Chaos, Complexity & Christianity

10. The exponential surprise and the laws of no power

Carlos E. Puente

University of California, Davis

Summary

- *Recalls the famous passage of the Vine and the branches and introduces a symbolic interpretation of it.*

- *Relates the exponential number e with the Holy Spirit and the passage with the Eucharistic Doxology.*

- *Reveals how the irrational numbers in the formula of the Gaussian bell π, $\sqrt{2}$ and e are related to the Most Holy Trinity.*

- *Shows that the logarithmic function, the inverse of the exponential, is curiously found in power-laws that reflect natural and man-induced complexity.*

- *Highlights sanctity, the power of zero, as the only possible solution for us to avoid the harmful effects of the omnipresent power-laws.*

A significant passage
(Jn 15:1–10)

"*I am the true vine*, and *my Father is the vine grower*. He takes away every branch in me that **does not bear fruit**, and everyone that **does he prunes** so that it bears more **fruit**. You are already **pruned** because of the **word** that I spoke to you. **Remain in me, as I remain in you**. Just as a branch cannot bear **fruit** on its own unless it remains on the vine, **so neither can you unless you remain in me**. **I am the vine, you are the branches**. Whoever **remains in me** and I in him will bear much **fruit**, **because without me you can do nothing**…

*...Anyone who does not remain in me will be **thrown out** like a branch and **wither**; people will gather them and throw them into a **fire** and they will be **burned**. If you **remain in me** and my words **remain** in you, **ask for whatever you want and it will be done for you**. By this is my Father glorified, that you bear **much fruit** and become my **disciples**. As the Father **loves** me, so I also **love** you. **Remain** in my **love**. If you keep my commandments, you will **remain** in my **love**, just as I have kept my Father's commandments and **remain** in his **love**."*

A symbolic translation

(Puente, 2018a, 2021)

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VII. …through **Christ**, $1/x$, with **Him**, $1 + 1/x$, and in **Him**, $(1 + 1/x)^x$,

O God, *almighty* **Father**, $x \to \infty$, in the *unity* of the **Holy Spirit**, e,

all glory and honor is yours, *for ever and ever*, *AMEN*. **(!)**

Another exponential surprise

The Most Holy Trinity
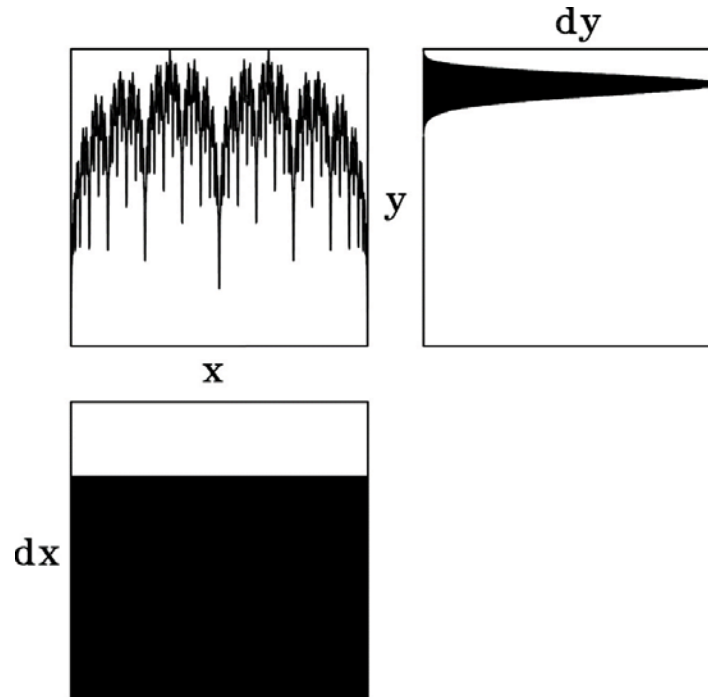
Father in π; **Son**, accumulating, in $\sqrt{2}$ and **Holy Spirit** in e
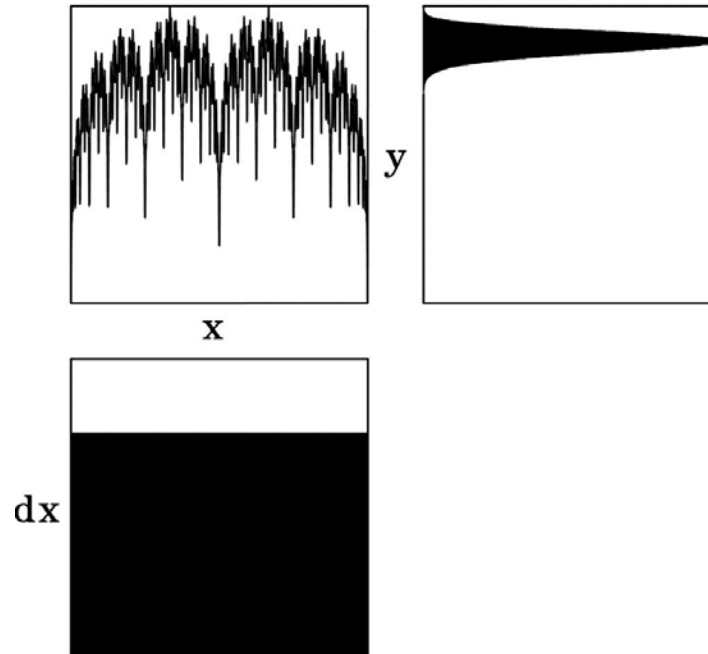
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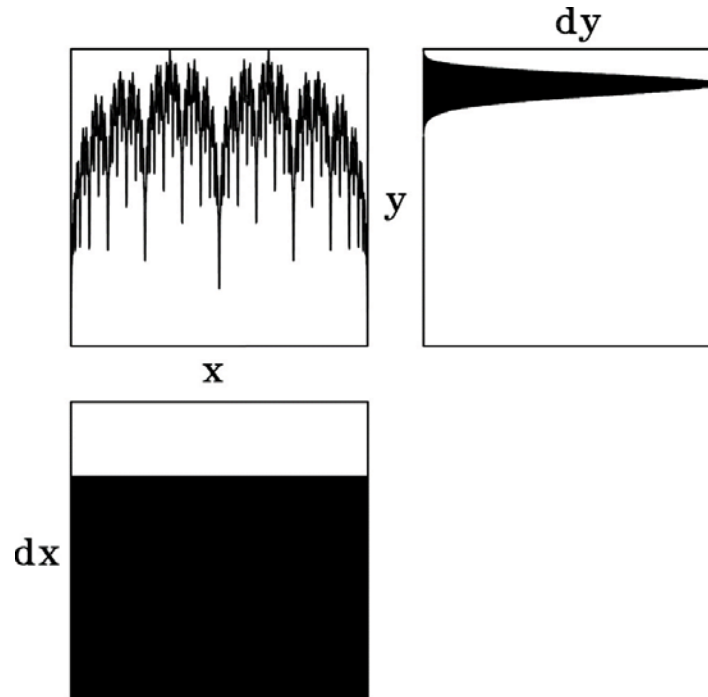
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$\sqrt{2}$ is to the right of π and e is in the middle of them **(!)**

The Most Holy Trinity

$$f(y) = \frac{1}{\sqrt{2\pi}} e^{-y^2/2}$$

Father in π; **Son**, accumulating, in $\sqrt{2}$ and **Holy Spirit** in e

$\sqrt{2}$ is to the right of π and e is in the middle of them (!)

the *famous irrationals* of the **bell** invite us to **freedom** **(!)**

Not remaining in Him

(Puente, 2020)

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curiously, **violence** gives rise to "**power-laws**":
straight lines having **negative** slopes in **logarithmic** scales

Natural power-laws

The land trembles…
(Gutenberg and Richter, 1954)
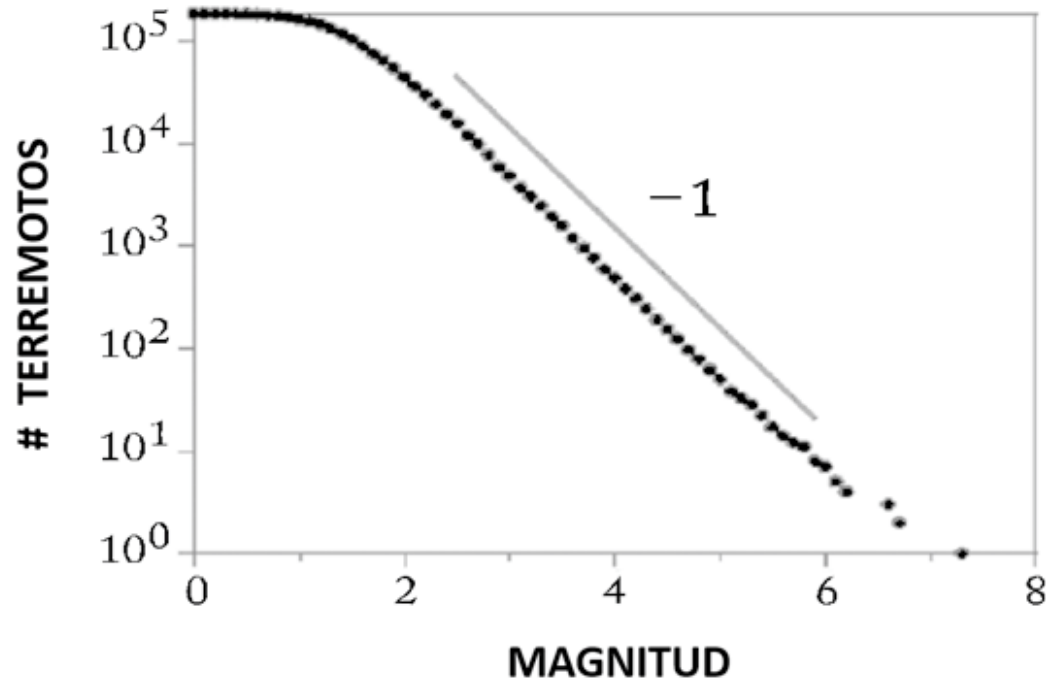
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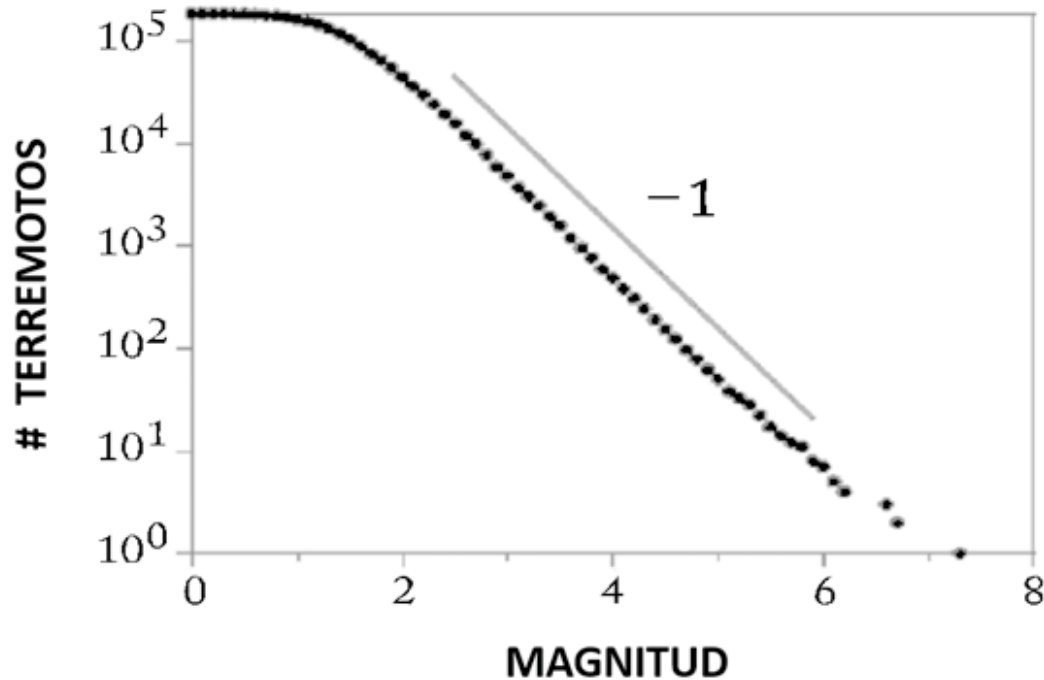
log x is magnitude
x is released energy

$$P[X \geq x] \sim x^c, \, c \approx -1, \, \log P \sim c \log x$$

The land trembles...
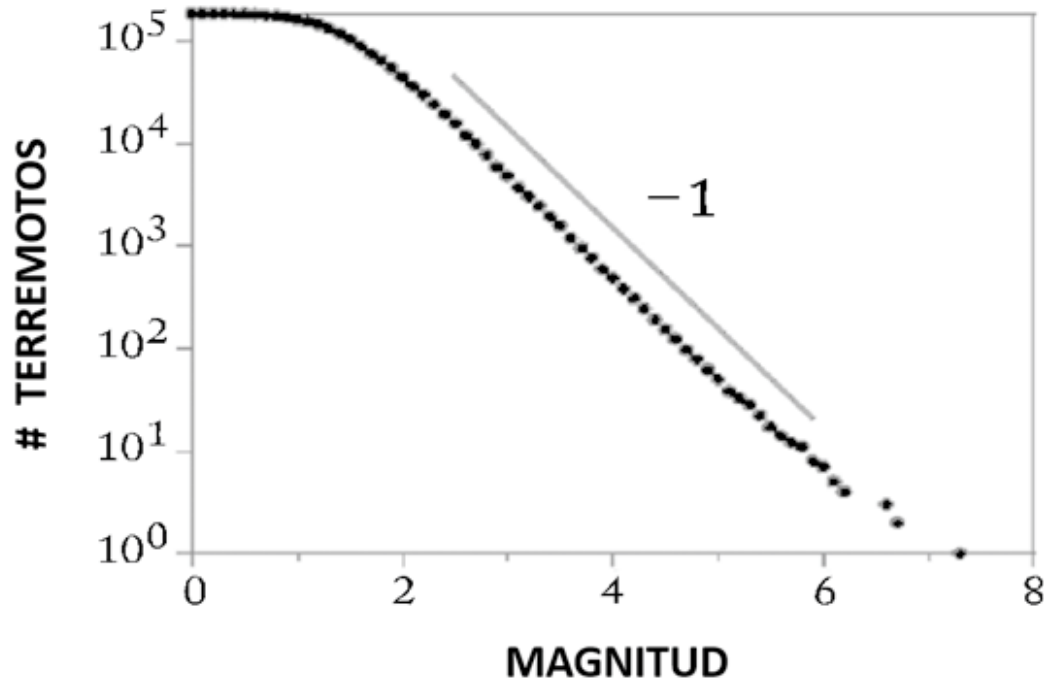
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there is no quake of a characteristic size, "*heavy tails*"

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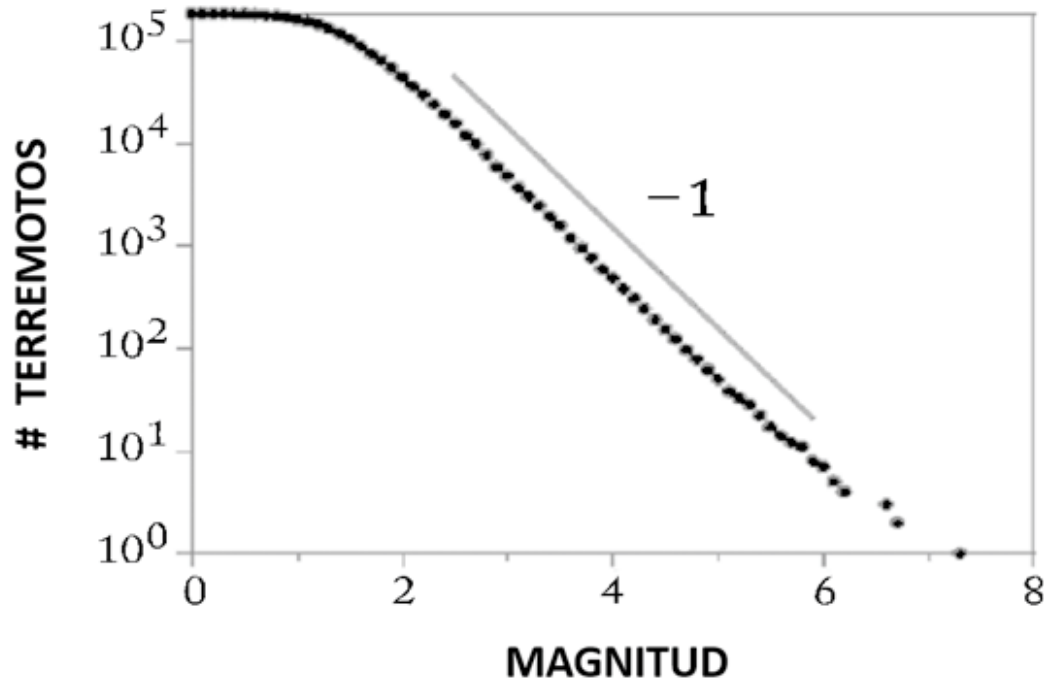
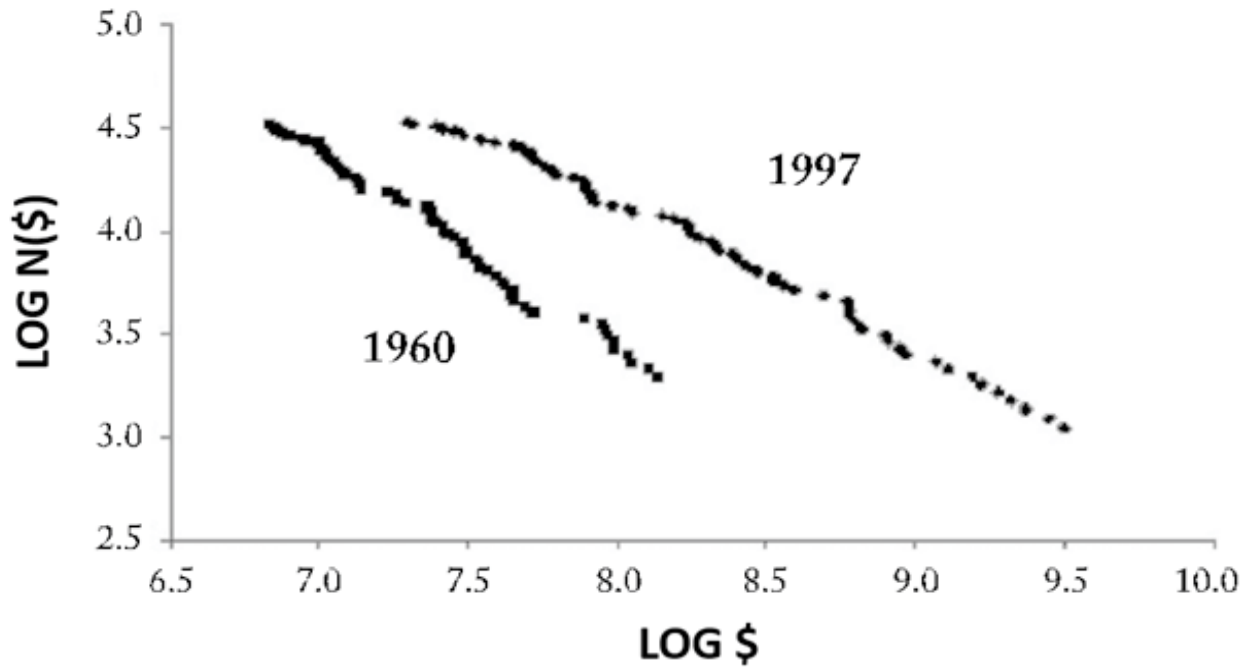$$P[X \geq x] \sim x^c, \, c \approx -1, \, \log P \sim c \log x$$

there is no quake of a characteristic size, "*heavy tails*"

…*floods*, *avalanches*, *volcanic eruptions*, *forest fires* **(!)**

Human power-laws

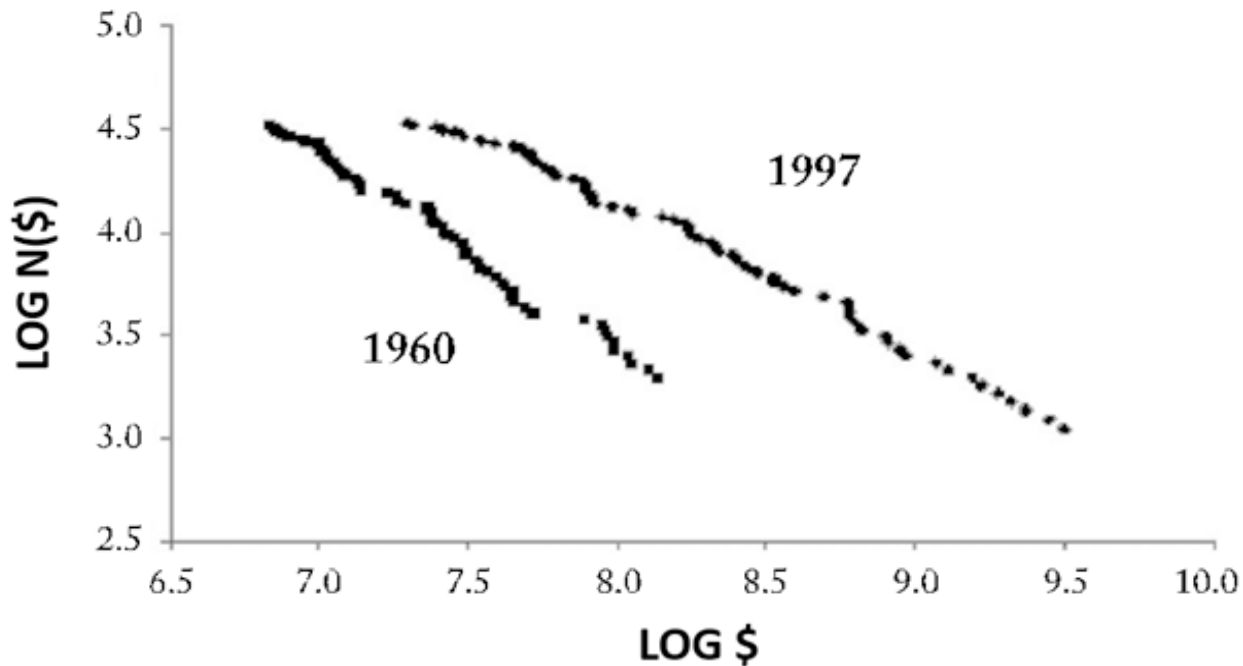# Economic "efficiency"
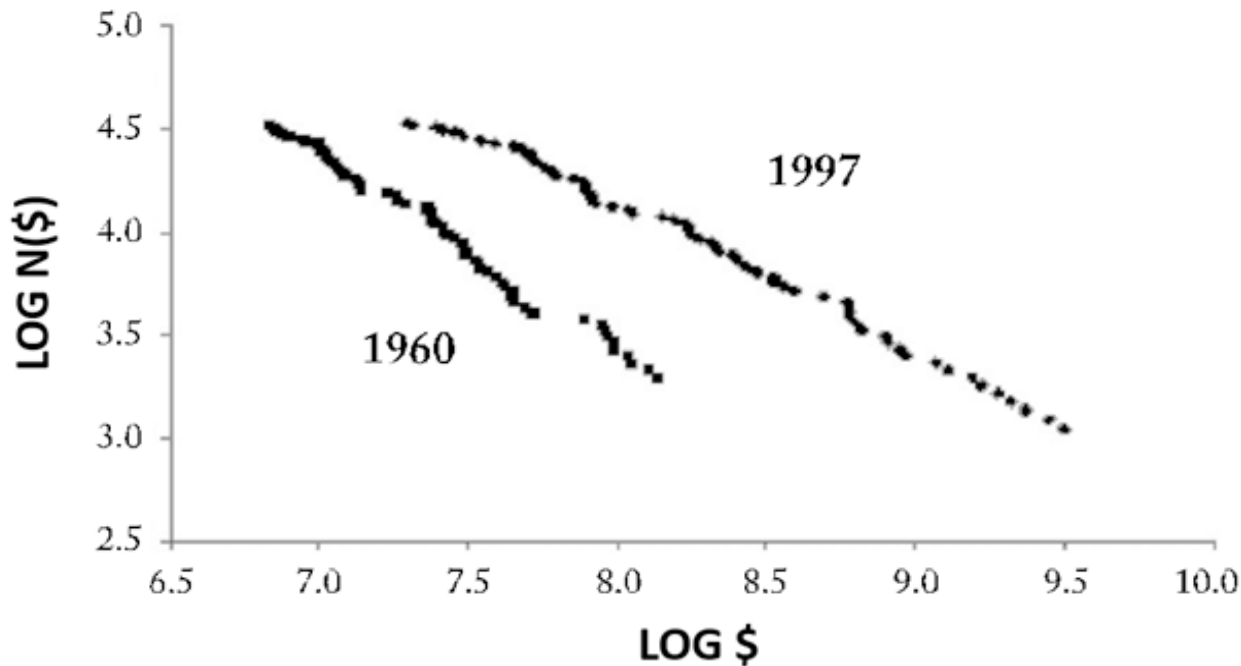## *(Pareto, 1909; Di Guilmi et al., 2003)*

Economic "efficiency"
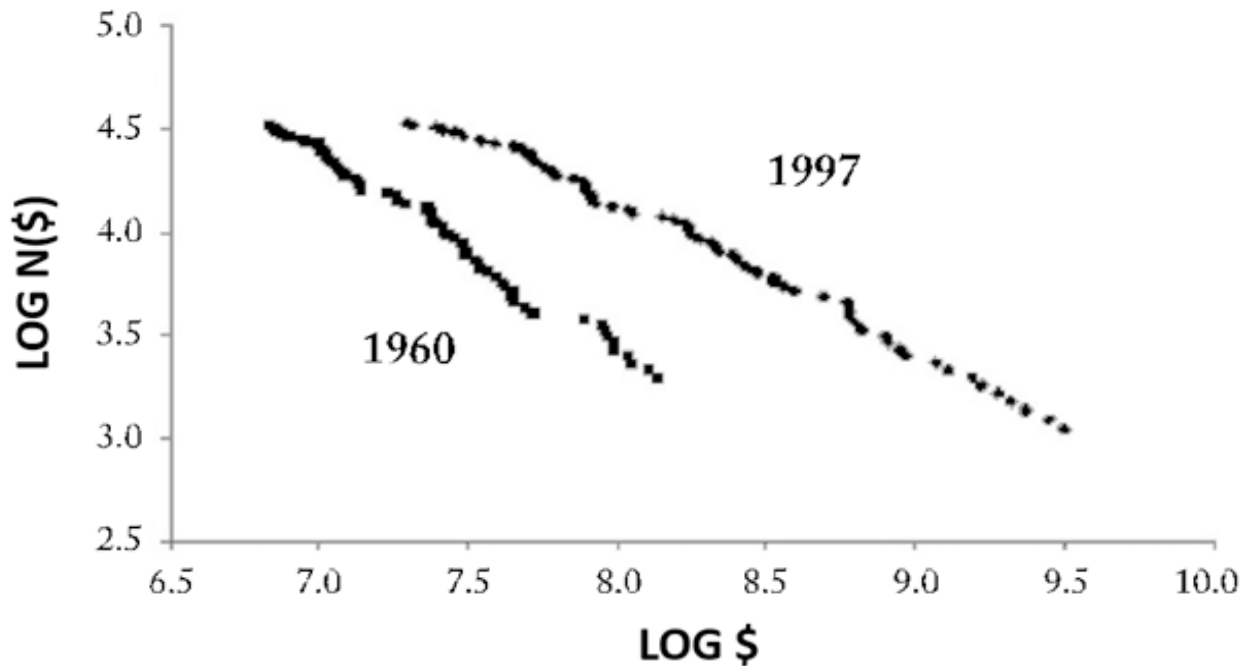
heavy-tailed distributions for *income* and *wealth*

Economic "efficiency"

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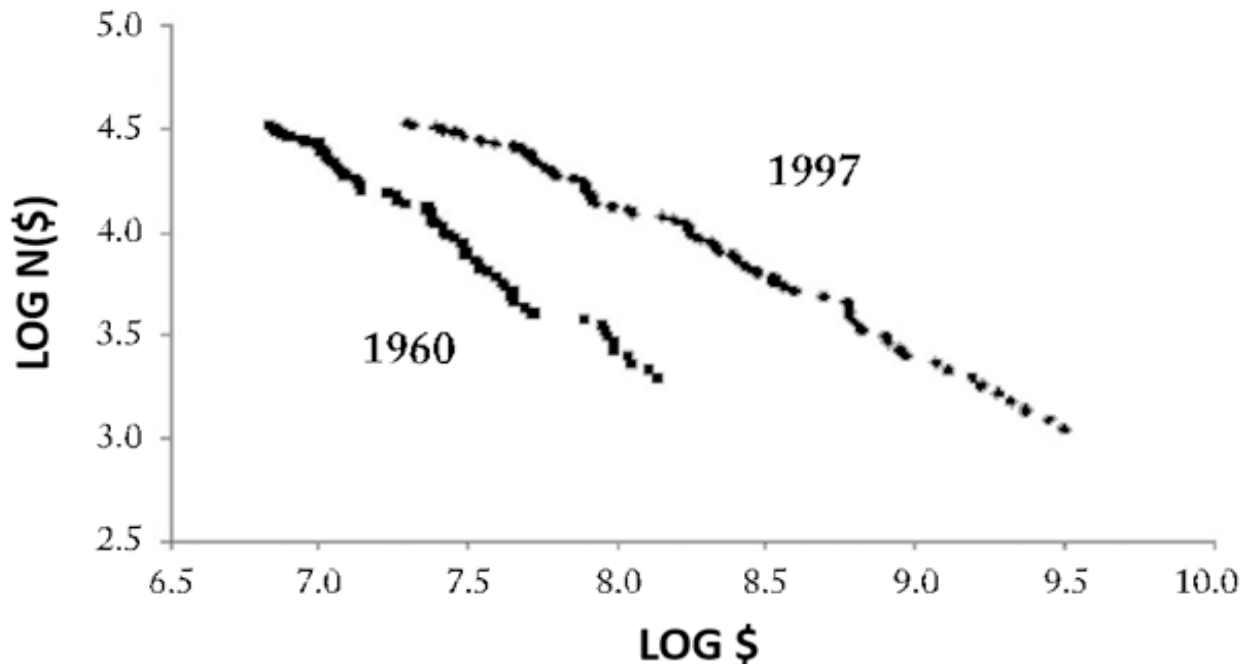the problems **widen** as a function of time

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the love of money is the root of all evils (1 Tm 6:10)

Economic "efficiency"

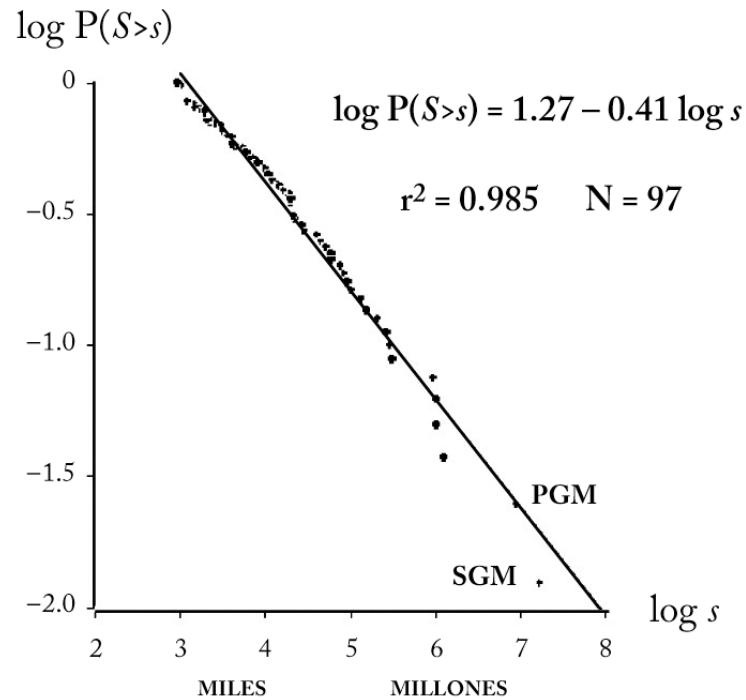heavy-tailed distributions for *income* and *wealth*

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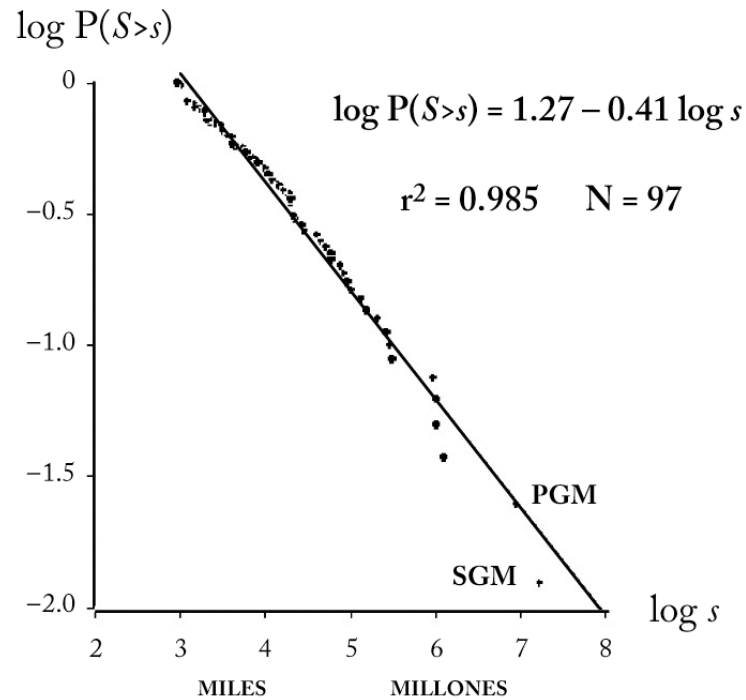***the love of money is the root of all evils*** (1 Tm 6:10)

who may fix this? is it by ourselves or together with Him?

Historic cruelty
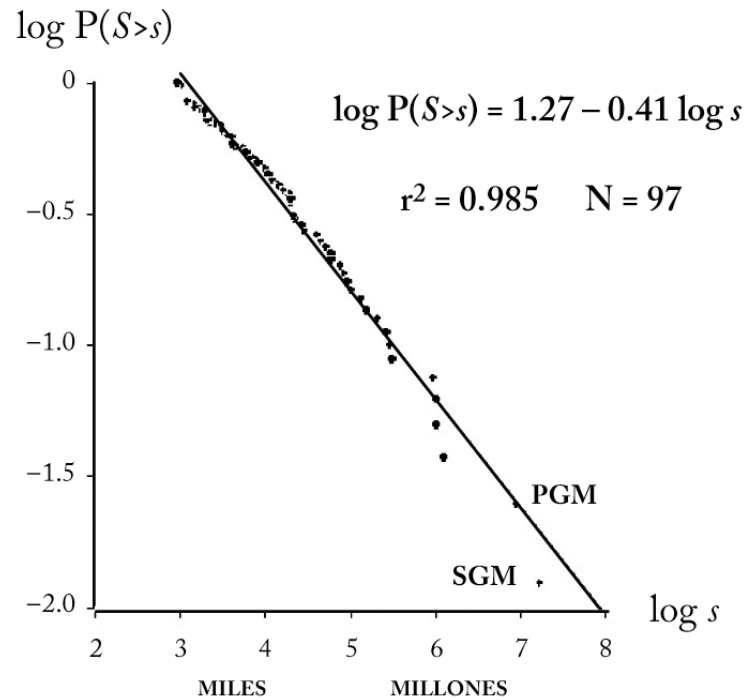*(Richardson, 1960a,b; Cederman, 2003)*

Historic cruelty

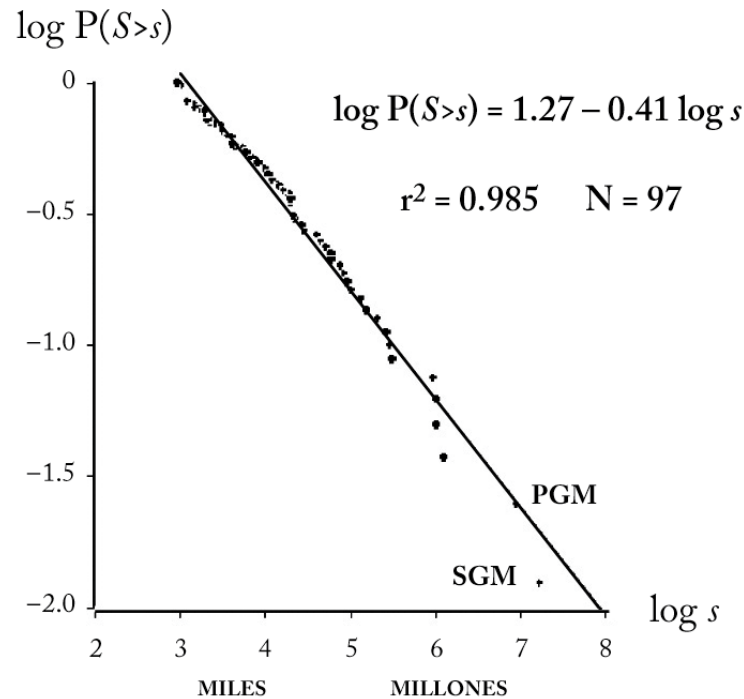searching for **power** generates *power-laws*

Historic cruelty

log P($S>s$) = 1.27 − 0.41 log s

r^2 = 0.985   N = 97

searching for **power** generates *power-laws*

a level 7 event had level 5 and grew: they are the ***same rubbish***

Historic cruelty

searching for **power** generates *power-laws*

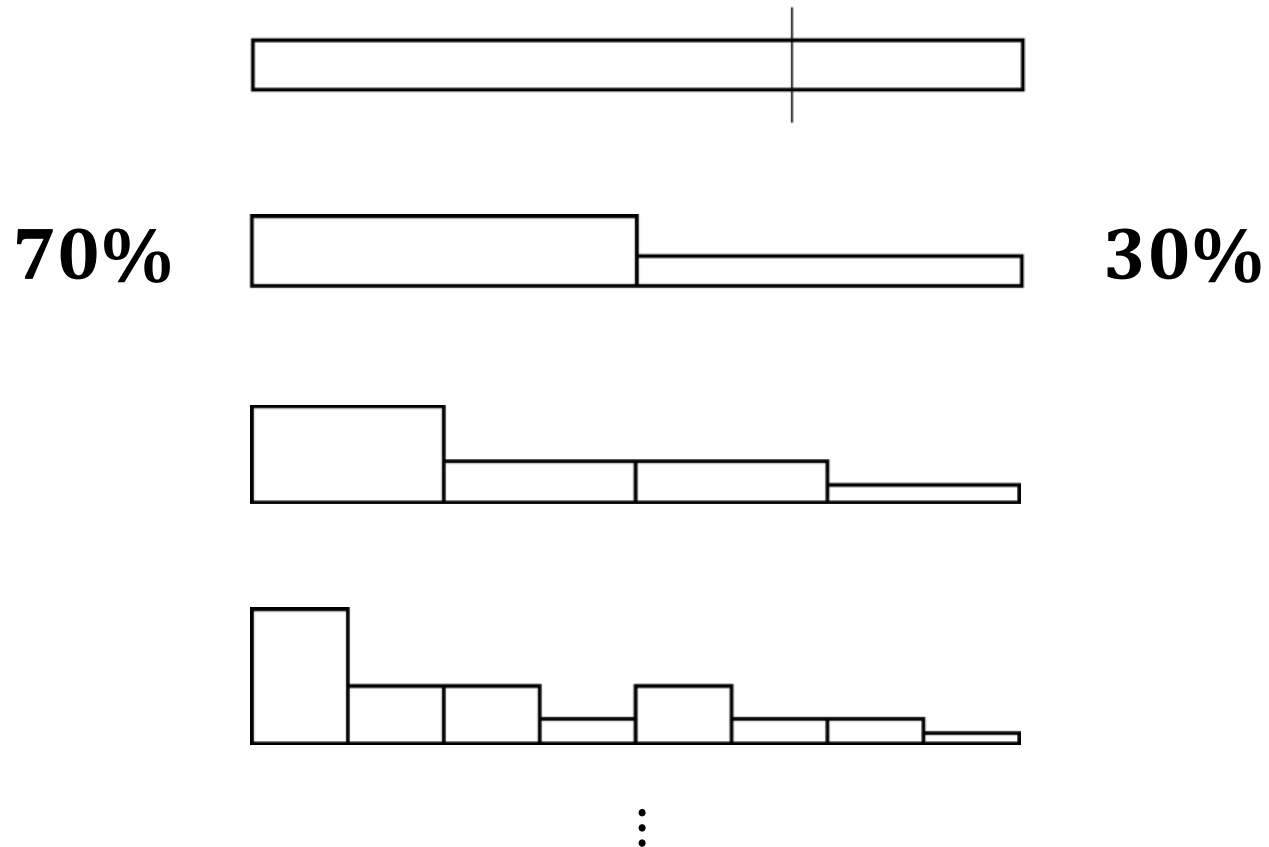a level 7 event had level 5 and grew: they are the *same rubbish*

to avoid the "*great war*" **little saints** are required
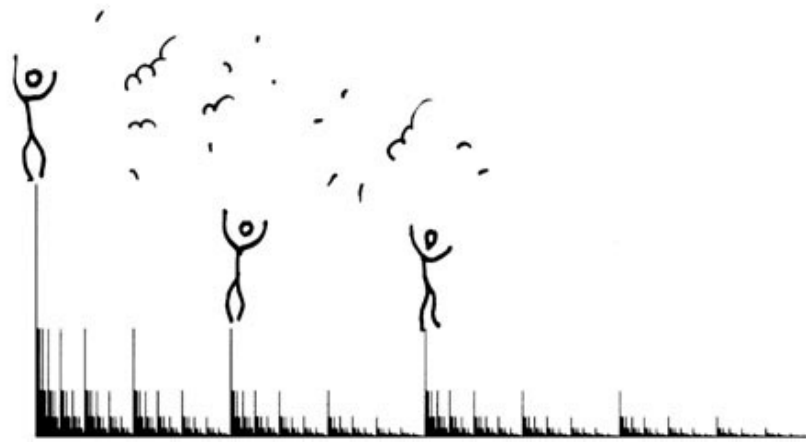
O heavy tails!

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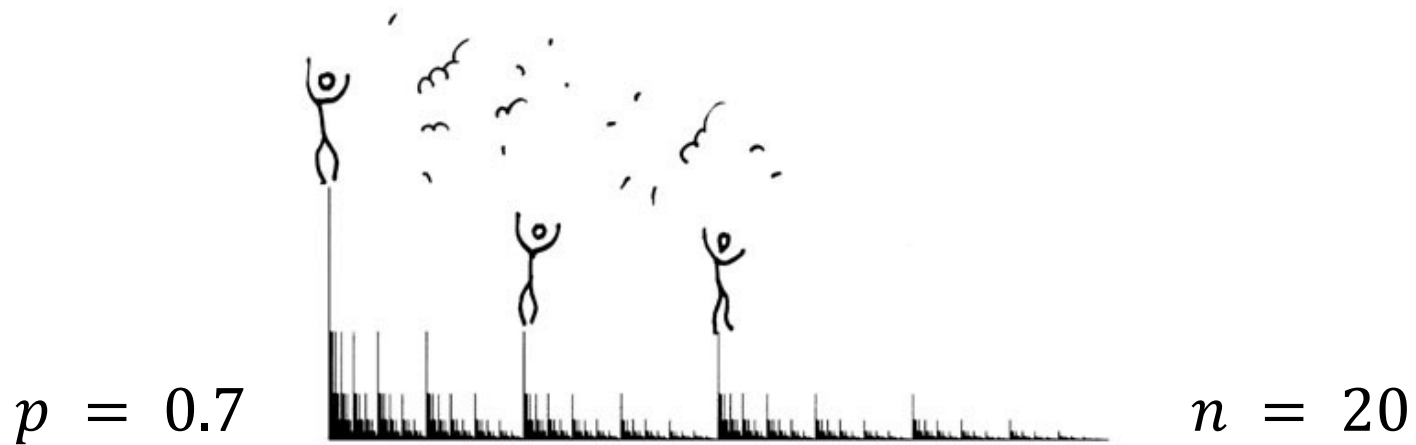## *(Puente, 2011)*

multiplicative cascades

70%   30%

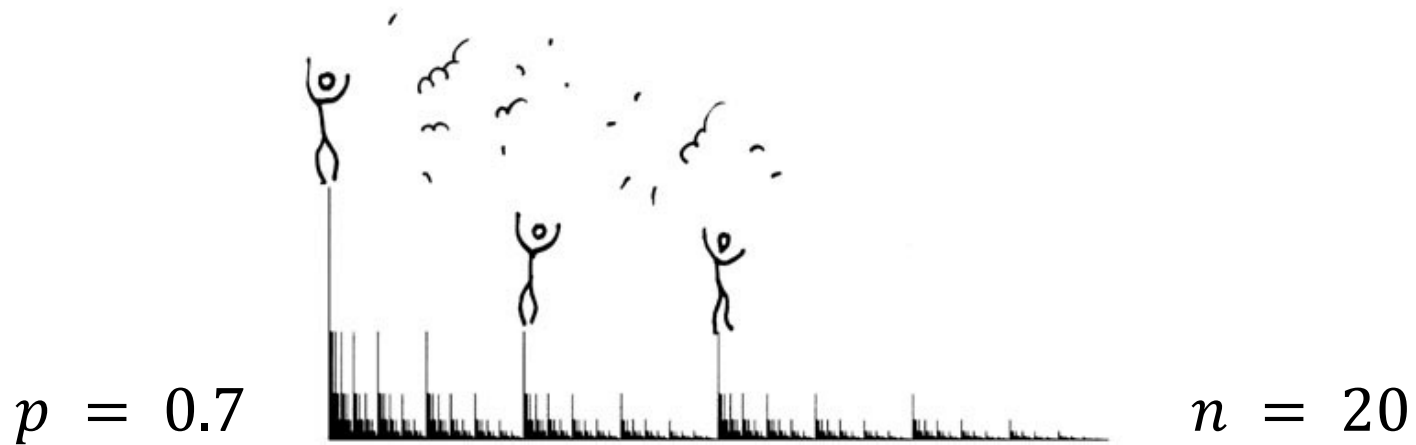# O heavy tails!

multiplicative cascades

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multiplicative cascades

$p = 0.7$ $n = 20$

5, 10, 20 and 40% of the largest *thorns* have

57, 70, 84 and 95% of the mass

O heavy tails!

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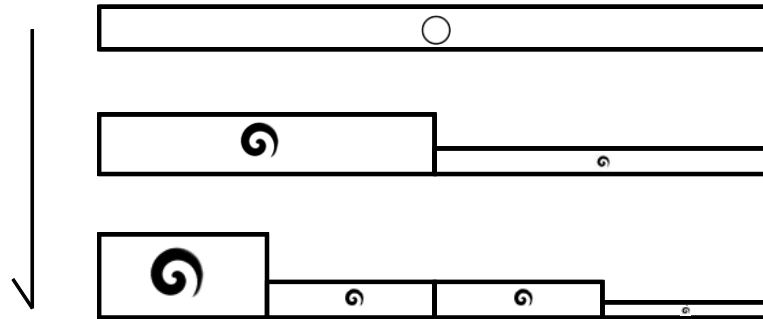
57, 70, 84 and 95% of the mass

near to **United States** @ 1998: 59, 71, 84 and 95%

O heavy tails!
(Meneveau and Sreenivasan, 1987)

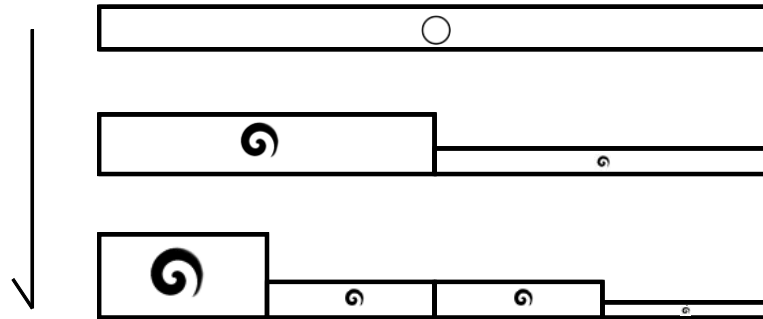**multiplicative cascades**

eddies

$$Re = \frac{v \cdot L}{v}$$

O heavy tails!

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turbulence in the *air*

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towards the **dissipation** of energy…

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2/3 = 0.666... in action: from **+** to **–**

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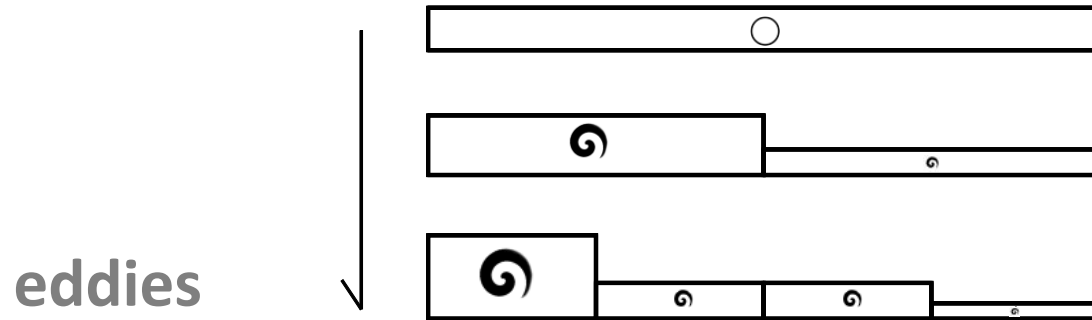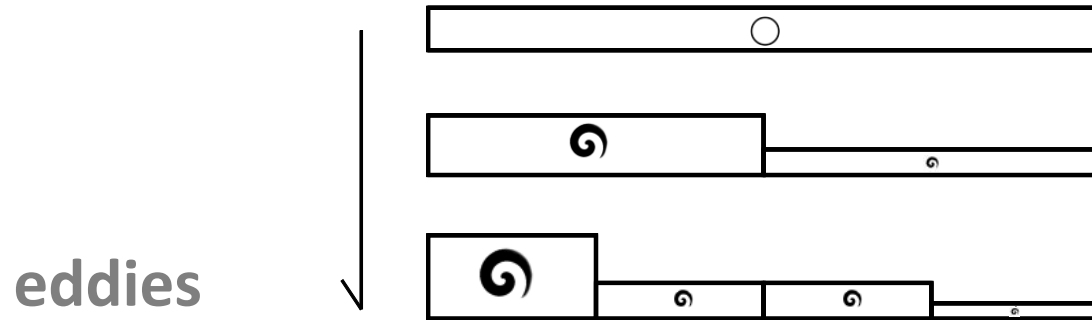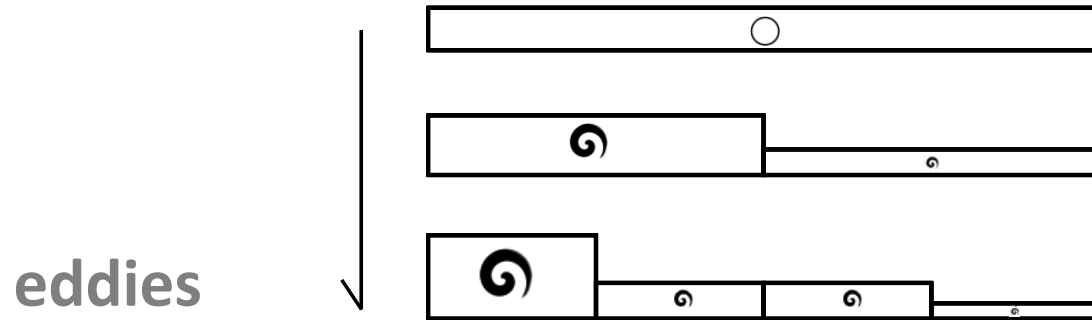
$$Re = \frac{v \cdot L}{\nu}$$

turbulence in the *air*

towards the **dissipation** of energy…

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the ruler of the power of the air and of the world

O heavy tails!

multiplicative cascades

preferential hierarchical networks → **6** degrees of **separation**

O heavy tails!
(Carlson and Doyle, 2000)

multiplicative cascades

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a **global** objective, **highly optimized tolerance**, *hot*

O heavy tails!
(Bak, 1996)

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SOC → **SOS**

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PARE TO!

both *e* and **9** go from **–** to **+**

O heavy tails!

multiplicative cascades

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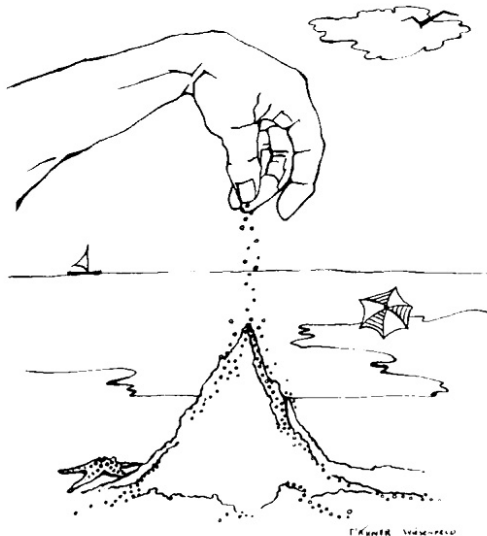a **global** objective, **highly optimized tolerance**, *hot*

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use **∫** and not **$**
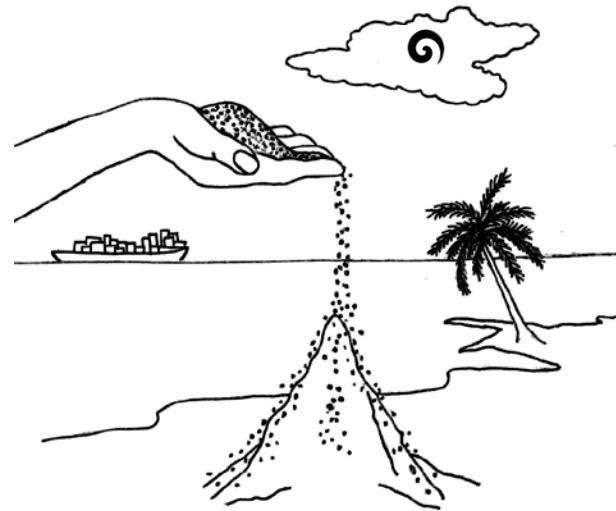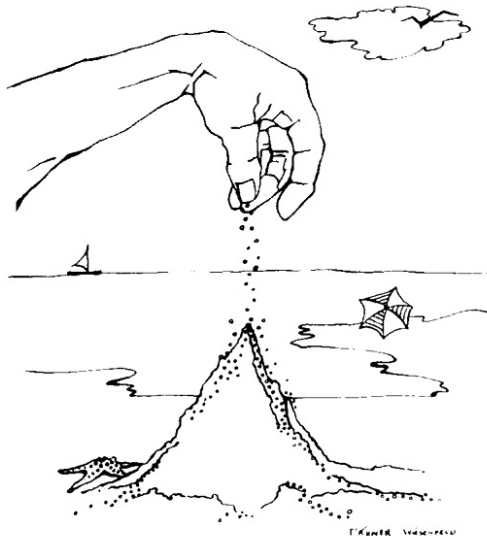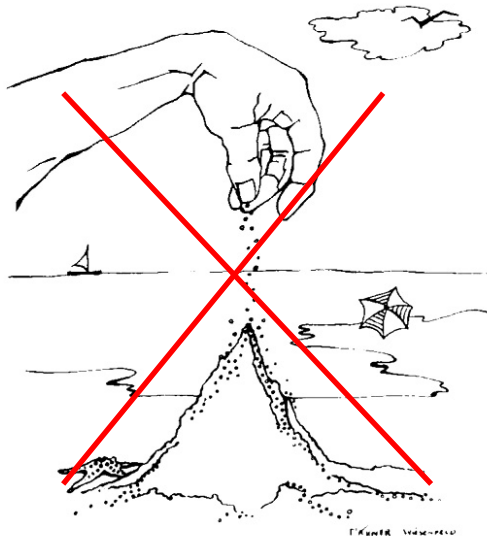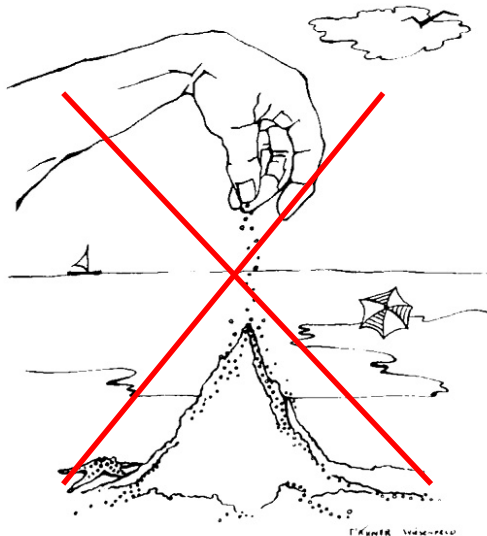
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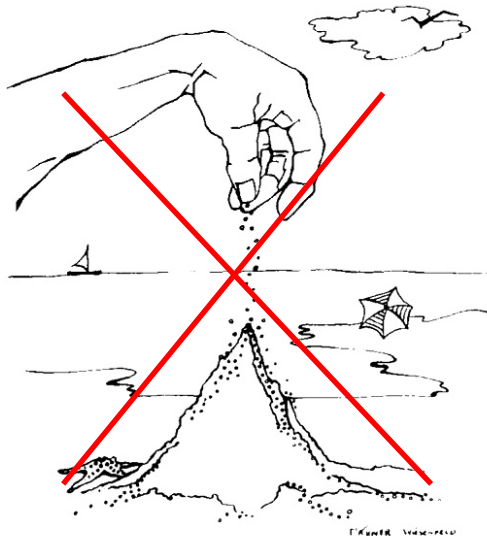
PARE TO!

both *e* and **9** go from **–** to **+**

use ∫ and not **$**

let zero be your power:

$$\lightning = 0.999... = 1$$

Conga to infinity

(Puente, 2018b)

$$0! = 1, 0 + 0 = \infty, 1 + 1 = 1, 1/0 = \infty, y^0 = 1, 0 \to \infty$$

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

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 twisting a round
arrives to infinity.

$$0! = 1, \, 0 + 0 = \infty, \, 1 + 1 = 1, \, 1/0 = \infty, \, y^0 = 1, \, 0 \to \infty$$

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

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.

$$0! = 1, 0 + 0 = \infty, 1 + 1 = 1, 1/0 = \infty, y^0 = 1, 0 \to \infty$$

come enjoy little saints…

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

The zero always key
grow up and be little.

O zero yields strength
is no longer brittle.

The way of one it is
endlesly united.

One heals very well
when it is invited.

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

$$0! = 1, 0 + 0 = \infty, 1 + 1 = 1, 1/0 = \infty, y^0 = 1, 0 \to \infty$$

The zero always key
finds oneself below.

O zero yields strength
humbly runs the show.

The way of one it is
more than little angel.

One heals very well
it is not a stranger.

To infinity it is…

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

O how pretty!

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

(September 2007)

$0, 1, \infty$
YouTube in Spanish

…Well, here we reiterated the absolute relevance of the triune God and of his call for our sanctity.

In our next occasion we shall summarize the symbols on this class from science to faith and we shall issue an invitation to peace using other citations from Holy Scripture.

Until next time…

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