Why Record War Casualties?

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The Role of Computer Science in Civilian Casualty
Recording and Estimation

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This is the most powerful reason to record war deaths.

Above is the memorial wall of the names of the people killed at Srebrenica.

An estimate of the number of people killed will not produce the same reaction, although estimates are useful in other contexts.

A second reason to record war deaths is to try to reduce them.

Hicks MH, Spagat M. (2008) The Dirty War Index: A public health and human rights tool for examining and monitoring armed conflict outcomes. *PLoS Medicine*, 5(12): e243. Open Access, 7 pages.

Hicks MH, Dardagan H, Guerrero Serdan G, Bagnall P, Sloboda J, Spagat M. (2009) The Weapons that Kill Civilians. *New England Journal of Medicine*, 360, 1585-1588.

Cameron E, Spagat M, Hicks H. (2009) Tracking Civilian Casualties in Combat Zone using Civilian Battle Damage Assessment Ratios. *British Army Review, Summer*.

We have more of this work on the way.

There are just two simple ideas here.

1. **Measure** the **impact** of different types of conflict events such as those carried out by particular **perpetrators** or those using particular **weapons**.

2. **Identify** event types that seem to have **disproportionately unacceptable** effects.

Data quality is paramount in this kind of work and, largely because of this, we try to keep the statistics as simple as possible.

It is fine to use estimates in this work, rather than just recorded deaths or events.

Example – Hicks et al. (cited above)

Iraqi civilians, females, and children killed by weapons in short-duration events of armed violence, March 20, 2003 through March 19, 2008.

Method†	Mean number of civilians killed per event* (SE)	Number of females/Number of civilians of known sex killed (% female)‡	Number of children/Number of civilians of known age killed (% children)‡
Execution§	7 (0.2)§	300/6,592 (5)	124/6,687 (2)
Execution with torture§	8 (0.4)§	49/1,906 (3)	16/1,882 (1)
Small-arms gunfire‖	2 (0.03)	660/7,220 (9)	416/7,963 (5)
Any Suicide bomb	12 (1.0)	266/2,535 (11)	340/2,734 (12)
Suicide bomber in vehicle	11 (1.2)	142/1,440 (10)	234/1,607 (15)
Suicide bomber on foot	16 (1.5)	124/1,086 (11)	106/1,118 (9)
Vehicle bomb	6 (0.4)	244/859 (28)	216/1,053 (21)
Roadside bomb	2 (0.1)	126/1,230 (10)	149/1,409 (11)
Mortar	3 (0.1)	170/386 (44)	231/556 (42)
Air attack	9 (0.9)	258/564 (46)	277/703 (39)
Bomb	17 (3.6)	28/67 (42)	34/88 (39)
Missile	8 (2.3)	36/115 (31)	35/118 (30)
Air and Ground attack¶	17 (6.5)	63/177 (36)	66/234 (28)
All Method Totals	4 (0.1)	2,396/21,448 (11)	2,146/23,581 (9)

One can make a case that such analysis is required by the laws of war which *prohibit* military actions that are *expected to cause civilian harm* out of *proportion* to anticipated military advantages.

Nevertheless, it appears that militaries and governments do very little analysis of the impact of their actions. The usual approach to the proportionality principle seems to be to say *"trust us we're the government."*
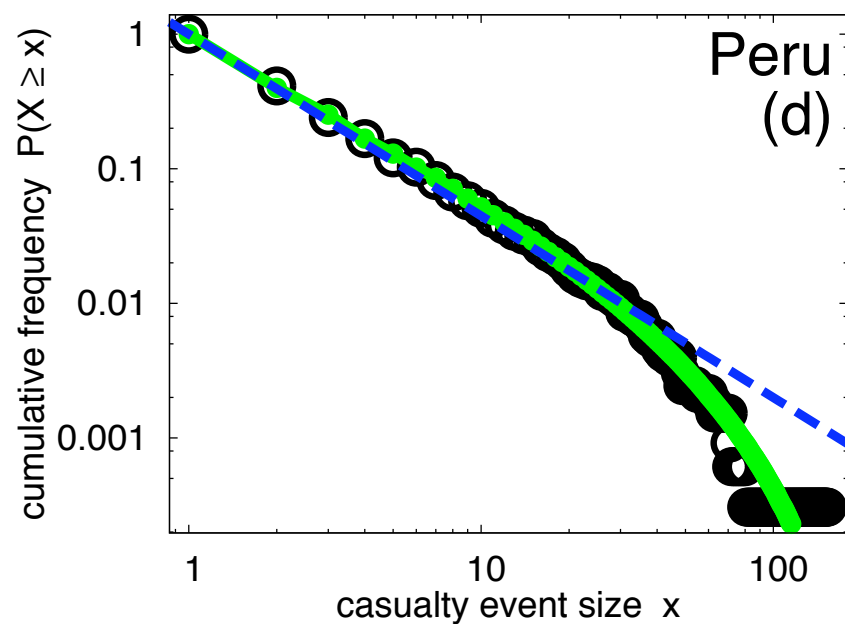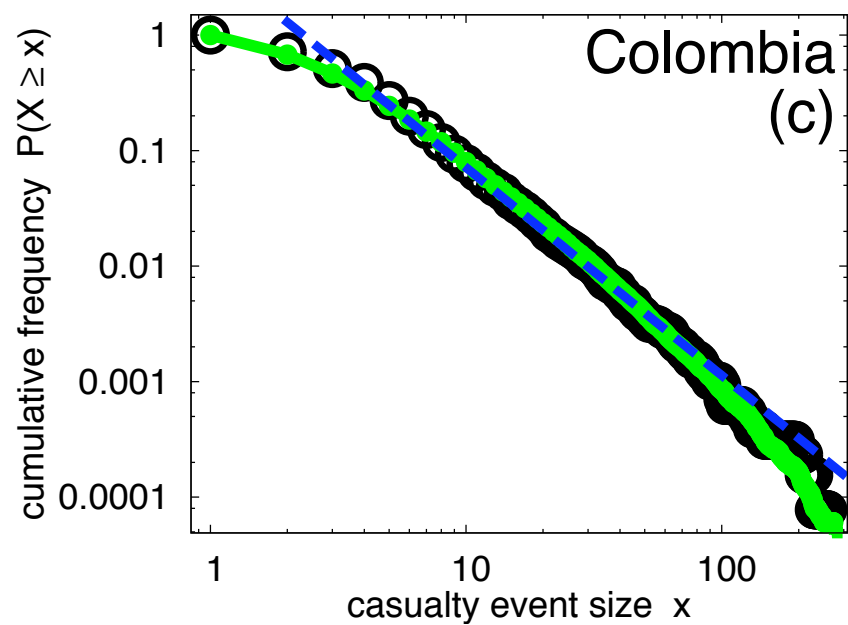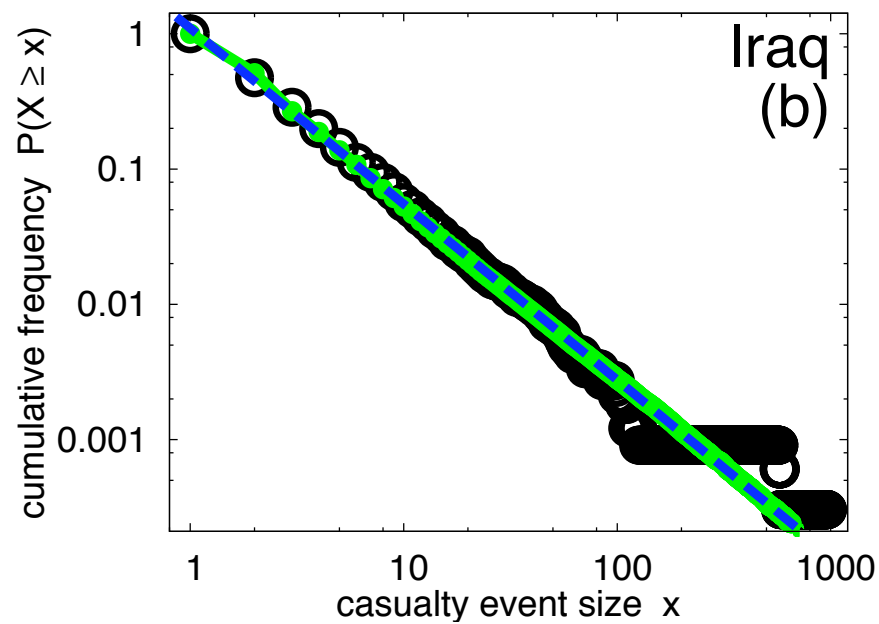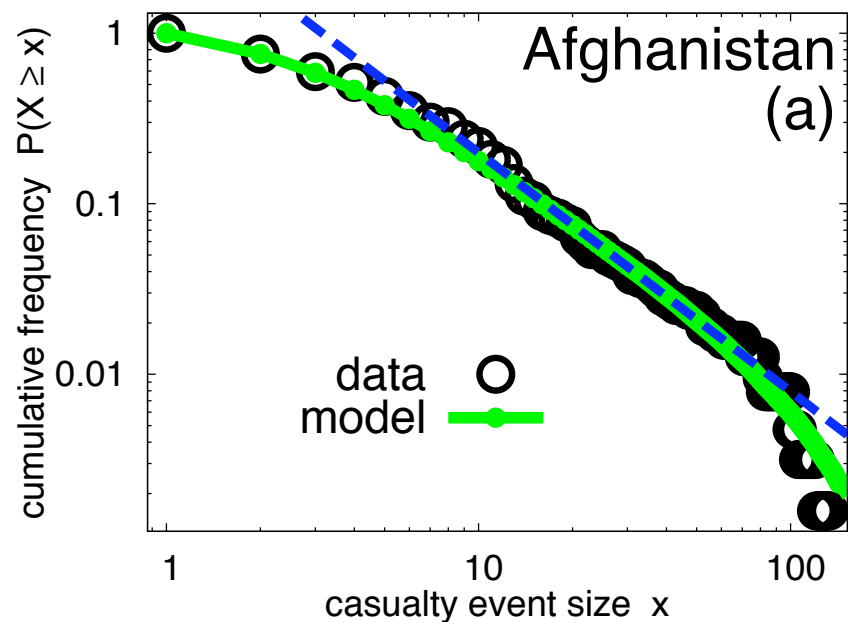
However, Lt. Col. Ewan Cameron (cited above), a British Army medic, is currently applying this approach with his colleagues in southern Afghanistan and believes that it is saving lives. For example, this group found that official procedures for firing *warning shots* were causing deaths with no military advantage. They changed those procedures.
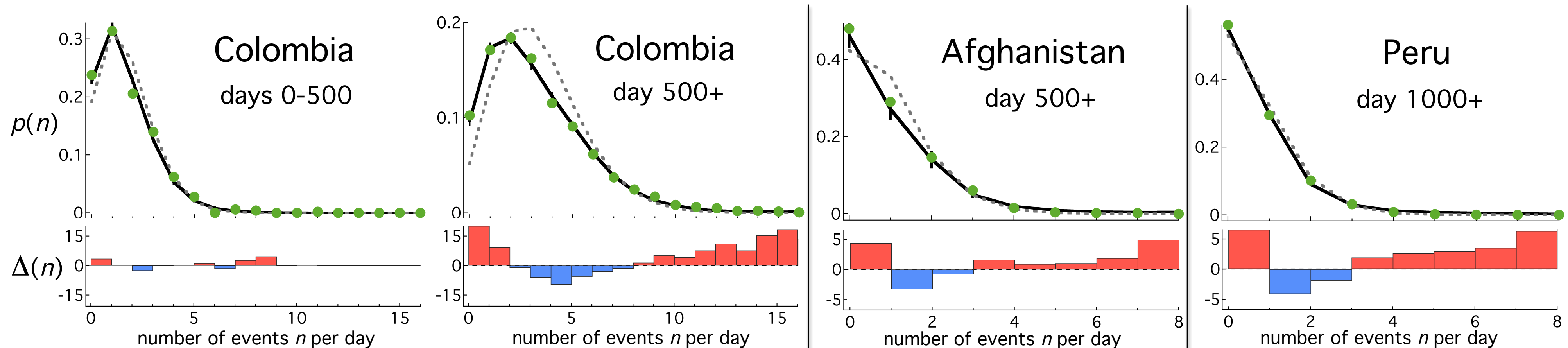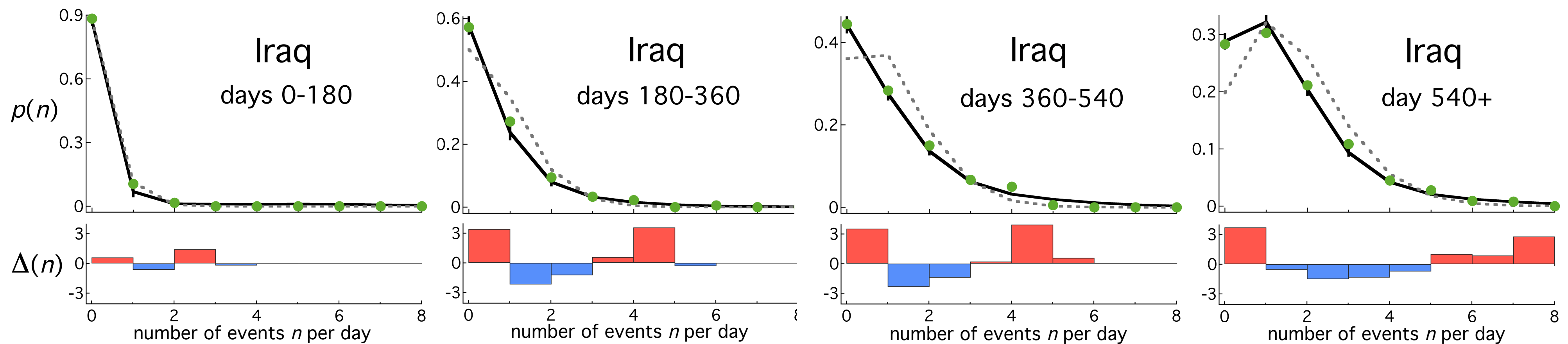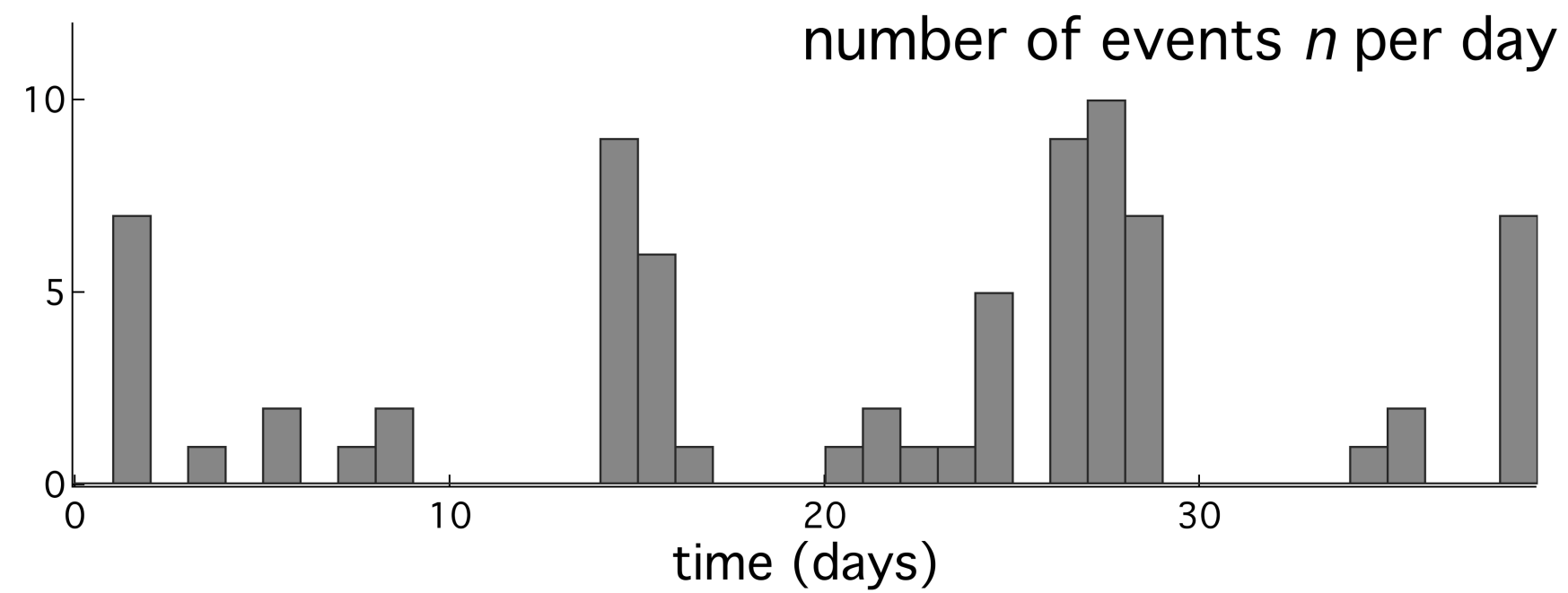
A third reason to record war casualties is to study the **nature of war**. (See the Mathematics of War web site. The most central person in this work is Neil Johnson of the University of Miami.)

Using conflict **event data** we have found that a variety of different wars exhibit surprisingly similar patterns both in the **size distribution of events**, where size is measured by casualties, and in the **"bursty" timing** of events.
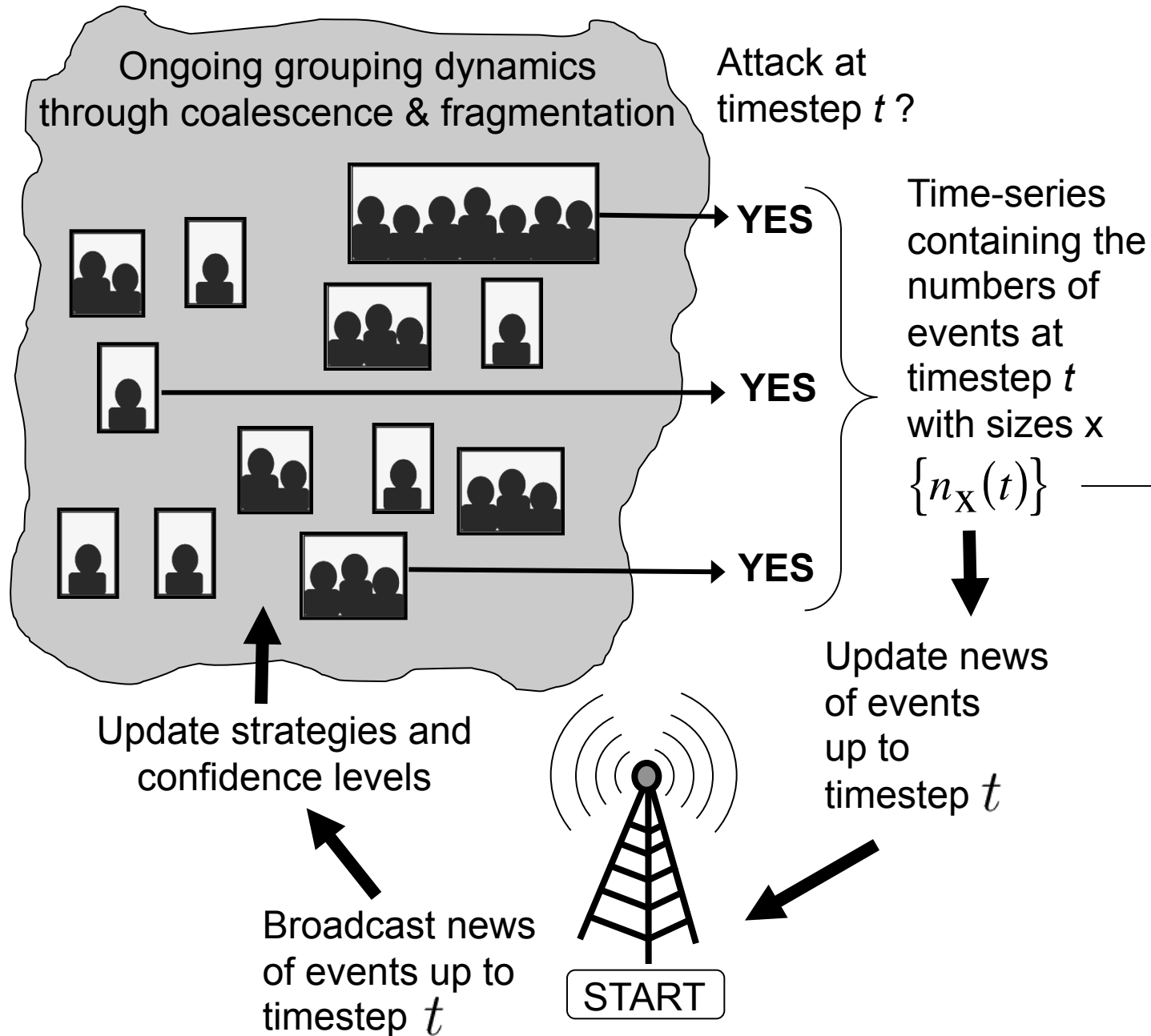
Bohorquez JC, Gourley S, Dixon A, Spagat M, Johnson NF. (2009) Common Ecology Quantifies Human Insurgency, *Nature*, 462, 911-914.

Much of this work involves building agent-based models of warfare that generate the empirical patterns we see in the data. The basic mechanisms driving the warring groups in these models are **coalescence and fragmentation** (i.e. no fixed hierarchy) and **competition for media attention**.

MODEL MECHANISM AT TIMESTEP t

Ongoing grouping dynamics through coalescence & fragmentation

Attack at timestep t ?

YES

YES

YES

Time-series containing the numbers of events at timestep t with sizes x

$$\{n_X(t)\}$$

Update news of events up to timestep t

Update strategies and confidence levels

Broadcast news of events up to timestep t

START

DATA ANALYSIS

Number of events of size x aggregated over time (Figs. 1 and 2)

$$\sum_t n_X(t)$$

Number of events at timestep t aggregated over size (Fig. 3)

$$\sum_X n_X(t)$$

What about Machine Learning Researchers?

First, I would urge people not to fixate on the question of how many people have been killed in a conflict. This question has its place but it is not the only important thing or even the most important thing.

The topic on the nature of war seems to me to be the most obvious entry point to the conflict field for computer scientists. I can see a few possibilities (but I do not really know much about machine learning). For example:

1. There is now a lot of good georeferenced conflict data available. There is much to learn about how conflict violence is distributed across space.

2. The adaptation of terrorist or insurgent groups to threats to their survival. People are now applying evolutionary methods to this problem ("Natural Security").