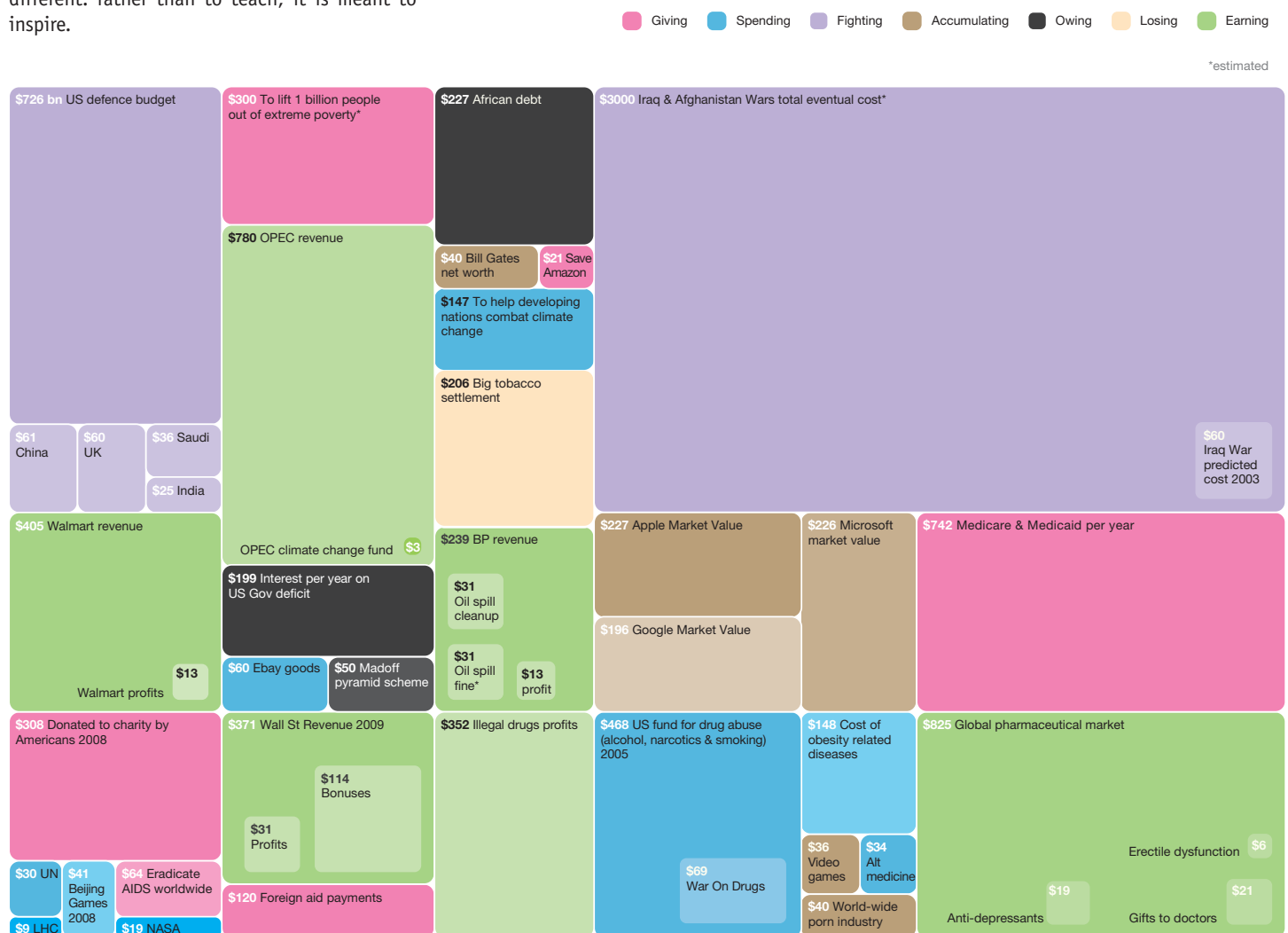# Making information beautiful
— and clear

Information is presented too often in ways that bore the reader, or put him off, or simply baffle him. **Julian Champkin** looks at four examples that do better things with data
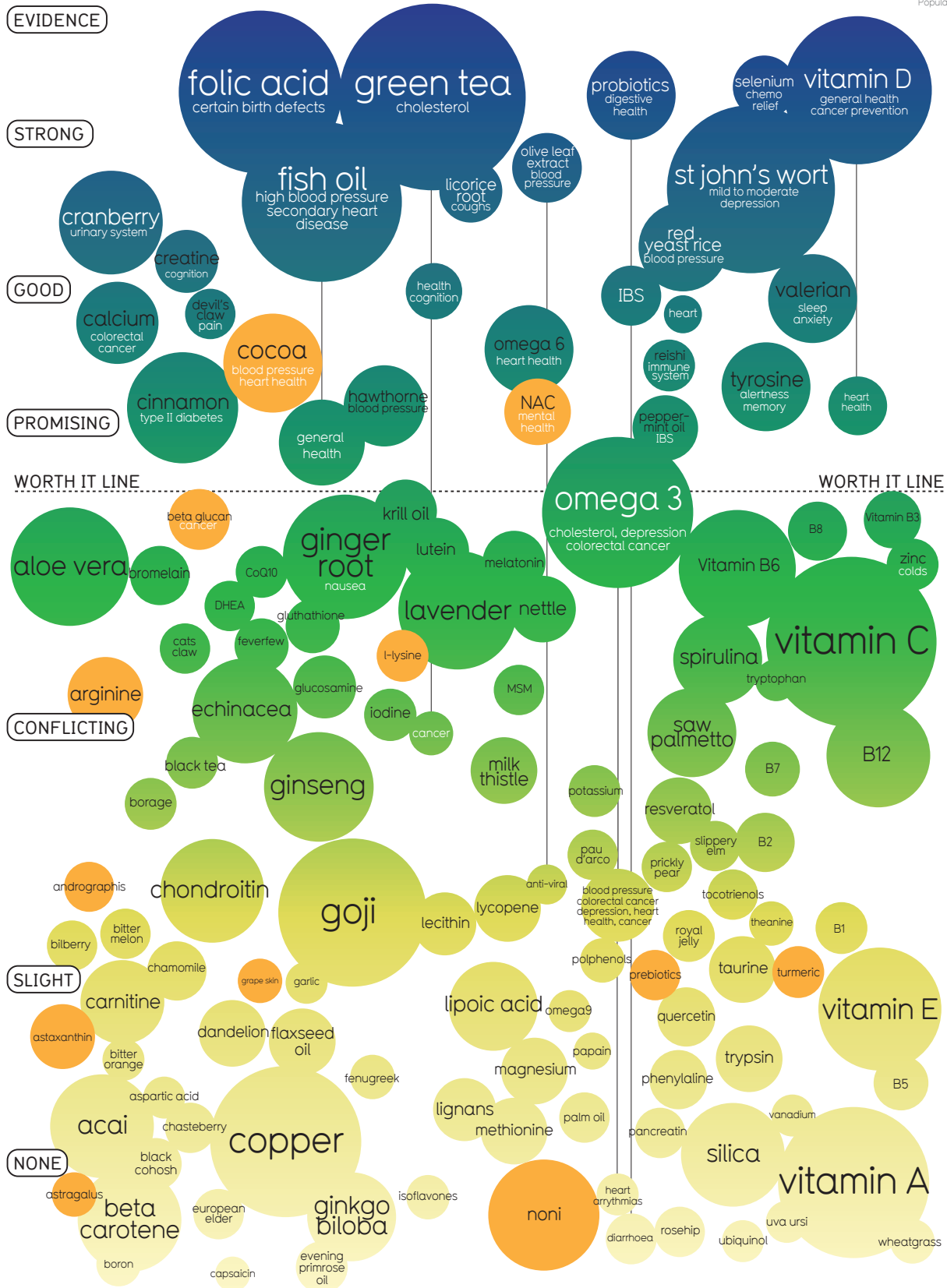
Usually this section tries to help the aspiring student to use one tool or another in the great armoury of techniques that are available to statisticians. This month's Toolkit is slightly different: rather than to teach, it is meant to inspire.

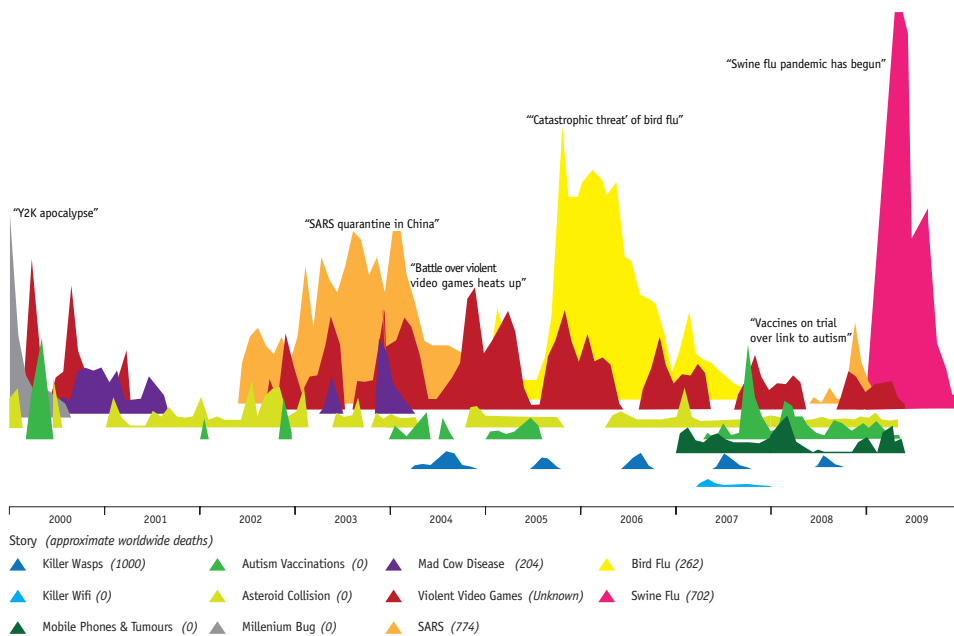When all the statistics of a project have been done, the results have to be communicated; increasingly, they have to be communicated to non-specialists or to the general public. Data can be presented as tables; but to a non-statistician few things are as off-putting as a table of figures.

● Giving　　● Spending　　● Fighting　　● Accumulating　　● Owing　　● Losing　　● Earning

*estimated

$726 bn US defence budget
$61 China
$60 UK
$36 Saudi
$25 India
$405 Walmart revenue
$13
Walmart profits
$308 Donated to charity by Americans 2008
$30 UN
$41 Beijing Games 2008
$64 Eradicate AIDS worldwide
$9 LHC
$19 NASA

$300 To lift 1 billion people out of extreme poverty*
$780 OPEC revenue
OPEC climate change fund $3
$199 Interest per year on US Gov deficit
$60 Ebay goods
$50 Madoff pyramid scheme
$371 Wall St Revenue 2009
$114 Bonuses
$31 Profits
$120 Foreign aid payments

$227 African debt
$40 Bill Gates net worth
$21 Save Amazon
$147 To help developing nations combat climate change
$206 Big tobacco settlement
$239 BP revenue
$31 Oil spill cleanup
$31 Oil spill fine*
$13 profit
$352 Illegal drugs profits

$3000 Iraq & Afghanistan Wars total eventual cost*
$60 Iraq War predicted cost 2003
$227 Apple Market Value
$196 Google Market Value
$226 Microsoft market value
$742 Medicare & Medicaid per year
$468 US fund for drug abuse (alcohol, narcotics & smoking) 2005
$69 War On Drugs
$148 Cost of obesity related diseases
$36 Video games
$34 Alt medicine
$40 World-wide porn industry
$825 Global pharmaceutical market
Erectile dysfunction $6
Anti-depressants $19
Gifts to doctors $21

The Billion-Dollar-o-Gram, 2009 figures. Sources: *NYTimes*, *The Guardian*, BBC, CNN and other media reports. Note: some slight visual cheating to make things fit.

Popularity   Promising

STRONG

folic acid
certain birth defects

green tea
cholesterol

probiotics
digestive
health

selenium
chemo
relief

vitamin D
general health
cancer prevention

fish oil
high blood pressure
secondary heart
disease

olive leaf
extract
blood
pressure

licorice
root
coughs

st john's wort
mild to moderate
depression

cranberry
urinary system

creatine
cognition

GOOD

red
yeast rice
blood pressure

calcium
colorectal
cancer

devil's
claw
pain

health
cognition

IBS

heart

valerian
sleep
anxiety

cocoa
blood pressure
heart health

omega 6
heart health

reishi
immune
system

tyrosine
alertness
memory

heart
health

cinnamon
type II diabetes

hawthorne
blood pressure

NAC
mental
health

pepper-
mint oil
IBS

PROMISING

general
health

WORTH IT LINE   WORTH IT LINE

beta glucan
cancer

krill oil

omega 3
cholesterol, depression
colorectal cancer

B8

Vitamin B3

aloe vera

bromelain

lutein

melatonin

Vitamin B6

zinc
colds

ginger
root
nausea

CoQ10

DHEA

gluthathione

lavender   nettle

Vitamin B6

DHEA

feverfew

cats
claw

l-lysine

spirulina

vitamin C

arginine

glucosamine

MSM

tryptophan

echinacea

iodine

cancer

saw
palmetto

B12

CONFLICTING

black tea

ginseng

milk
thistle

potassium

B7

resveratol

borage

slippery
elm

B2

chondroitin

goji

lycopene

anti-viral

prickly
pear

tocotrienols

andrographis

bitter
melon

lecithin

blood pressure
colorectal cancer
depression, heart
health, cancer

theanine

B1

bilberry

chamomile

pau
d'arco

royal
jelly

SLIGHT

grape skin

garlic

polphenols

prebiotics

taurine

turmeric

vitamin E

carnitine

lipoic acid

omega9

quercetin

astaxanthin

bitter
orange

dandelion flaxseed
oil

papain

trypsin

phenylaline

B5

fenugreek

magnesium

aspartic acid

lignans

palm oil

vanadium

acai

chasteberry

methionine

pancreatin

silica

copper

vitamin A

NONE

black
cohosh

isoflavones

heart
arrythmias

astragalus

ginkgo
biloba

noni

uva ursi

beta
carotene

european
elder

diarrhoea

rosehip

ubiquinol

wheatgrass

boron

capsaicin

evening
primrose
oil

Snake oil? Scientific evidence for popular dietary supplements showing tangible health benefits when taken orally by an adult with a healthy diet. Source: English language placebo-controlled double-blind human trials on PubMed.org, US Office of Dietary Supplements, Herbmed.org, European Medicines Agency

"Swine flu pandemic has begun"

"'Catastrophic threat' of bird flu"

"Y2K apocalypse"

"SARS quarantine in China"

"Battle over violent video games heats up"

"Vaccines on trial over link to autism"

| 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |

Story *(approximate worldwide deaths)*

▲ Killer Wasps *(1000)* ▲ Autism Vaccinations *(0)* ▲ Mad Cow Disease *(204)* ▲ Bird Flu *(262)*
▲ Killer Wifi *(0)* ▲ Asteroid Collision *(0)* ▲ Violent Video Games *(Unknown)* ▲ Swine Flu *(702)*
▲ Mobile Phones & Tumours *(0)* ▲ Millenium Bug *(0)* ▲ SARS *(774)*

Mountains out of molehills: a timeline of global media scare stories. Source Google News (worldwide deaths at time of print)

Detailed technical reports may be necessary; on the other hand they may not be, and one picture is worth a thousand words.

Whole books can, have, and should be written about visual presentation of data. One of them is *Information is Beautiful*, by David McCandless.

McCandless is not a statistician; he is a journalist. His skill is in communicating things. His diagrams have appeared in the pages of the

In a good graphic, the user reads the graphic, not the caption

Guardian newspaper and elsewhere; here we present four of them. They are not perfect. But they are different, and they are clear, and they convey the data in ways that every reader can understand – and that may even stick in the mind.

How much did the Gulf oil spill affect BP's profits? If Wall Street bankers' bonuses were otherwise applied could it eliminate AIDS worldwide, and pay for a moderate-sized Olympic Games on top? And just how much is the war in Afghanistan costing, compared with what was predicted? Is that a lot or a little compared to, say, the nation's Medicare? The "Billion-Dollar-o-Gram" shows such things, by area. (A fuller version of it, incidentally, shows just how huge the world financial crisis was – as great as the rest of the chart combined.) Area, rather than length or

height, is what the eye judges size by. All such charts of course are only as good as their data, and though sources are given the many caveats, uncertainties and problems of definition are of necessity skated over.

Trying to show two or more variables on one diagram is notoriously difficult, but it can be done: the "Snake Oil" bubble-chart shows, simultaneously and clearly, four – the popularity of the treatment, its promise, the evidence for its effectiveness, and what it is supposed to treat. Its message is clear at a glance – though the meaning of the vertical lines could do with
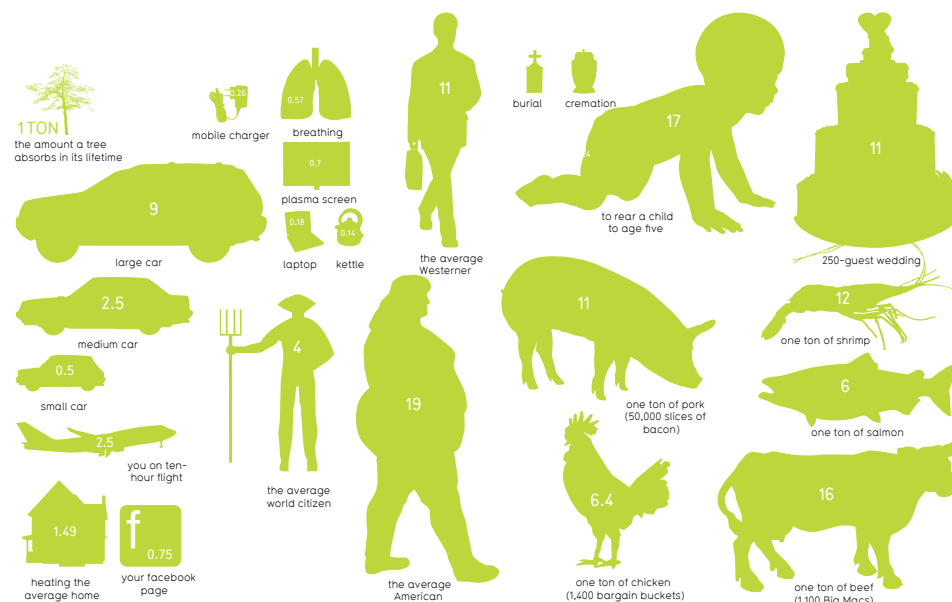
clarification. (For a classic graphic that shows no fewer than six variables, from army casualties and geography to direction of advance and what the weather was like, and using only two colours at that, see Minard's famous diagram of Napoleon's march on Moscow (*Significance*, September 2008).)

Only a purist would complain about the lack of a vertical axis scale in "Mountains out of Molehills"; the story it tells is clear. The importance of a story in no way reflects the media space that is given to it. "Tons of Carbon" puts some surprising data before you: does your Facebook page really emit half as much carbon as heating your house? That the numbers are again represented by the area, not the height, of the outlines could be made more plain. And if the ton of shrimp really represents 12 tons of carbon, shouldn't it be the same size as the pig and the wedding cake?

Which in itself is a plus: errors can be spotted. The degree of redundancy – size with the number inside – itself forms a cross-check. A similar mistake in a plain table of the data just would not be noticed.

These are sunspots. The mark of a good graphic is that the user reads the diagram, not the caption. Information should be in the picture, not in the words underneath. These pass that test with flying colours.

They are not intended to be copied; rather to hint at what is possible. For many other examples, ingenious, informative and beautiful, see *Information is Beautiful*, by David McCandless, published by Collins at £20.00. The US title is *The Visual Miscellaneum: A Colorful Guide to the World's Most Consequential Trivia*, published by Collins Design at $26.99.

Tons of carbon emissions per year (unless otherwise stated). Source: *New York Times*, Environmental Protection Agency, IPCC, Energy Information Administration, UNESCO