

**O N T H E M O S T E C O N O M I C
G E O M E T R Y O F P E A C E**

Carlos E. Puente

Department of Land, Air and Water Resources
University of California, Davis

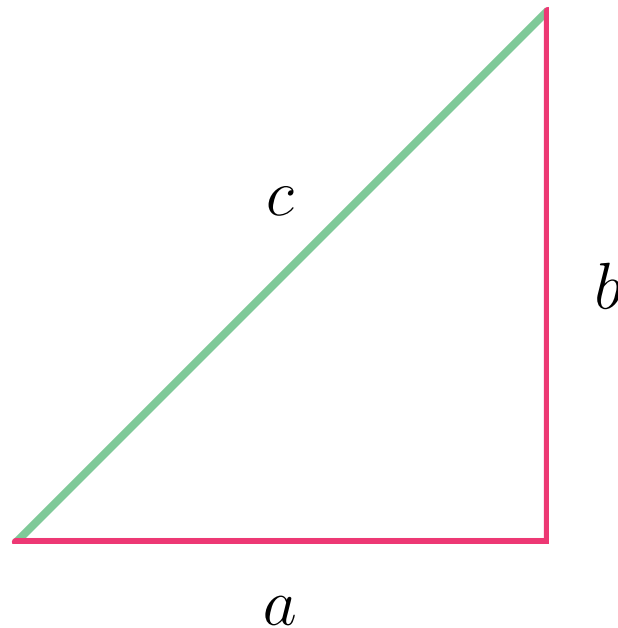
ASREC Annual Meeting

Portland, June 29 - July 3, 2010

Thesis

We humans, with a soul,
may learn from recent advancements
regarding natural complexity
in order to find peace...

Pythagorean theorem

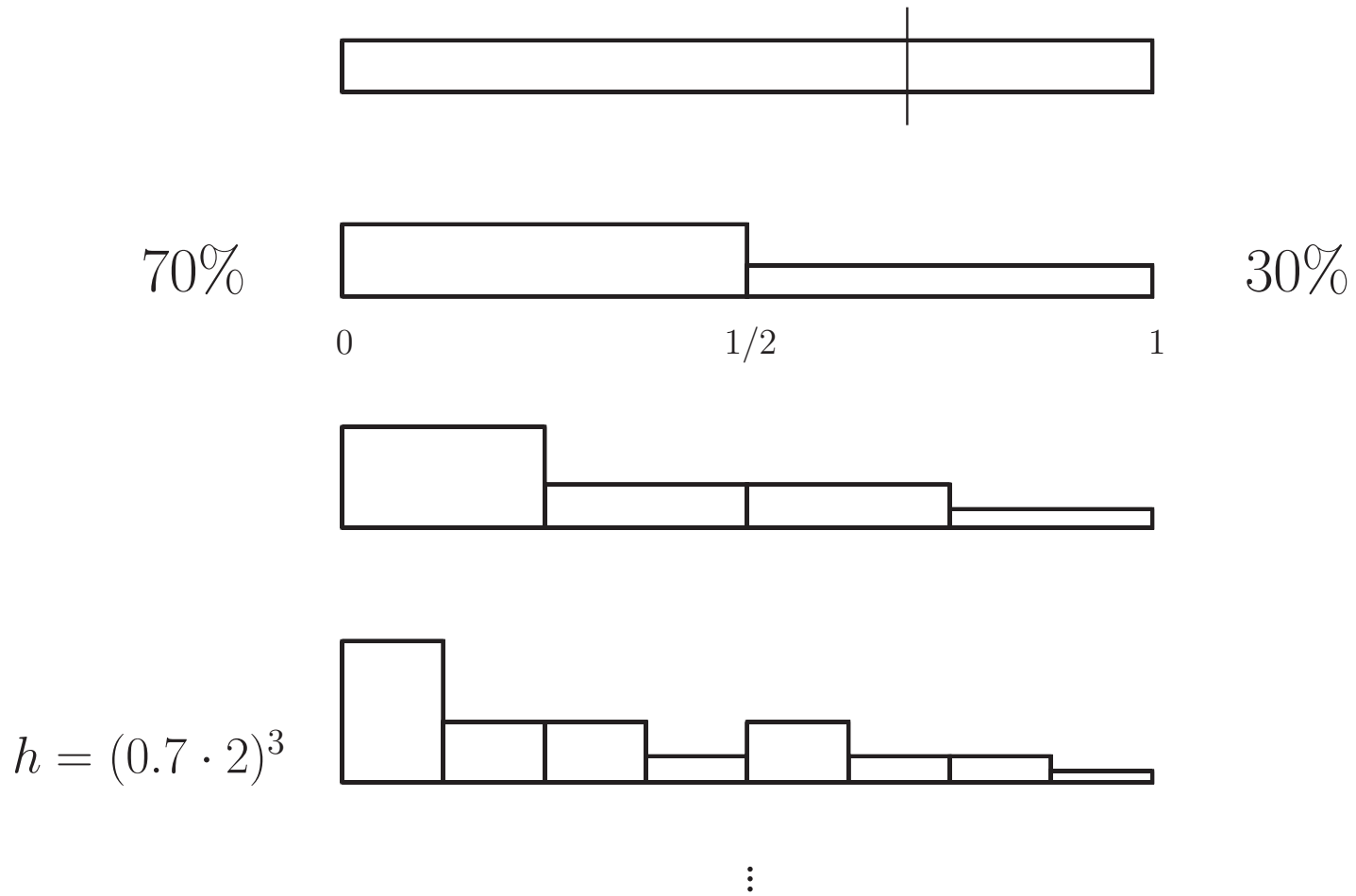


a , b are **legs** and c is **hypotenuse**

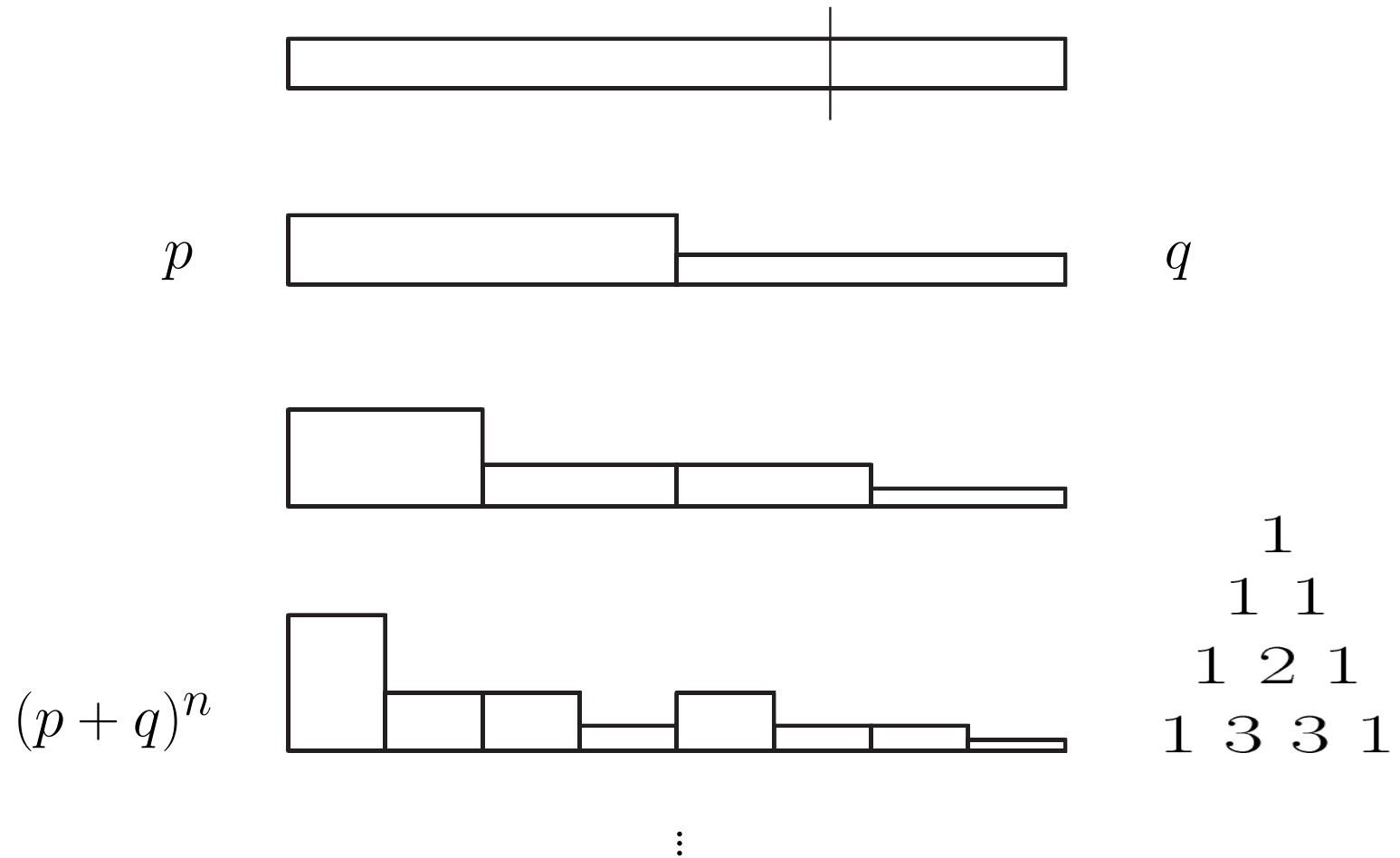
$$a^2 + b^2 = c^2$$

$$a = b = 1 \Rightarrow c = \sqrt{2} \approx 1.4142\dots$$

A game for kids

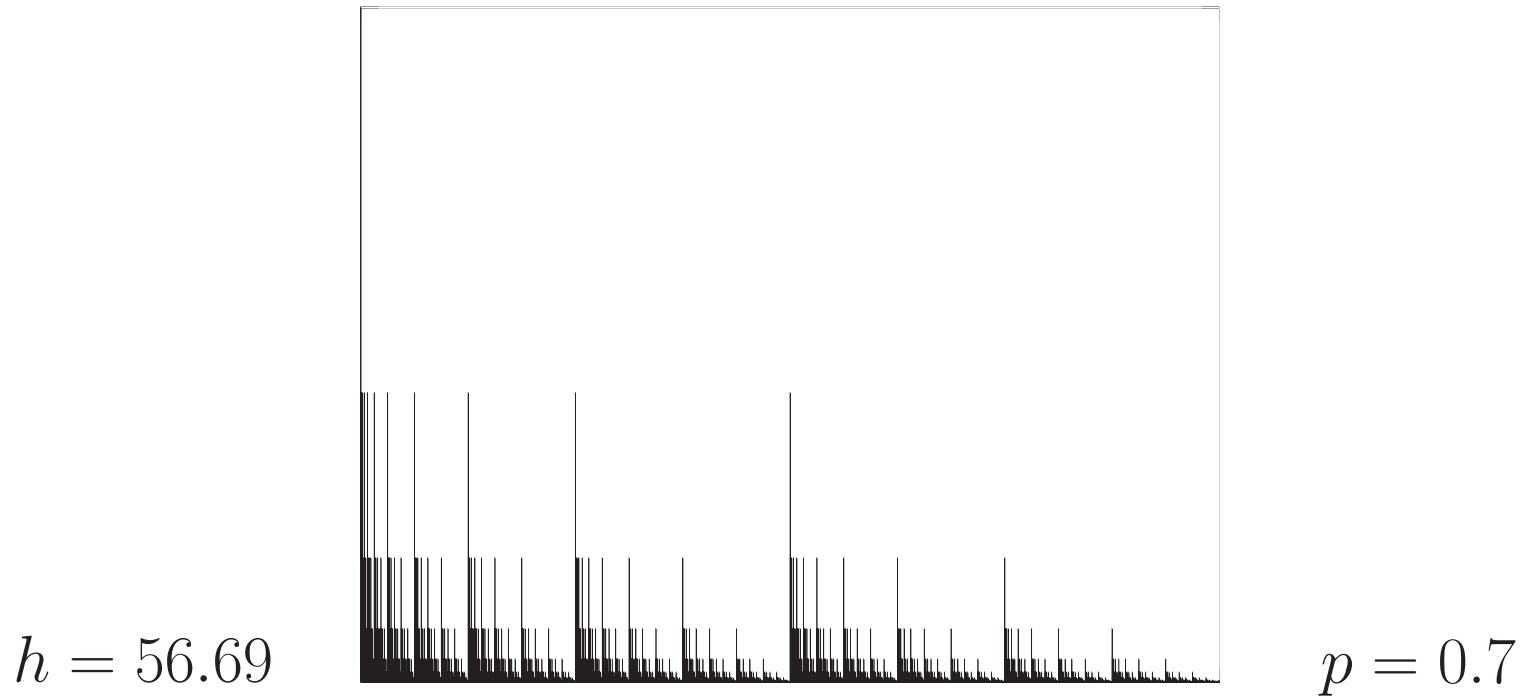


A game for kids



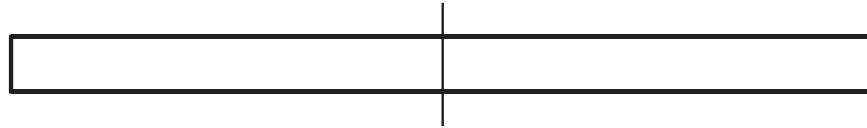
game defines a multiplicative **cascade**

After $n = 12$ levels



intertwined **thorns** via layers having distinct densities
ultimate support on each of the layers is **dust**
game generates a **multifractal** measure

Another game for kids

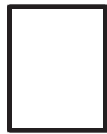


50%



0

1/3



2/3

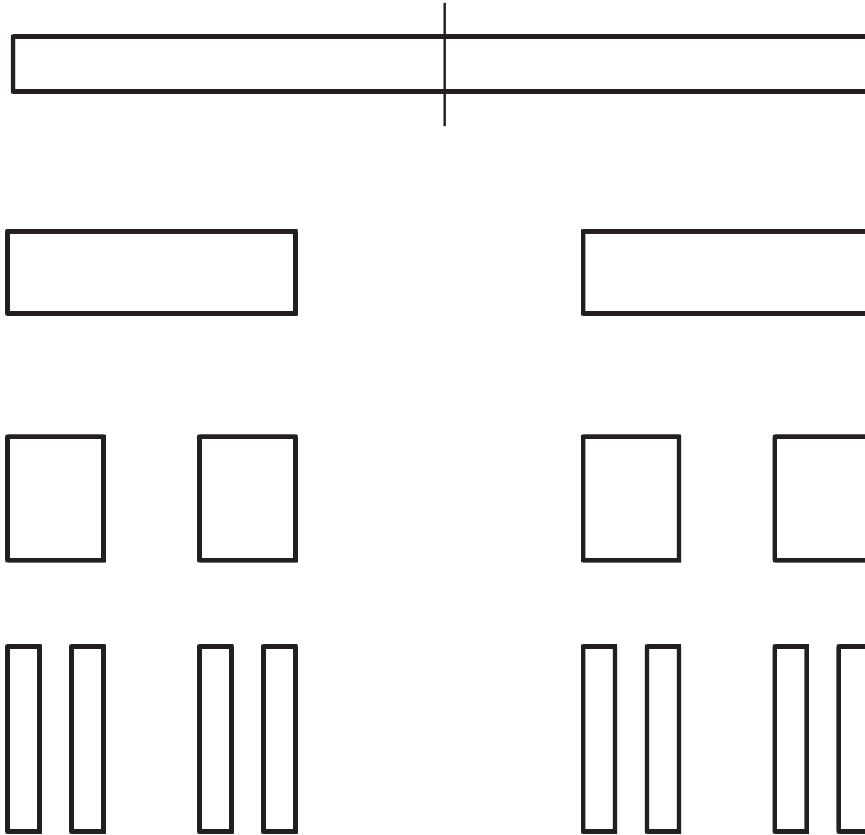
1



50%

⋮

Another game for kids

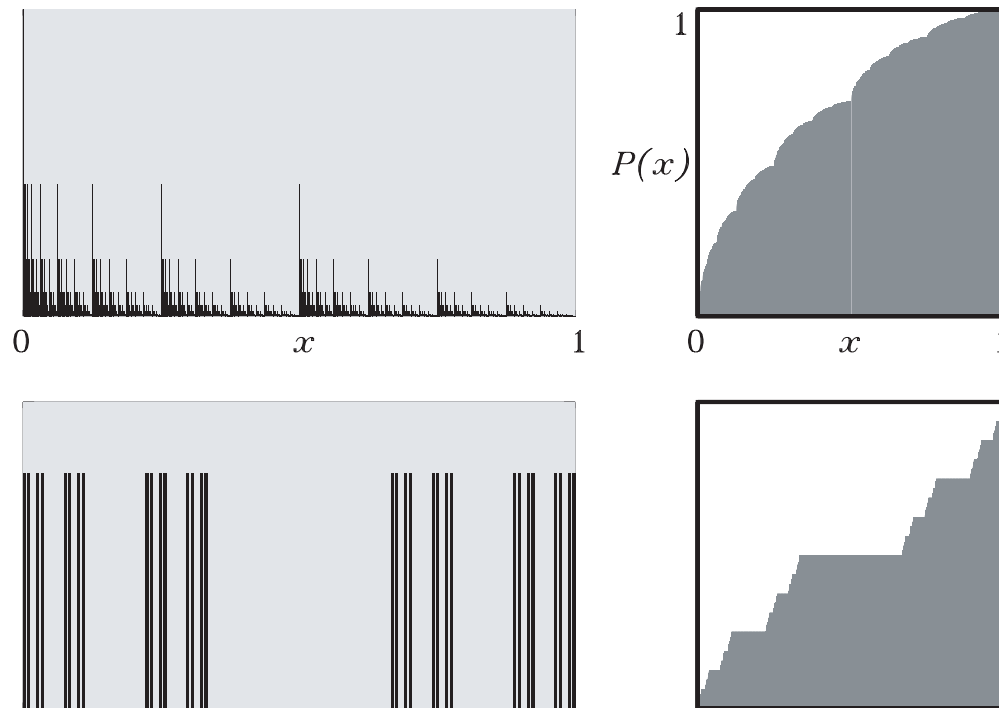


cascade yields equal disjoint **thorns** over **dust**

varying the **hole** size gives topologically the layers on first game

Moral: the two games are intimately **related**

Accumulated clay

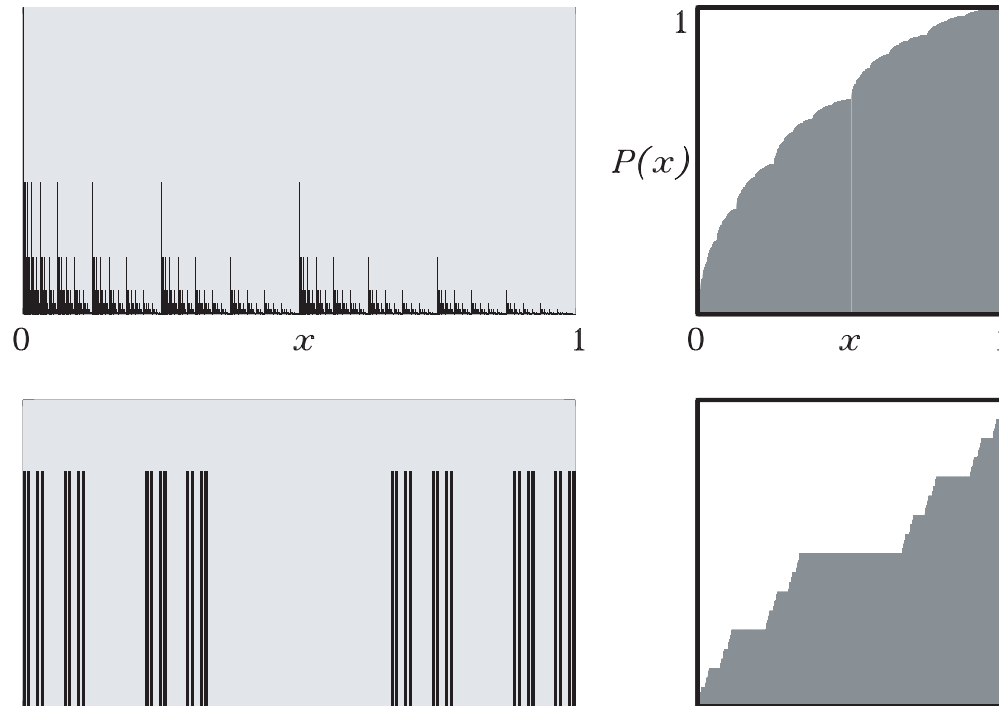


...simply from the dynamics of the games

notches above: $P(1/2) = 0.7$, $P(1/4) = 0.49$, etc.

plateaus below: $P(1/3) = P(2/3) = 0.5$, etc.

Accumulated clay

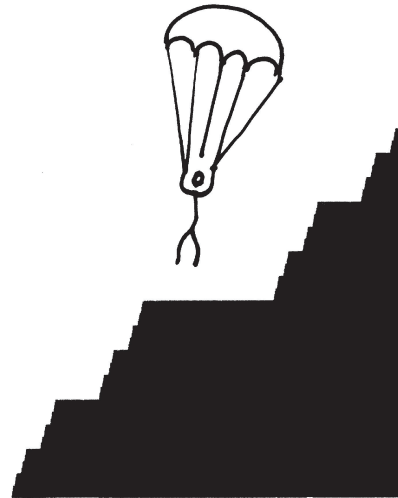


cumulative sets have no **derivatives** and are **locally flat**
they **universally** have **maximal lengths**:

$$d\{(0, 0), (1, 1)\} = 2, \quad p \neq 1/2, \quad h \neq 0$$

...also found combining the games and adding randomness

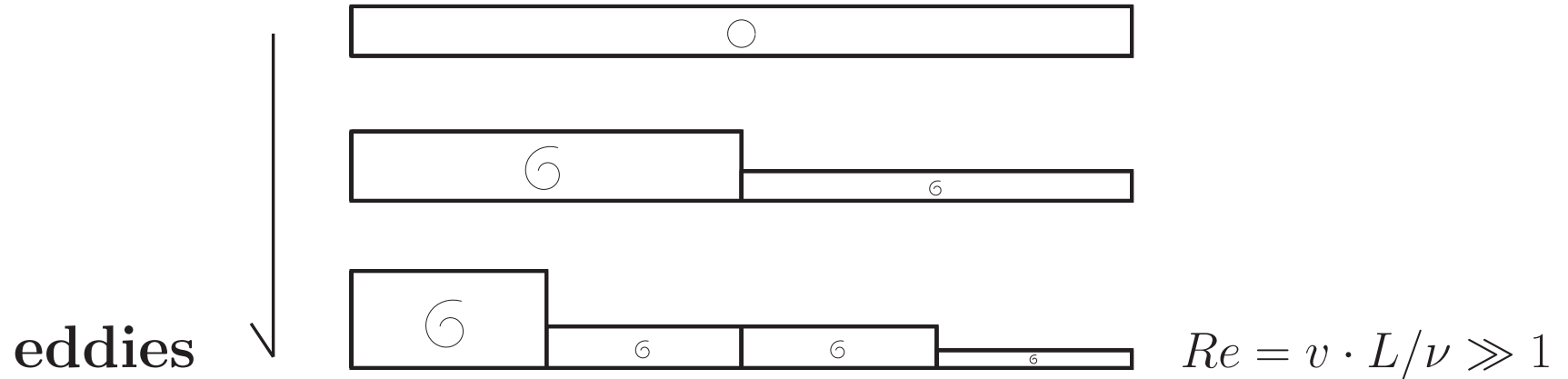
A veritable deception



a devil's staircase...

Fully developed turbulence

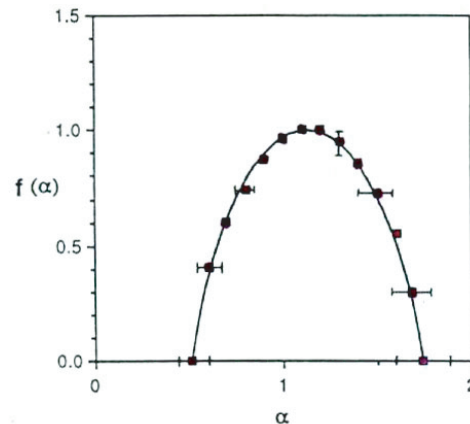
(Meneveau and Sreenivasan, 1987)



layers in one-dimensional turbulence as in first cascade

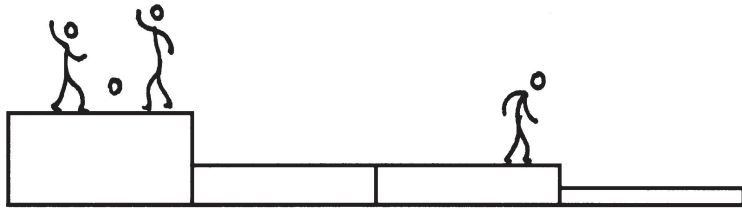
dissipation: atmospheric, boundary layer, wake of a cylinder...

$$p = 0.7$$



universal

Our turbulent times



inequities
competition
disparities



discriminations
forced equality
fear

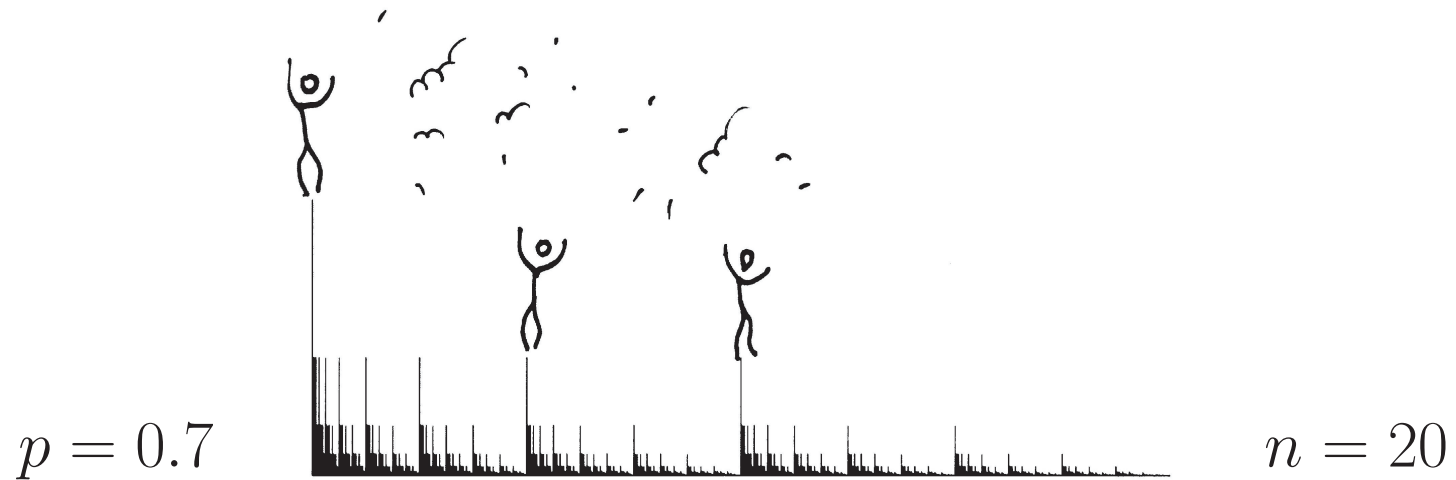
selfish postures and actions

2/3 of the world under **poverty**

6,000 kids **die** a day for lack of **water**

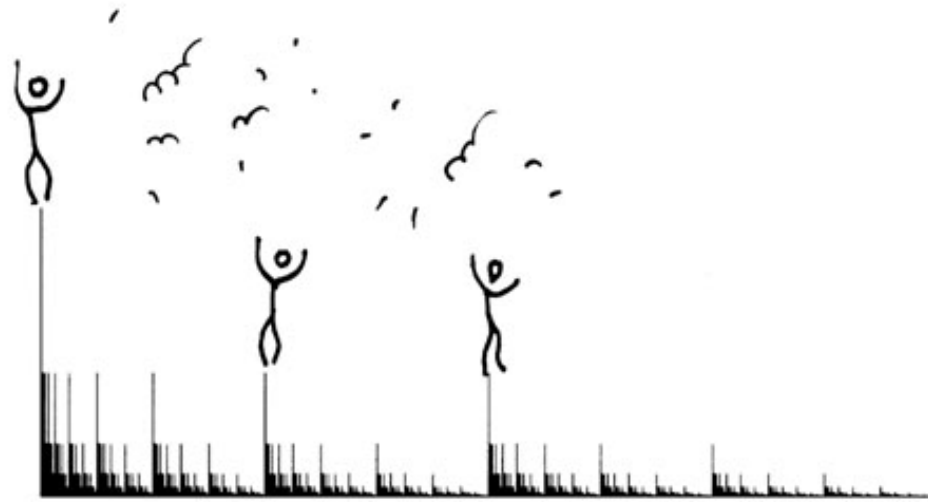
violence and **terror...**

An optimal system?



5, 10, 20 and 40% largest thorns have
57, 70, 84 and 95% of the mass

An optimal system?



$$p = 0.7$$

$$n = 20$$

5, 10, 20 and 40% largest thorns have
57, 70, 84 and 95% of the mass

this is quite close to **USA**: 59, 71, 84 and 95%, **Gini**: 40.8 vs. 40

Moral: as both cascades **dissipate** the energy,
if we ride them, they lead us to “bite the dust”

Common sense code for peace

run cascade in reverse to achieve **unity**

“cut mountains and fill valleys” to restore **equilibrium**

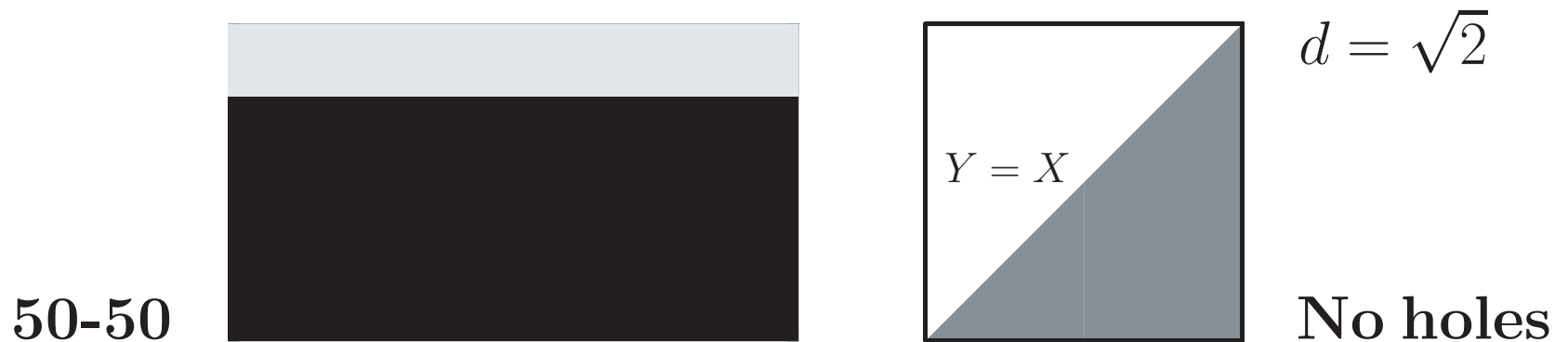
live at **low** Reynolds numbers to avoid violence

Common sense code for peace

run cascade in reverse to achieve **unity**

“cut mountains and fill valleys” to restore **equilibrium**

live at **low** Reynolds numbers to avoid violence:

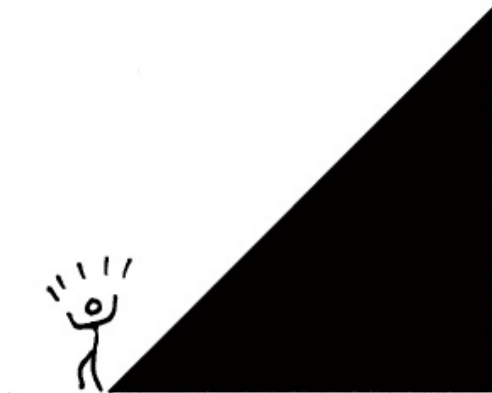
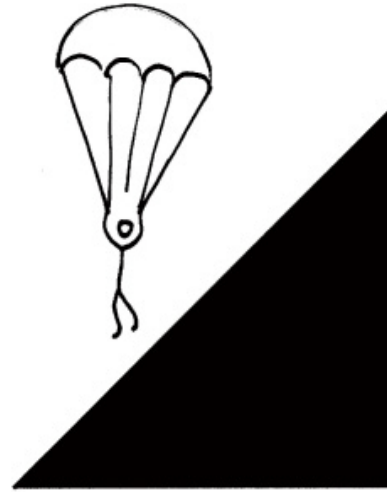


a **unique** solid solution without **thorns** and **dust**

the **hypotenuse** is the pathway of **peace!**

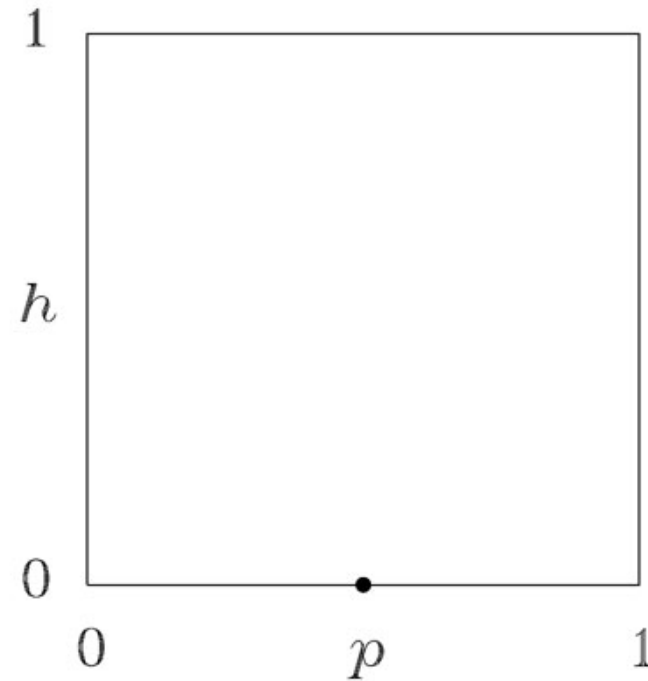
Moral: humbly love everyone to find **unity**, $1 = 0.999\dots$

A veritable invitation



to the **origin...**

Equilibrium is an improbable point



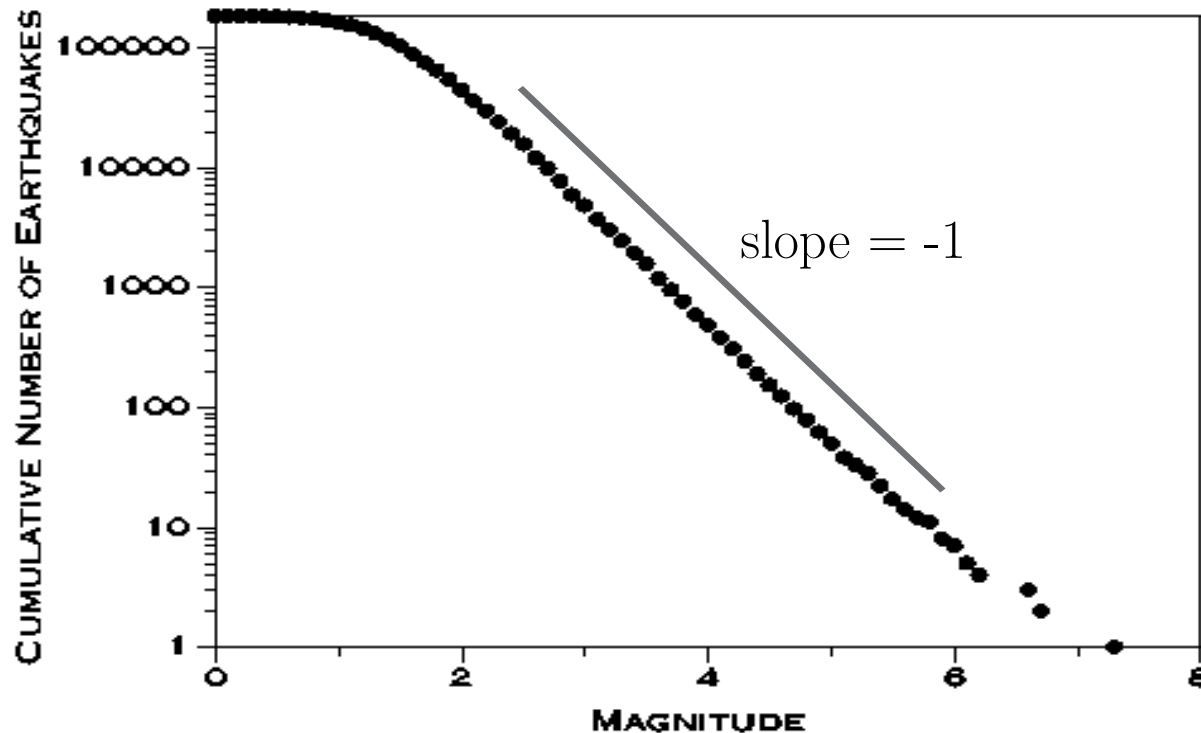
it is **hypocritical** to judge if we are “far away” from the **point**
a convex surface is found for a **finite** number of levels:

balance is found easily aided by **gravity**

in truth there is **darkness** between **6** and **9**...

Power-laws and natural complexity

$$P[X \geq x] \sim x^{-c}$$



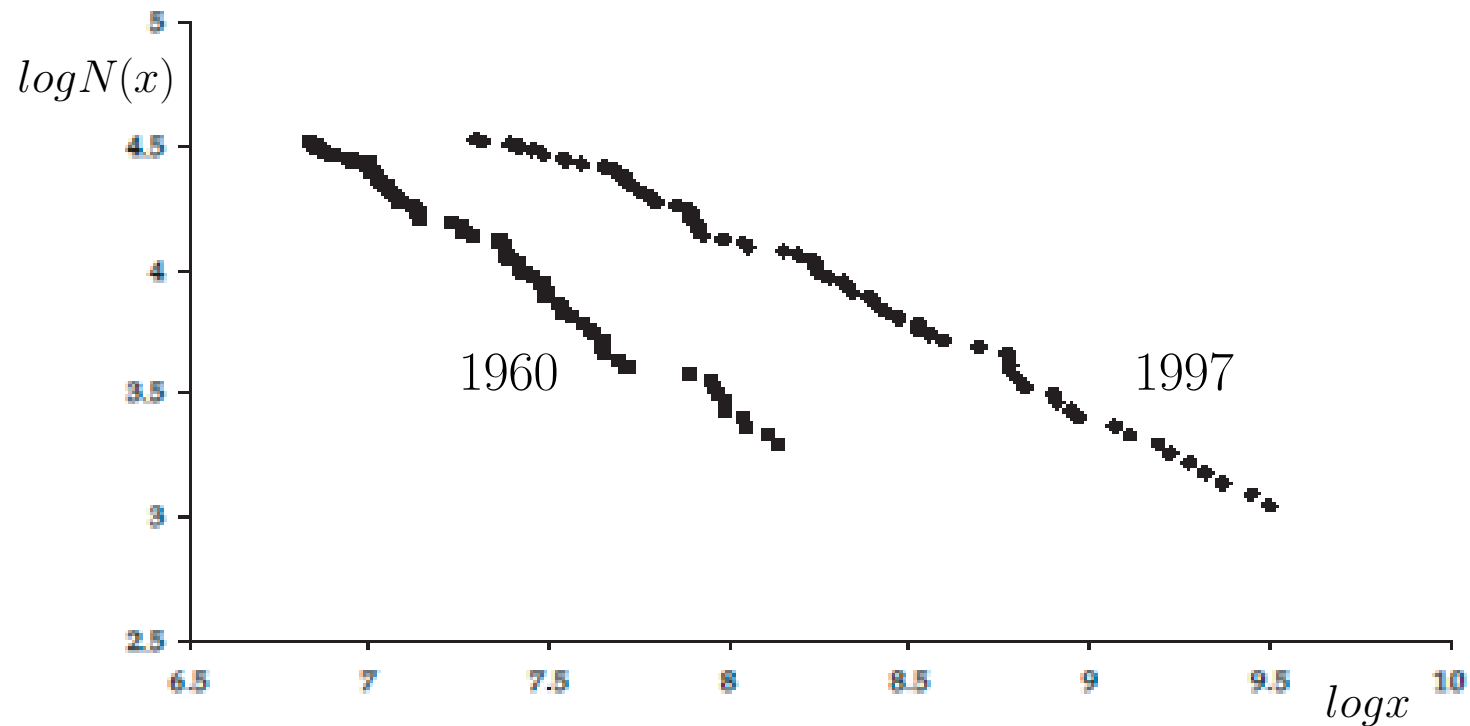
earthquakes, avalanches, hurricanes, floods,
volcanic eruptions, forest fires

utter violence...

Power-laws and inequalities

(Vilfredo Pareto, 1896)

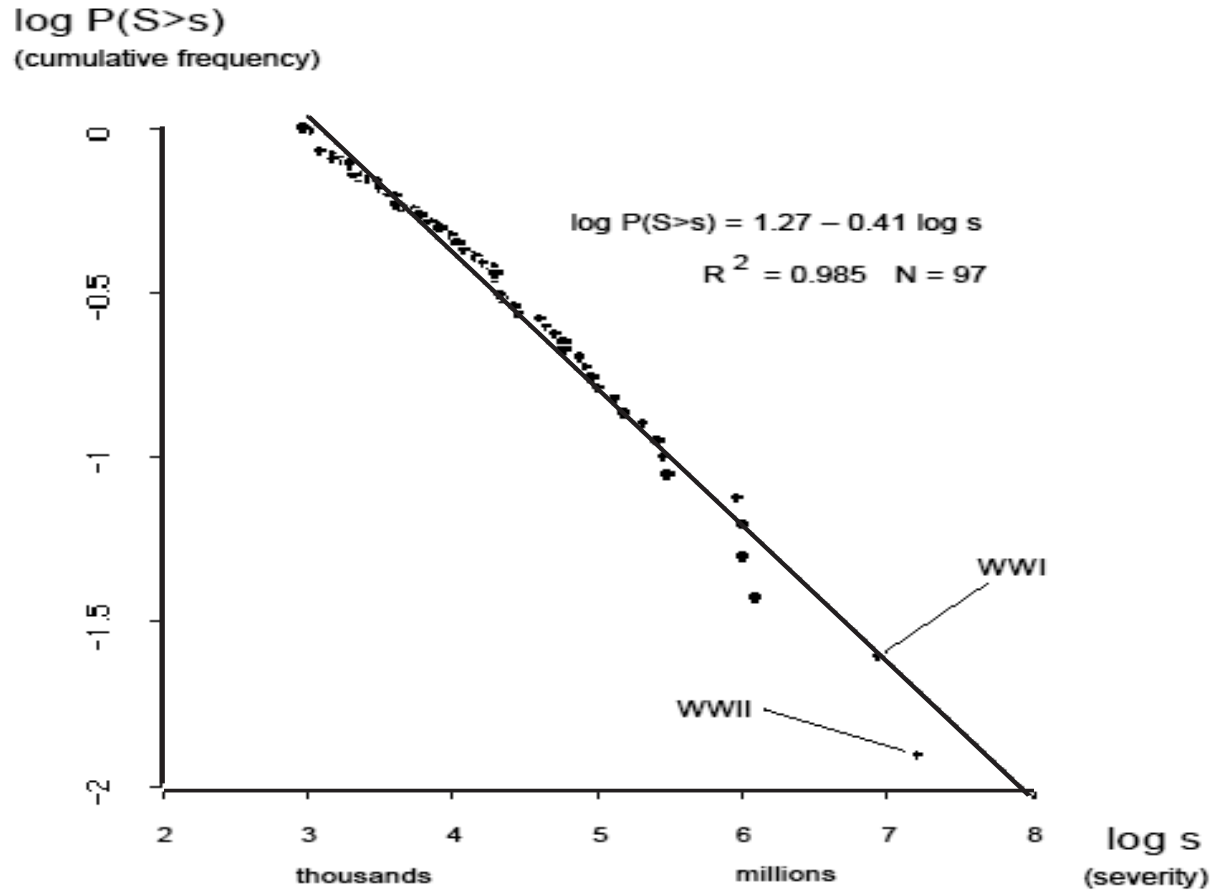
$$\log N(x) = \log A + m \cdot \log x$$



30th to 85th percentiles of world income distribution
(After Di Guilmi et al., 2003)

Power-laws and wars

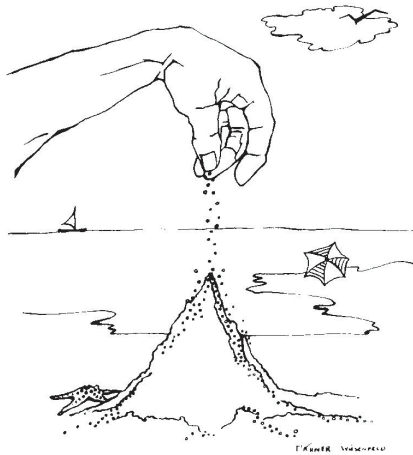
(Lewis Fry Richardson, 1960)



(After Cederman, 2003)

A bit more of common sense

avoid mechanisms that generate the **violence** in power-laws:



(After Bak, 1996)

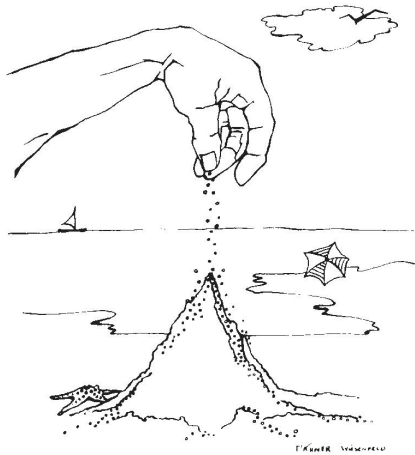
- multiplicative cascades
- preferential attachments
- highly optimized tolerance
- self-organized criticality...

there is no “**invisible hand**” but ours:

“humans without scale” abuse their power and yield power-laws...

A bit more of common sense

avoid mechanisms that generate the **violence** in power-laws:



(After Bak, 1996)

- multiplicative cascades
- preferential attachments
- highly optimized tolerance
- self-organized criticality...

there is no “**invisible hand**” but ours:

“humans without scale” abuse their power and yield power-laws...

...it is best to adopt **zero** power:  = 1

CONGA TO INFINITY

$0! = 1, 0 + 0 = \infty, 1 + 1 = 1,$
 $1/0 = \infty, x^0 = 1, 0 \rightarrow \infty$

Shanti Setú to dance...

**This is the conga
of a lovely trinity,
o dance your conga
intently to infinity. (2)**

The zero admired
is one very pretty,
and zero plus zero
adds up to infinity.

A one with another
joins a lovely rite,
and zero below one
is truly all might.

The zero as power
is the same divinity,
and a twist of nothing
arrives to infinity.

Shanti Setú to ponder...

**This is your conga
enjoy its affinity,
join in the conga
of a lovely trinity. (2)**

A zero rewired
is one of pure light,
and zero with zero
is I tell you a delight.

A one with a one
o united vicinity,
and a circle down
yields again infinity.

The halo on top
o saintly neophyte,
with a zero weaved
o expels all fright.

To dance...

**To zero is,
the one you see,
and to infinity. (2)**

The zero is a key
leading to be humble,
the zero o loves well
o it never crumbles,
the one is how it is
always precious pointer,
the one o rings a bell
with its real wholeness.

**To zero is,
the one you see,
and to infinity. (2)**

The zero is a key
always a good shelter,
the zero o loves well
there is no one better,
the one is how it is
more than little angel,
the one o rings a bell
driving to the center.

To infinity. (8)

Shanti Setú inspiring...

**To zero is,
the one you see,
and to infinity.**

Let's all repeat...

**To zero is,
the one you see,
and to infinity.**

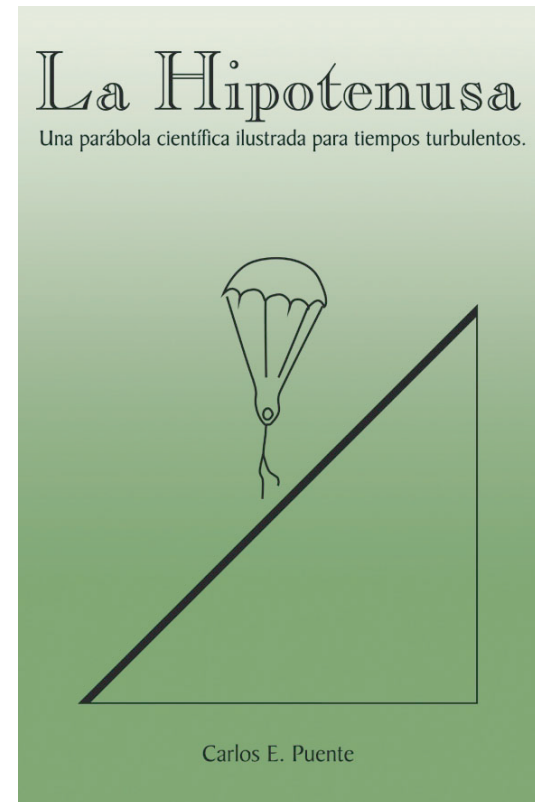
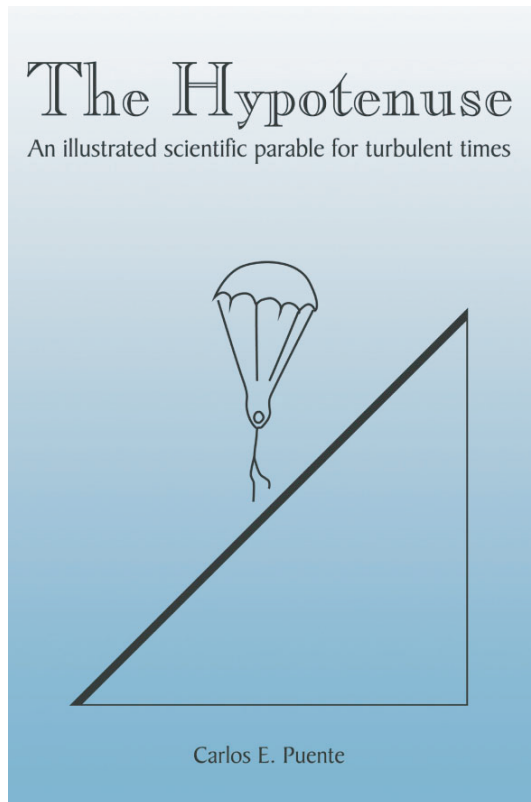
One more time...

**To zero is,
the one you see,
and to infinity.**

O how nice!

**To zero is,
the one you see,
and to infinity.**





all proceeds to aid needy in Africa and Colombia

For other lessons based on complexity please visit:

<http://puente.lawr.ucdavis.edu/peace.htm>

For explicit Biblical connections please visit:

http://puente.lawr.ucdavis.edu/chaos_complexity_christianity.htm