Turbulent Times

## Conflict, Cooperation and Change in the International Arena

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Version 1

**Abstract**

It is well established that the bulk of international conflict takes place between the same few dyads. However, dyads are not just divided between trouble makers and peace lovers. Some dyads experience steadily conflictual relations, others steadily peaceful ones and still others move quickly from periods of cooperation to periods of conflict. While turbulence in the international arena is the bread and butter of practitioners, it still is a little investigated subject in studies of International Relations. In this paper, I will try to identify the best possible strategy to empirically investigate and theorize on turbulence in IR, mainly focusing on the first, fundamental step checking for construct validity.

In the second half of the 1940s, right after achieving their independence from Great Britain, India and Pakistan were involved in a series of crises over the definition of their territory. A crisis over the accession of the region of Junagadh to Pakistan developed between August 1947 and February 1948, overlapping with a crisis over Kashmir, which unfolded between October 1947 and January 1949. In January 1949, the two countries signed a cease fire, sponsored by the UN, but it did not take long before they were enmeshed in yet another violent crisis, this time over the Punjab region. Meanwhile, these displays of force were punctuated by more or less successful cease-fires, multiple joint declarations of peaceful intentions and trade arrangements. During the exact same years, China and the US were developing relations that were equally hostile (with two major crises over Formosa and Korea), but much more consistently so. There was no trade agreement to sign or any other device to diffuse the tensions between the two countries.

Turbulence in the international arena, that is, the rapid shift in the relations between states from acts of cooperation to act of conflict, constitutes the bread and butter of practitioners, and fills the pages of newspapers. One case in point are the recent developments in the Middle East, where the interactions between President Mubarak and the protesters were closely followed abroad, while rapidly shifting *within hours* from being cooperative to being conflictual.

And yet, in IR theory, moments of turbulence in the international systems are hardly ever recorded. More specifically, there are multiple and competing explanations of why these states are more likely to get involved in violent disputes (Waltz 1959, Waltz 1979, Blainey 1988, Evera 1999, Morgan 1994), when and who is more likely to initiate them (Reiter & Stam III 1998, Geller 2000) and, alternatively, what the determinants of spells of peace of conflict are (Werner 1999). If (international) politics is all about who gets what when and how, conflict is truly at the heart of it.

More recently, the observation that just a few dyads are responsible for the bulk of conflict registered in the system has catalyzed a research program that investigates under what conditions a dyad will repeatedly engage in conflict, or, as it is called, form an *enduring rivalry*. While there are at lest four competing explanations of why China and the US and Pakistan and India constitute enduring

rivalries, there is no account in the literature of why the relation between Pakistan and India were so much more turbulent than the ones between China and the US during the same period of time. That is, there is no account of why these relations would rapidly go from cooperative to conflictual. And yet, this very turbulence in one of the most maddening aspects of international relations for practitioners and pundits. Turbulent situations increase uncertainty on the consequences of alternative courses of action, both for those involved in the dispute and for those who try to mediate. In this sense, it is possible to say that a turbulent situation is even worse than a steady conflictual one, because turbulence entails rapid change in a short period of time, and thus the impossibility to assess the likely developments based on previous events. I propose to model the determinants of turbulence: why is it that some dyads experience more turbulent relations and others less turbulent ones? what determines whether one or more countries enter or exit a turbulent phase?

In this paper, I lay the foundations for my theory-building process by setting up the empirical data that would allow me to investigate this phenomenon of turbulence in international relations. In setting up the data, I seek to establish the foundations for the *construct validity* of my analysis, that is, the capability to generalize the causal relationship estimated from the method and data applied to this study back to the theoretical construct that the method and the data were meant to represent (Brewer 2000, Cook, Campbell & Day 1979). In other words, by setting up the data and the analysis like I do, am I really testing what I want to test?

# 1 Turbulence in the international system

## 1.1 Turbulence and Substitution

When states interact, they have different tools to advance their interests, some of them conflictual and others cooperative. For instance, states' leaders can respond to the decision of the counterpart to move troops at the border by calling for a UN resolution, by forming an alliance or by increasing defense spending (Bennett & Nordstrom 2000). Each alternative is more or less cooperative, and has specific conse-

quences for others actors, both at the national and at the international level. Theories of foreign policy substitutability build on this central insight by (Most & Starr 1984, Most & Starr 1989) that states' leaders have multiple means at their disposal to deal with any particular event taking place in the international system. States‘ tradeoffs might be determined by the actions of the counterpart (Clark, Nordstrom & Reed 2008) or by considerations of efficiency and resource availability (Bennett & Nordstrom 2000). In either case, the fact that states make a choice of an instrument with which to carry on their foreign policy has two crucial implications for students of IR. First, it makes it extremely counterproductive to use dichotomous lenses to decipher the developments in the international arena. The fact that we don't witness conflict does not mean that the state is not engaging in hostile activities, such as increasing military spending. Second, the specific choice of foreign policy behavior is in part a function of the available alternatives, a fact often ignored when modeling the determinants of disputes.

Turbulence and substitutability are clearly related. If turbulence is defined as the rapid shift of states' relations from cooperation to conflict and vice versa, then the availability of different policies to achieve similar goals can be a factor in determining the likelihood of witnessing a turbulent interaction among states. Simply put, if there aren't many alternatives to conflict or cooperation, then volatility is highly unlikely. However, studying turbulence is different than studying substitution in at least three ways.

First, studying turbulence means looking at choices of foreign policy *through time*, rather than defining them as a one time event. The question that a study of turbulence wants to answer is not why, for instance, states decided at time $t$ to form an alliance rather than increasing defense spending, but why they went from forming an alliance at time $t$ to amassing troops at the border at time $t+1$ rather than to appealing to the UN for a Resolution of condemnation at time $t+1$.

Second, studying turbulence entails clearly distinguishing between cooperative and conflictual alternatives. Appealing to the UN and amassing troops at the borders might be considered both substitutes to increasing domestic spending, but they are certainly not equivalent in terms of how cooperative and conflictual they are. By treating them

both as substitutes, we are not using crucial information in our data.

Finally, precisely because studying turbulence entails *both* looking at time and distinguishing between cooperative and conflictual options, modeling turbulence allows to make inference on questions of *sequencing*. In particular, by looking at how rapidly interactions go from being cooperative to being conflictual, it is possible to make inference on whether periods of stable interactions are more likely to follow cooperative foreign policy actions or conflictual ones. Does it make a difference for the stability of the relations among states if a state decides to react to an hostile act by amassing troops on the border first and then ask for a UN intervention or the other way around?

## 1.2 Towards a conceptualization of turbulence

What then does it exactly entail to study turbulence in the international system? In the common use, turbulence is a synonymous of instability, fickleness and rapid change of status (Oxford English Dictionary). Here, I define turbulence as a specific characteristic of an interaction between states, that is, the rapidity with which these interactions go from being cooperative to being conflictual, and vice versa, through time. To clarify what I mean by the concept of turbulence, and following Munck and Verkulien (2002), I build a *concept tree* where I vertically organize the attributes of the concept of turbulence by levels of abstraction. There are two necessary and jointly sufficient components of turbulence, change and rapidity. [1]In other words, in order for us to speak of turbulent relations, it needs to be the case that these relations change rapidly. A steady trend toward improvement in the relations between states, whereupon governments would try to implement various measures of cooperation, with occasional defections due mostly to misunderstandings or problems in the chain of delegation does not count as a turbulent relation. By the same token, a rapid deterioration of the relations between states, like

[1]Goertz (2006) gives a very intuitive definition of what it means to identify necessary and sufficient components of a concept: "We tend to identify as core dimensions those that have causal powers when the object interacts with the outside world. We use the atomic structure of copper to explain why it is a good conductor of electricity."(Goertz, 2006:28)

is common in cases of escalation for example, cannot be considered a case of turbulence.

Similarly, turbulence is different than cases where there states' relations undergo *regular* phases of conflict and conflict. For example, there might be instances where leaders of rival states decide to rally up support for their own party before a major election by engaging in violent activities toward a "national" or common enemy. This would translate in a periodic deterioration of the relations between states and a periodic improvement of such relations once, say, the elections are over. In this sense, turbulent relations are marked by rapid changes in the interactions between states, with the alternation in a short period of time of instances of cooperation and conflict. Descending the abstraction scale on the list of the attributes to seek more measurable attributes of the concept of turbulence, I claim that in order to capture the idea of rapidity, there has to be a measure of time. Similarly, change can be operationalized by dividing up the specific foreign policies pursued by states' leaders between cooperative and conflictual, in order to capture the shift from the one to the other. In sum, to empirically measure turbulence in the relations between states, I need to set up my empirics so as to capture two fundamental aspects of the interactions in the international system: time and shift from cooperation to conflict.

### 1.3 Who cares about turbulence?

Why is it important to study turbulence? Turbulence is consequential for both policymakers and scholars (Maestas & Preuhs 2000). Intuitively, turbulence has a negative connotation, both in the common use and in IR. Nobody wants to have a fickle relation, or deal with a rapidly changing environment. Similarly, in the international arena, turbulent situations are seen with suspicion by all the actors involved. First, states' leaders are uncomfortable with turbulent situations because they breed uncertainty on the final outcome and make it hard to assess the consequences of a specific choice of foreign policy. Consider the situation between India and Pakistan during territorial disputes over Kashmir in 1948 and over Kutch in 1965. In the first instance, the crisis was embedded in a highly turbulent period for the two coun-

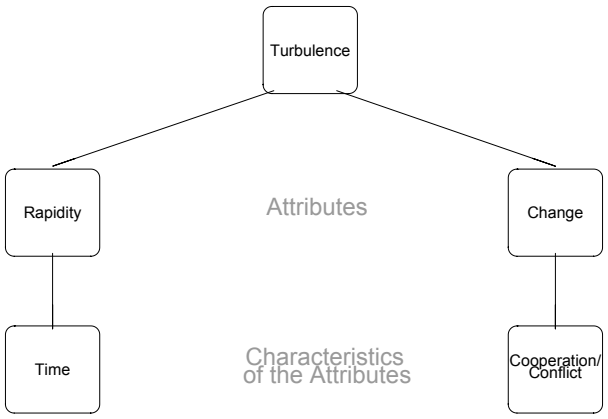


Figure 1: Concept Tree for Turbulence.

tries, during which relations between the two were marked by recurring crises and recurring agreements to peaceful solutions and trade agreements. In 1965, the situation had been more tranquil for some time between the two countries. In some sense, the degree of uncertainty over the outcome of the crisis was smaller: the steadiness of previous interactions makes it easier to form expectations on the possible reactions of the counterpart.

Second, turbulence makes it harder for possible third parties to assess the impact of an intervention in the conflict. In the Nineties, the rapid succession of events on the ground in the conflict in former Yugoslavia complicated calculations of both the feasibility and appropriateness of a foreign interventions (Goldstein & Pevehouse 1997, Goldstein, Pevehouse, Gerner & Telhami 2001). More recently, the extreme turbulence of the situation in Egypt made it very risky for the US to take a position pro or against Mubarak, as the consequences of such action were hard to predict. Similarly, parties interested in bolstering cooperation will have a stake in decreasing turbulence: what matters if relations improve, if improvement rapidly withers away? How to

overcome the diffidence between the parties when there is a lot of turbulence?

As for IR, studies of protracted conflicts have focused mainly on (1) what makes some states more likely to experience conflict and conflict recurrence or (2) what makes them more likely to experience protracted periods of peace or conflict (duration analysis). In international relations theory, modeling turbulence entails both abandoning the dichotomization of relations between conflictual and cooperative and unearthing the dynamic of the relation through time.[2]

## 2 The Construct Validity of Turbulence

Brewer (2000) identifies three main phases where challenges to construct validity need to be faced in research: first, the explanandum has to be carefully translated from the conceptual to the empirical world, making sure there is a close correspondence between the theoretical interpretation and the empirical phenomenon. Second, in the operationalization phase, the quality of the data need to be appropriate. Finally, multiple measures of the same concept should be used. In the following sections, I address each of these challenges to construct validity and explain how I try to overcome them. [3]

[2]When compared to current studies of protracted conflict, with respect to analyses that simply look at whether conflict is likely to take place between a dyad or to recur in time, a study of turbulence will avoid dichotomizing the interaction and thus allows to offer a more realistic and nuanced representation of the actual relations among states. With respect to studies of duration, an investigation of turbulence allows to go beyond making statements on how likely states are to break out of peace or of conflict and to theorize about why in some cases relations are steadily conflictual or steadily cooperative while in others they go from periods of high cooperation to periods of great conflict.

[3]There is also a forth challenge, concerning the causal mechanism that connects the IVs to the DV, but since I am still at the theory building process, I will not touch on that challenge in this paper.

# 3 Translating Turbulence: Explaining Volatility

I defined turbulence as the rapid shift in the relations among states between cooperative and conflictual acts. What is then the best way to empirically translate this theoretical concept? Given that both the two fundamental attributes of the concept of turbulence are time and shift from cooperation to conflict, I intend to study turbulence by building a time series of the interaction between states and analyze its level of volatility.

In statistical terms, I want to study the time series of the interactions in a dyad, and rather than explaining whether the dynamic is constant, or there is a trend or a cycle, I want to explain the variance of the series, that is, why these interactions rapidly improve or deteriorate in some cases and not others. Clearly the variance and the mean of a variable of interest are related, as the variance, or second central moment of a distribution, is defined as "a measure of the degree of spread of a distribution around its mean" (Casella & Berger 2002, 59), but studying them separately can help getting a better understanding of the data generating process (Braumoeller 2006).

The study of volatility has been pursued mainly in the study of financial time series (Taylor 2008): the basic intuition at the basis of the study of volatility is that, for instance, investors are interested not just in knowing the rate of return of an investment, but also how rapidly such rate of return changes through time.

Talking about the volatility of an interaction is different than talking about its average value: interactions that are similarly cooperative through time might differ in the level of volatility, while interactions that are similarly volatile can exhibit different average values of cooperation or conflict.

The basic idea in the study of volatility is similar to the fundamental idea of an heteroskedastic probit (Alvarez & Brehm 1995), namely that the process that produces the final outcome–being it the string of 0 and 1 values in the probit or the continuous values of the DV in the time series–contain some heterogeneity. Such heterogeneity can be captured by modeling the variance of the error term of the model, on the premise that it varies systematically. There are various options

to model volatility in the time series, and the study of volatility constitutes one of the fastest growing areas of research in Time Series. For instance, the ARCH model represents the variance as a function of the square of the residuals. In the model, the conditional mean of $y_{t+1}$ is defined as follows (Enders 2004):

$$E_t y_{t+1} = \alpha_0 + \alpha_1 y_t \tag{1}$$

The error variance is then:

$$E_t[(y_{t+1} - \alpha_0 - \alpha_1 y_t)^2] = E_t \epsilon_{t+1}^2 \qquad = \sigma^2 \tag{2}$$

In the ARCH model, this variance is not assumed to be a constant $\sigma^2$, but rather to be determined by an AR(q) process:

$$\hat{\epsilon}_t^2 = \alpha_0 + \alpha_1 \hat{\epsilon}_{t-1}^2 + \alpha_2 \hat{\epsilon}_{t-2}^2 + ... + \alpha_q \hat{\epsilon}_{1-q}^2 \tag{3}$$

The GARCH model expands on the ARCH and allows the variance to be an ARMA process, while TARCH and EGARCH models allow for different effects of good or bad events on the volatility of the series (Enders 2004). Gronke & Brehm (2002) combine together an ARCH model and a multiplicative heteroskedasticity model and they build an ARCH-MH model where the variance is a function of the square of the residuals in the previous periods and of a series of explanatory variables, to model the volatility of the approval rates of presidents as a function of partisanship (Gronke & Brehm 2002, 432-433):

$$\hat{\epsilon}_t = \alpha_0 + \alpha_1 \hat{\epsilon}_{t-1}^2 + Z_t \gamma \tag{4}$$

The two authors identify predictors for the mean, as well as for the variance. They test their theory with data on public opinion, specifically presidential job approval in the past sixty years.

### 3.1 Enduring Rivalries

Which series would give me a better grasp of turbulence in the international system? I propose to study the volatility in the interactions between *enduring rivals*. Enduring rivals are those states that are responsible for the bulk of conflict in the international system (Maoz &

Mor 2002, 19). There are mainly five approaches to enduring rivalries, and they are usually compared and contrasted according to the definition of enduring rivalry that they propose (Colaresi, Rasler & Thompson 2007), that is, according to the number of conflicts between the parties that such approaches postulate as necessary to identify a rivalry. [4]

This literature focuses on some of the most interesting dyads that there are in the international arena, precisely because these are the trouble maker dyads: enduring rivalries start, grow and die off (Diehl & Goertz 2001) almost like a living organism, and in this sense the literature on enduring rivalries offer some of the most realistic accounts that there are in IR of states' behavior in the international system.

If turbulence is actually relevant for any third party in the system, it will have to be turbulence among enduring rivalries: not only these states will be more likely in the future to engage in conflict (Colaresi & Thompson 2002), they will also be the ones with more of a history (Maoz & Mor 2002). At the same time, little is known of the differences between rivalries when it comes to turbulence: and yet, why is it the case that some dyads experience steady conflictual relations, while others rapidly go from being cooperative to being conflictual? Do dyads with turbulent relations experience more steady phases and vice versa? Does turbulence systematically characterize the initial or the final part of an enduring rivalry?

### 3.2 Hypotheses Generating Case Studies

Gerring ( in Box-Steffensmeier, Brady & Collier (2010, 647)) specifies nine different criteria to select case studies, distinguishing between theory testing and theory building appropriate cases. To start the hypothesis generation process, I select three enduring rivalries. Enduring rivalries are actually, substantively, the interactions we care

[4] For most scholars, the *conditio sine qua non* for it to be possible to talk about the presence of an enduring rivalry is the recurrence of conflict. Diehl & Goertz (2001) elaborate specific numeric criteria to define an interaction as an enduring rivalry (specifically, there have to be at least six conflicts in 20 years), while Thompson (2001) argues that witnessing the actual use of force is not a necessary condition to define an interaction as rivalrous, but he still defines the high likelihood of conflict as a fundamental component of the concept.

more about, because they are the dyads that cause the bulk of violence in the system. Moreover, partly as a function of the greater violence registered within dyads, these are dyads for which I expect to have many event data (see section below). There are at least five definitions of enduring rivalries, and only some dyads qualify as rivalries *in all of them*. These super enduring rivalries are: Afghanistan-Pakistan (1948-89), Algeria-Morocco (1962-84), Argentina-Chile (1843-1991), China-US (1959-72), Egypt-Israel (1948-89), Ethiopia-Somalia (1960-88), India-Pakistan (1947-91), Morocco-Spain (1957-80). For theory generating purposes, I am going to select among these according to both the principle of the most diverse and the most similar case. Most similar cases are those in which the values for variables belonging to alternative explanations match, while most diverse cases are those in which these values are the most distant.

Given the tendency in IR to focus on predicting the likelihood of conflict and how long before it explodes, there are not many obvious alternatives to an explanation that focuses on the variance. One possibility is to look at whether capabilities are symmetric or asymmetric. States‘ capabilities play a crucial role in any explanations of recurrent conflicts among the same set of actors. Symmetry in capabilities is a necessary cause of the persistence of enduring rivalries, (Maoz & Mor 2002, Thompson 1999, Diehl & Goertz 2001). If symmetric capabilities ensure the duration of the rivalry, then capabilities will probably be related to low volatility: states will just keep fighting each other out. Another crucial variable is *contiguity*: Reed & Chiba (2010) shows that contiguous dyads systematically differ from noncontiguous ones on their propensity to engage in conflictual activities because of how they respond to observables, such as trade levels, peace agreements and so on (thus, they are different in their $\beta$, not in their $x$).

For all these reason, I propose to focus on these cases: (1) India-Pakistan, (2) India-Bangladesh, (3) US-China. India and Pakistan and India and Bangladesh represent two “most similar" cases: India is in both dyads, it borders with both countries, it had territorial issues with both countries, Bangladesh and Pakistan have comparable CINC scores throughout the past century (**?**). And yet, in one case (India-Pakistan) we have the development of a long, crucial enduring

rivalry that breeds conflict and uncertainty up to the present day, while in the other case, we have some disputes early on when Bangladesh acquires independence and not much thereafter. Conversely, India-Pakistan and US-China represent two "most different" cases: unlike India-Pakistan, US and China do not border, do not share a colonial past, and are quite different in terms of their CINC scores, growing more and more similar toward the end of the past century. Also, both dyads qualify as enduring rivalries according to all definitions.

Choosing two dyads where one of the members is the same: by choosing, say, India and Pakistan and India and Bangladesh, I can obtain several advantages. First, I can hold everything about India constant, and see how predictions change when India faces the same country. Second, in this specific case, I can also hold constant factors such as (1) contiguity and (2) presence of territorial disputes, while comparing the volatility of the relation.

# 4 Looking for Turbulence in Events Data

I set to explain the determinants of turbulence in the relations among states. In order to empirically test a theory of turbulence, I will employ a model of volatility–which one exactly, of course, is an issue that will be decided in large part by the data structure. In this section, I will illustrate the event data that I intend to use (Burgess & Lawton 1972).

Event data are constituted by daily international and domestic events or interactions for roughly 135 countries in the international system (in the case of the COPDAB data set, (Azar 2009)).There are mainly two sources of "canned" event data, the COPDAB data set and the WEIS data set. The two event data collections differ both in terms of the time period covered and the sources used. Specifically, the WEIS data set relies exclusively on news and reports from the *New York Times* and it covers the years from 1968 to 1977 (McClelland & Hoggard 1969), whereas the COPDAB data come from a more diverse set of sources: not only newspapers but also historical accounts and chronologies such the Keesing's Report of World Events. Since it covers a period that stretches further back in time, I will start by looking

at data in the COPDAB data set.[5]

The COPDAB data set records several aspects of an international event: the source, that is, the state initiating the action, the target, that is, the state towards which the action was directed, and a brief description of the action itself, together with the day, month and year when the action took place. The data set assigns a scale to each event, from 1 (extremely cooperative act) to 15 (war). Each scale point is assigned a weight to answer the question of exactly how much more cooperative or conflictual an event was, when compared to a neutral point (the event scaled at 8). So for instance, the scale point 15 is given a weight of 102, which means that any event that corresponds to the scale point 15 is 102 times more conflictual than any event that corresponds to a scale point of 8.[6]

I use the weighted values of the events, following common practice in the discipline (Goldstein 1992). In Figure 2 and 3, I plot the time series of the events between, respectively, China and the US and US and China, between 1948 and 1958. The x axis represents weeks, the y axis represents how cooperative–positive values– and how confictual–negative values– are the events that took place. Again, following common practice in the discipline, if multiple events happened within a week, I sum them. So, for instance, in the first week of 1948, in the data there were two cases of Pakistan issuing strong threats to India and one minor attempt to resolve the issue paeacefully. In the scaled data, those instances are coded, respectively as -16, -16 and 6. For that week, the observation would be -26.

[5]In the WEIS data set, events are coded according to 16 categories (going from yielding to waging war) and many subcategories. For instance, Category 5, Promise, has the following subcategories: political support (51), material support (52), support in the future (53), continuation of ongoing support (54). The time frame is from 1968 to 1978, almost the same as for COPDAB data and although categories are more refined, there seems to be not much difference between the two data (see FAQ on KEDS website). It will still be a useful check of the inference made from the other data.

[6]I also rescale this variable to be centered around zero. Negative values are for conflictual acts, and positive ones are for cooperative ones. As for the years after 1978, I am currently using TABARI to collect data from newswire reports, an operation I describe in the Appendix.

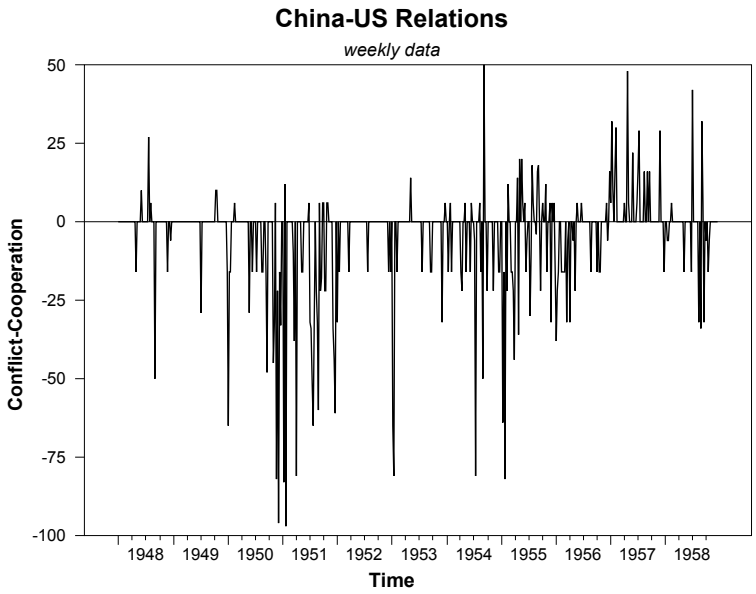


Figure 2: China-US weekly interactions, 1948-58. Source:COPDAB

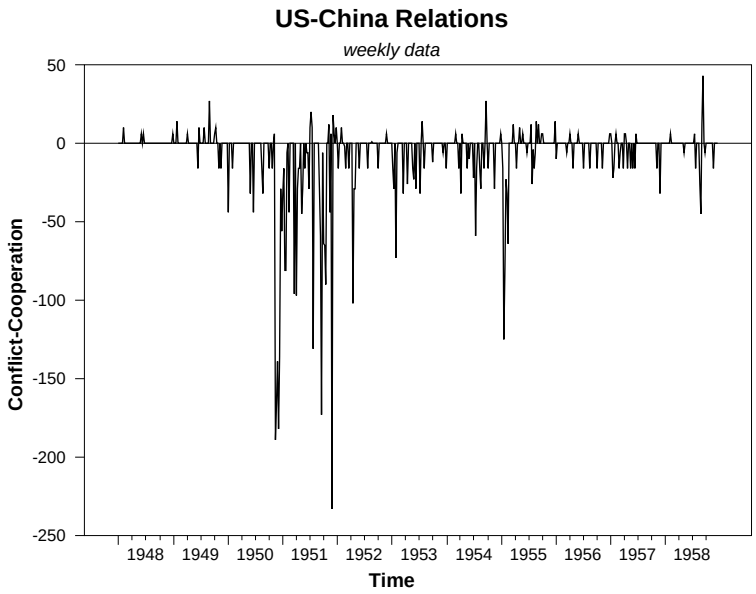


Figure 3: US-China weekly interactions, 1948-58. Source:COPDAB

## 4.1 The Publicity Bias

Events data present some challenges for the study of turbulence. As King & Lowe (2003, 617) and Azar, Cohen, Jukam & McCormick (1972) recognize, events data are imperfect because they rely on wire reports, newspapers and other journalistic accounts, and thus coverage is neither uniform nor conceived with the needs of a Political Science student in mind: the biggest problem in this respect is the lack of information on secret deals.

If newswires are chosen as the source, then only what constitutes public information is coded: nothing is left on record of the secret meetings between statesÕ representatives. This exclusive reliance of events data on public information can be complemented in each case studies with archival resources or biographies and memoirs of the various actors involved to get a better understanding of the developments within the dyad. These other sources do not necessarily need to be coded, but might help complementing the case narrative. On the other hand, by distinguishing between different degrees of conflict and cooperation among states, Events Data help addressing the issue of *heterogeneous zeroes* present in many studies of recurrent conflict. In other words, when looking at the non conflictual behavior that takes place within the rivalrous dyad, scholars fail to distinguish between the presence of peaceful interaction and the presence of no interaction at all, by coding conflict as a "1" and everything else as a "0". However, there is no clear fix for the publicity bias with these data.

## 4.2 Crises or not Crises?

Event data allow me to study the volatility in the interactions among states on a daily basis for more than 50 years (on issue of temporal aggregation, see section below). However, there remains the issue of whether to look at these interactions in their entirety or rather to focus on crises in the dyad. The issue is both theoretical and empirical. Theoretically, we know that the decision making process varies significantly during crises (Roeder 1984, 182). As Fearon (1995) makes clear, the leadership of a country engages in risky, provocative and very public courses of actions during these unusual times. At the same time,

we also know that crises are integral parts of the interactions between states. Not only do leaders build on prior beliefs on whether violence will be used when assessing the policy to implement(Fearon 1995), past crises also makes future ones more likely (Colaresi & Thompson 2002). These different dynamics that kick in during crises are reflected in the empirics, when we use event data. The problem is twofold. If newswires are more likely to thoroughly report during crises, then there is systematic sampling (see section below). If the data generation process is different during crises and during normal times,as our theories point out, then the sampled data are very much less representative then they should be.

I propose to model the whole interaction between dyads, comprising of periods of crises and periods of non crisis. To address the concerns with mixing all these time periods together, I intend to employ two strategies:

- Model crises separately: using the practical and temporal definition of crisis used in the International Crisis Behavior data set, I will first analyze the whole time series together and then "slice off" crisis periods to zoom in on them and see how the volatility dynamic changes during those periods.

- Use a Dynamic Conditional Correlation Model, which I describe more in depth in the following section. This model will allow me to look how volatility changes in different phases of the interaction among states. Instead of slicing off crisis periods, I will thus be able to see how the process changes during those periods, within the context of the whole relation.

Finally, another concern with periods of crisis relates specifically to the data at hand. Is it possible to expect that during crises, data are likely to come in more frequently than during normal times, both as a function of there being a crisis and as a function of there being more public attention on the matter.

In Figure 3 and 4, I plot event data for India and Pakistan from 1948 to 1958: the shaded area represent the weeks during which a crisis takes place. [7] As it emerges from the plot, event data do not

[7] I use the ICB data set to identify a crisis. A crisis is defined as "a threat to one or more basic values, an awareness of finite time for response to the value

seem to be more frequent for periods of crisis, probably a consequence of the prominence of these dyads in the international system.

# 5 Multiple Measures of Turbulence

Finally, construct validity can be bolstered by the use of different measures of turbulence. For instance, turbulence can be measured on different series. Various options are available to investigate turbulence within a dyad:

- Source-Target: the series represents the action of one country (source) toward another (target).
- Net Cooperation: the series is derived by subtracting the scores of the series where one member of the dyad is the source and the other the target, and vice versa (Goldstein 1992)
- Dynamic Conditional Correlation Models (Lebo & Box-Steffensmeier 2008): this models start off with the two separate Source-Target series, models them as a GARCH process and then proceeds to model the correlation of the two series through time, breaking it into different phases. In other words, these models allow to study the relationship between the two series, by calculating the current correlation between them as a function of past realizations of volatility. In this sense, this model allows the two series to have moments of positive, negative or no correlation at all, so that both the direction and the strength of the correlation can be measured. For instance, for the purpose of this dissertation, in periods of crises, we expect that correlation between these two series to be higher (see concerns in section 4.3). The model consists of estimating the following equations, for a DCC(1,1) model (Lebo & Box-Steffensmeier 2008, 695):

$$h_t = c_0 + a_1\epsilon_{t-1}^2 + b_1 h_{t-1} + b_2 h_{t-2} + m_1\epsilon_{t-1}^2 I_{\epsilon>0} \qquad (5)$$

$$R_t = (1-\alpha-\beta)\overline{R} + \alpha\epsilon_{t-1}\epsilon_{t-1}^{'} + \beta R_{t-1} \qquad (6)$$

threatened and a heightened probability of involvement in military hostilities" (**?**, 3)

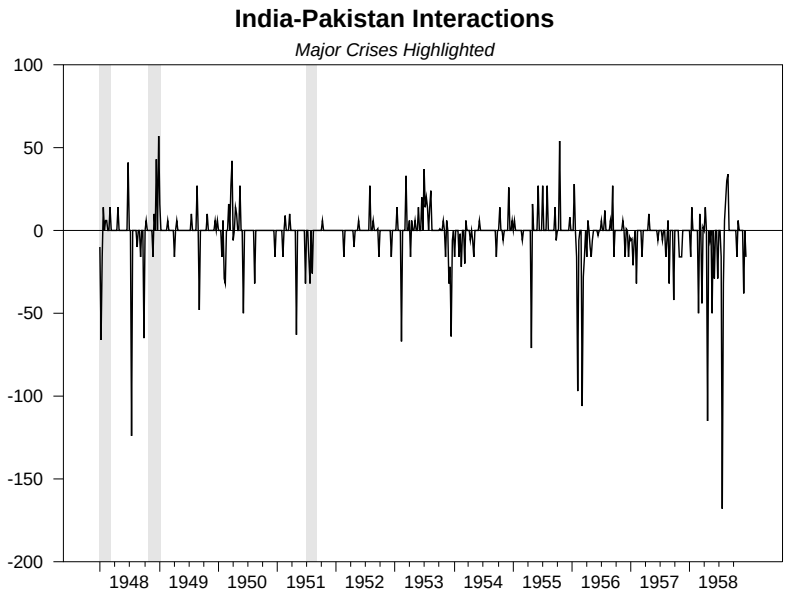


Figure 4: India-Pakistan Interactions, 1948-58. Source: COPDAB.

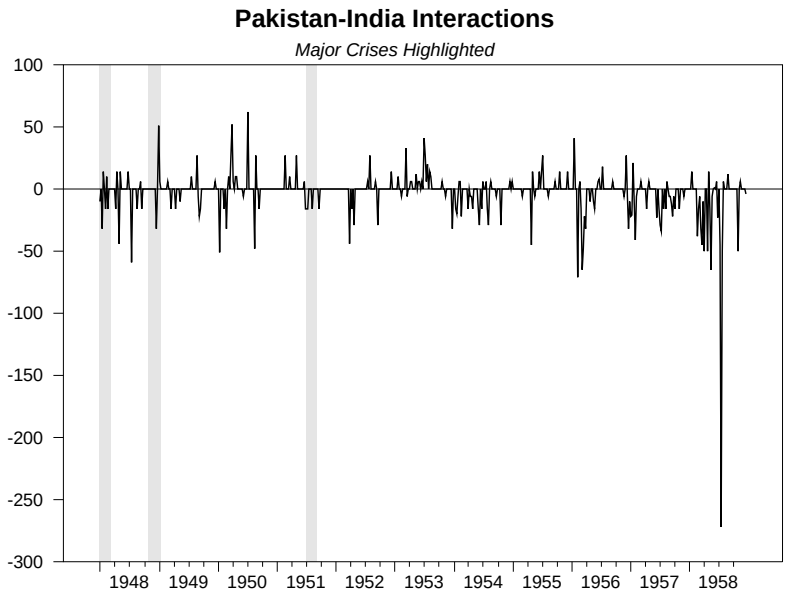


Figure 5: Pakistan-India Interactions, 1948-58.Source: COPDAB.

where $a$, $b_1$,$b_2$ and $m$ are the parameters for the GARCH model, which speak to the appropriateness of such model for the volatility in the series, while if $\alpha$=$\beta$=0, there is no dynamic correlation between the series and the classic constant conditional correlation model is sufficient.

## 5.1 Issues of Temporal Aggregation and Sampling

What is the natural time unit of a social dynamic such as foreign policy behavior? Without a clear answer to this question, there is no clear answer as to which temporal unit of analysis is the most indicated in this case. Marcellino (1999) defines temporal aggregation as a situation in which the frequency of data generation is smaller than the frequency of data collection, so that not all the realizations are observable. He then distinguishes between "point in time sampling" if the variable of interest is observed or sampled at regular intervals and "average sampling" if it is a flow variable and the elements of the aggregated processes are partial sums of the disaggregated ones. Rossana & Seater (1995) on average sampling and they study the effects of aggregating on ARIMA, finding that the shape of the data changes when moving from monthly to yearly data, and phenomena such as cyclicity tend to be masked in the data. Similarly, Shellman (2004) looks at how different decisions on temporal aggregation affect the inference drawn from a VAR model of events data on the interaction between the Colombian government and Colombian dissidents. He finds that as he moves from lower (daily) to higher (yearly) levels of aggregation relations are unmasked and unexposed (meaning, they loose statistical and substantive significance). He concludes that unless there is a theoretical reason as for why to choose one aggregation over the other, it might be wise to trust more the results that hold regardless of the time specification. A similar recommendation emerges in Freeman (1989): replicating Ward's (1982) analysis of COPDAB data aggregating data annually, quarterly, monthly and weekly, Freeman finds that residuals are highly serially correlated and that the substantive findings are somewhat different. He also points to the risks of aggregating a variable across levels of analysis, or even across instances of cooperation and conflict, claiming that both practices can compound the effects of selective sampling and temporal aggregation.

With respect to temporal aggregation, it will be interesting to see how the effects of the predictors change across different temporal aggregation strategies. Temporal aggregation can only mask interesting processes when one form of aggregation only is used. If different time units are employed, then the inference process is enriched.

# 6 Conclusions

Conflict is often the main topic of many studies in IR: while we have competing theories of why conflict starts or end, we know very little of one of the most controversial and relevant aspects of it, turbulence, intended here as the rapid alternation of cooperative and conflictual relations between states. In this paper, I explored issues of construct validity that arise in the study of turbulence in the international system. First, I translate the theoretical concept of turbulence into the idea of *volatility*. Volatility successfully capture the two main components of turbulence, that is, change and rapidity. Second, I discuss the quality of the operationalization: events data show a publicity bias that might make it more useful to complement them with other sources. Finally, I discuss the possibility of measuring turbulence in different contexts. While many of the challenges to construct validity might emerge later on in the process, it is crucial to lay them down before starting the empirical analysis.

# A Handcoding Events Data

Events data rely on information extraction, that is, "a constrained form of natural language understanding in which only pre–specified information is acquired from textual data, often by filling a template "(King & Lowe 2003, 638). There are two main components of the process of information extraction: an information extraction system and an ontology. An information extraction system is a software tool that is fed language (usually in the form of newsleads from newswires such as Reuteurs Business Briefing) and proceeds to parsing, analyzing and quantitatively summarizing the events described in such language. Currently, the most used information extraction tools are the Virtual Research Assistant Reader (VRA) and the Textual Analysis by Augmented Replacement Instructions (TABARI). The first one is proprietary, the second is open source and available from the website of the Kansas Event Data System (KEDS).

Both software tools work through an event ontology or protocol, a category typology that assigns a number to each event on a scale that ranks such events based on how cooperative or how conflictual they are. For instance, the Integrated Data for Event Analysis (IDEA) ontology relies of 157 categories, comprising codes for military engagement, humanitarian aid and natural disaster (223, 073, 96). Different ontologies have been produced, the most famous of which are IDEA, WEIS and CAMEO. IDEA seems to be the most comprehensive, but translation between them merely amounts to recoding a variable (the relations between IDEA and the other ontologies is described on the IDEA website and in King & Lowe 2003, Table 1).

I have successfully used TABARI to code some of the recent events going on in Egypt and involving Egypt and Israel in the last three months. This activity involved several step, but not too much time. I retrieved newswires from Nexis Lexis, filtered them through PERL, fed them to TABARI (which runs on TERMINAL exclusively on Mac OS X), together with dictionaries on actors and verbs, and collected the final product, a .txt document that can be readily imported in STATA with information on the actors involved, the action carried on and a number on the CAMEO ontology scale associated with each action. I report here some examples.

**Event 1.** *The White House Friday called on the new authorities in Egypt to honor existing peace agreements with Israel after the resignation of president Hosni Mubarak.*
*Coding: 110211 USAGOV EGY 20 (Make an appeal or request) CALLED ON EGYPT*

**Event 2.** *US intelligence officials faced tough questions from lawmakers Wednesday over Egypt's Muslim Brotherhood, acknowledging they are unsure of the opposition group's views and goals.*
*Coding: 110217 EGYREBMBR USASPY 90 (Investigate) US INTELLIGENCE QUESTIONS FROM EGYPT'S MUSLIM BROTHERHOOD*

**Event 3.** *Canal officials say it would be the first time Iranian warships have made the passage since the 1979 Islamic revolution.*
*Coding: Skipped.*

**Event 4.** *The political turmoil in Egypt may encourage Israel to normalise ties with Turkey, in crisis since a deadly raid on a Gaza-bound aid ship last year, a Turkish official said Friday.*
*Coding: 110212 ISR EGY 51 (Praise or endorse) WELCOMED AGREEMENT*

The first two events are coded correctly. The source and destination country are identified, and the action is assigned a value in the CAMEO ontology, and a brief summary of the lead is provided. The third event is skipped because TABARI cannot recognize "Canal official" as the source of the action, an error that can easily be prevented by adding this expression in the vocabulary. As for the forth event, the mistake cannot be undone; as the online TABARI manual (p131) explains, "the COMMA SOURCE SAID sequence at the end of the lead gets dropped by Tabari's feature that eliminates subordinate clauses and then the source's opinion, command, or interpretation gets coded as an actual event." This is something to be careful about, especially because TABARI does not drop the observation, it miscodes it. Aside from the results, coding of data with TABARI is fairly smooth.

## References


Alvarez, R.M. & J. Brehm. 1995. "American ambivalence towards abortion policy: Development of a heteroskedastic probit model of competing values." *American Journal of Political Science* 39(4):1055–1082.

Azar, E.E. 2009. "Conflict and Peace Data Bank, COPDAB." *ICPSR07767-v4* .

Azar, E.E., S.H. Cohen, T.O. Jukam & J.M. McCormick. 1972. "The problem of source coverage in the use of international events data." *International Studies Quarterly* 16(3):373–388.

Bennett, D. S & T. Nordstrom. 2000. "Foreign Policy Substitutability and Internal Economic Problems in Enduring Rivalries." *Journal of Conflict Resolution* 44(1):33.

Blainey, G. 1988. *The Causes of War*. Free Pr.

Box-Steffensmeier, Janet M., Henry E. Brady & David Collier. 2010. *The Oxford Handbook of Political Methodology*. Oxford University Press.

Braumoeller, B. F. 2006. "Explaining Variance; Or, Stuck in a Moment We Can't Get Out Of." *Political Analysis* 14(3):268.

Brewer, M. 2000. Research design and issues of validity. In *Handbook of Research Methods in Social and Personality Psychology*, ed. H. Reis & C. Judd. Cambridge University Press.

Burgess, P.M. & R.W. Lawton. 1972. *Indicators of international behavior: An assessment of events data research*. Sage Publications.

Casella, G. & R. L Berger. 2002. *Statistical inference*.

Clark, D. H, T. Nordstrom & W. Reed. 2008. "Substitution Is in the Variance: Resources and Foreign Policy Choice." *American Journal of Political Science* 52(4):763âĂŞ773.

Colaresi, M. P, K. A Rasler & W. R Thompson. 2007. *Strategic rivalries in world politics: position, space and conflict escalation*. Cambridge Univ Pr.

Colaresi, M. P & W. R Thompson. 2002. "Hot spots or hot hands? Serial crisis behavior, escalating risks, and rivalry." *The Journal of Politics* 64(04):1175âĂŞ1198.

Cook, T.D., D.T. Campbell & A. Day. 1979. *Quasi-experimentation: Design & analysis issues for field settings*. Houghton Mifflin Boston.

Diehl, P. F & G. Goertz. 2001. *War and peace in international rivalry*. Univ of Michigan Pr.

Enders, W. 2004. "Applied Econometric Time Series." *Technometrics* 46(2):264âĂŞ264.

Evera, S. Van. 1999. *Causes of war: power and the roots of conflict*. Cornell Univ Pr.

Fearon, J. D. 1995. "Domestic Political Audiences and the Escalation of International Disputes." *International Organization* 49(03):379âĂŞ414.

Freeman, J. R. 1989. "Systematic Sampling, Temporal Aggregation, and the Study of Political Relationships." *Political Analysis* 1(1):61.

Geller, D.S. 2000. "Status quo orientation, capabilities, and patterns of war initiation in dyadic rivalries." *Conflict Management and Peace Science* 18(1):73.

Goldstein, J. S. 1992. "A conflict-cooperation scale for WEIS events data." *Journal of Conflict Resolution* 36(2):369.

Goldstein, J. S & J. C Pevehouse. 1997. "Reciprocity, bullying, and international cooperation: Time-series analysis of the Bosnia conflict." *American Political Science Review* 91(3):515âĂŞ529.

Goldstein, J. S, J. C Pevehouse, D. J Gerner & S. Telhami. 2001. "Reciprocity, triangularity, and cooperation in the Middle East, 1979-97." *Journal of Conflict Resolution* 45(5):594.

Gronke, P. & J. Brehm. 2002. "History, heterogeneity, and presidential approval: a modified ARCH approach." *Electoral Studies* 21(3):425âĂŞ452.

Hewitt, J. J, J. Wilkenfeld & T. R Gurr. 2010. *Peace and conflict 2010*. Paradigm Publishers.

King, G. & L. Zeng. 2001. "Logistic regression in rare events data." *Political analysis* 9(2):137.

King, G. & W. Lowe. 2003. "An Automated Information Extraction Tool for International Conflict Data with Performance as Good as Human Coders: A Rare Events Evaluation Design." *International Organization* 57(03):617âĂŞ642.

Lebo, M. J & J. M Box-Steffensmeier. 2008. "Dynamic Conditional Correlations in Political Science." *American Journal of Political Science* 52(3):688âĂŞ704.

Maestas, C. & R. R Preuhs. 2000. "Modeling volatility in political time series." *Electoral Studies* 19(1):95âĂŞ110.

Maoz, Z. & B. D Mor. 2002. *Bound by struggle: The strategic evolution of enduring international rivalries*. Univ of Michigan Pr.

Marcellino, M. 1999. "Some Consequences of Temporal Aggregation in Empirical Analysis." *Journal of Business & Economic Statistics* 17(1):129âĂŞ136.

McClelland, C.A. & G.D. Hoggard. 1969. "Conflict patterns in the interactions among nations." *International politics and foreign policy* pp. 711–724.

Morgan, T. C. 1994. *Untying the knot of war: A bargaining theory of international crises*. Univ of Michigan Pr.

Most, B. A & H. Starr. 1984. "International Relations Theory, Foreign Policy Substitutability, and" Nice" Laws." *World Politics: A Quarterly Journal of International Relations* p. 383âĂŞ406.

Most, Benjamin A. & Harvey Starr. 1989. *Inquiry, Logic, and International Politics*. Univ of South Carolina Press.

Reed, W. & D. Chiba. 2010. "Decomposing the Relationship Between Contiguity and Militarized Conflict." *American Journal of Political Science* 54(1):61âĂŞ73.

Reiter, D. & A.C. Stam III. 1998. "Democracy, war initiation, and victory." *American Political Science Review* 92(2):377–389.

Roeder, P.G. 1984. "Soviet Policies and Kremlin Politics." *International Studies Quarterly* 28(2):171–193.

Rossana, R. J & J. J Seater. 1995. "Temporal Aggregation and Economic Time Series." *Journal of Business & Economic Statistics* 13(4):441âĂŞ451.

Shellman, S. M. 2004. "Time Series Intervals and Statistical Inference: The Effects of Temporal Aggregation on Event Data Analysis." *Political Analysis* 12(1):97.

Taylor, J.S. 2008. *Modeling Financial Time Series*. World Scientific Publication Co.

Thompson, W.R. 1999. *Great power rivalries*. Univ of South Carolina Pr.

Thompson, W.R. 2001. "Identifying rivals and rivalries in world politics." *International Studies Quarterly* 45(4):557–586.

Waltz, K. N. 1959. *Man, the State and War*. Columbia University Press New York.

Waltz, K. N. 1979. *Theory of International Politics*. McGraw-Hill.

Ward, M.D. 1982. "Cooperation and conflict in foreign policy behavior: Reaction and memory." *International Studies Quarterly* 26(1):87–126.

Werner, S. 1999. "The precarious nature of peace: Resolving the issues, enforcing the settlement, and renegotiating the terms." *American Journal of Political Science* 43(3):912âĂŞ934.