

semiology of graphics

pioneering
work
in
data
visualization

semiology of graphics

**the name of the
textbook
for what
I'd like
to teach you today**

semiology of graphics

**how to
make graphics
systematically**

semiology of graphics

you may
think
graphics
are separate from
information

semiology of graphics

**you may
think
graphics
should be
constructed by
artists**

semiology of graphics

**what about
a graphics system
to express
information?**

semiology of graphics

it does not
belong
to the
artist

semiology of graphics

it does not
belong
to the
artist

Salvador Dali is
pictured at right



semiology of graphics

it belongs
to anyone
communicating
information

information needs graphics

give me
half an hour to
convince you
of this

first
an
exercise

please
take
5 minutes
to sketch
a graphic

a table from the Census Bureau

a subset of manufacturing data

U.S. Department of Commerce

United States®
Census
Bureau

MAIN COMMUNITY FACTS GUIDED SEARCH ADVANCE

Advanced Search - Search all data in American FactFinder

1 Advanced Search **2 Table Viewer**

EC0731A1 | Manufacturing: Geographic Area Series: Industry
Places: 2007 *i*
2007 Economic Census

Table View

Actions: [Modify Table](#) | [Bookmark](#) | [Print](#) |

Not all rows may be displayed below.
Click Back to Search to select other geographies or industry codes using the search bar.

The table contains a total of 133,377 data rows.

Data based on the 2007 Economic Census. For information on confidentiality procedures available when this file was created; data may not be available for all NAICS industries.

industry in Oregon counties

**36 counties:
all mfg subsectors
total sales
hours worked
wages**

area name	code	code	Year	estimated	establishments
Benton County, Oregon	334	Computer and electronic product manufacturing	2007	3	9
Clackamas County, Oregon	311	Food manufacturing	2007	0	38
Clackamas County, Oregon	321	Wood product manufacturing	2007	0	32
Clackamas County, Oregon	322	Paper manufacturing	2007	0	12
Clackamas County, Oregon	327	Nonmetallic mineral product manufacturing	2007	1	23
Clackamas County, Oregon	331	Primary metal manufacturing	2007	0	12
Clackamas County, Oregon	332	Fabricated metal product manufacturing	2007	0	164
Clackamas County, Oregon	333	Machinery manufacturing	2007	4	51
Clackamas County, Oregon	334	Computer and electronic product manufacturing	2007	0	29
Clackamas County, Oregon	336	Transportation equipment manufacturing	2007	2	21
Clackamas County, Oregon	339	Miscellaneous manufacturing	2007	1	57

how
would you
graphically
portray
some or all?

whole table available at:
Canvas > Files > misc >
ocounties.pdf

area name	code	code	Year	estimated	establishments
Benton County, Oregon	334	Computer and electronic product manufacturing	2007	3	9
Clackamas County, Oregon	311	Food manufacturing	2007	0	38
Clackamas County, Oregon	321	Wood product manufacturing	2007	0	32
Clackamas County, Oregon	322	Paper manufacturing	2007	0	12
Clackamas County, Oregon	327	Nonmetallic mineral product manufacturing	2007	1	23
Clackamas County, Oregon	331	Primary metal manufacturing	2007	0	12
Clackamas County, Oregon	332	Fabricated metal product manufacturing	2007	0	164
Clackamas County, Oregon	333	Machinery manufacturing	2007	4	51
Clackamas County, Oregon	334	Computer and electronic product manufacturing	2007	0	29
Clackamas County, Oregon	336	Transportation equipment manufacturing	2007	2	21
Clackamas County, Oregon	339	Miscellaneous manufacturing	2007	1	57

pretend
you're going to
give the
table & sketch
to an assistant
to polish

whole table available at:
Canvas > Files > misc >
ocounties.pdf

area name	code	code	Year	estimated	establishments
Benton County, Oregon	334	Computer and electronic product manufacturing	2007	3	9
Clackamas County, Oregon	311	Food manufacturing	2007	0	38
Clackamas County, Oregon	321	Wood product manufacturing	2007	0	32
Clackamas County, Oregon	322	Paper manufacturing	2007	0	12
Clackamas County, Oregon	327	Nonmetallic mineral product manufacturing	2007	1	23
Clackamas County, Oregon	331	Primary metal manufacturing	2007	0	12
Clackamas County, Oregon	332	Fabricated metal product manufacturing	2007	0	164
Clackamas County, Oregon	333	Machinery manufacturing	2007	4	51
Clackamas County, Oregon	334	Computer and electronic product manufacturing	2007	0	29
Clackamas County, Oregon	336	Transportation equipment manufacturing	2007	2	21
Clackamas County, Oregon	339	Miscellaneous manufacturing	2007	1	57

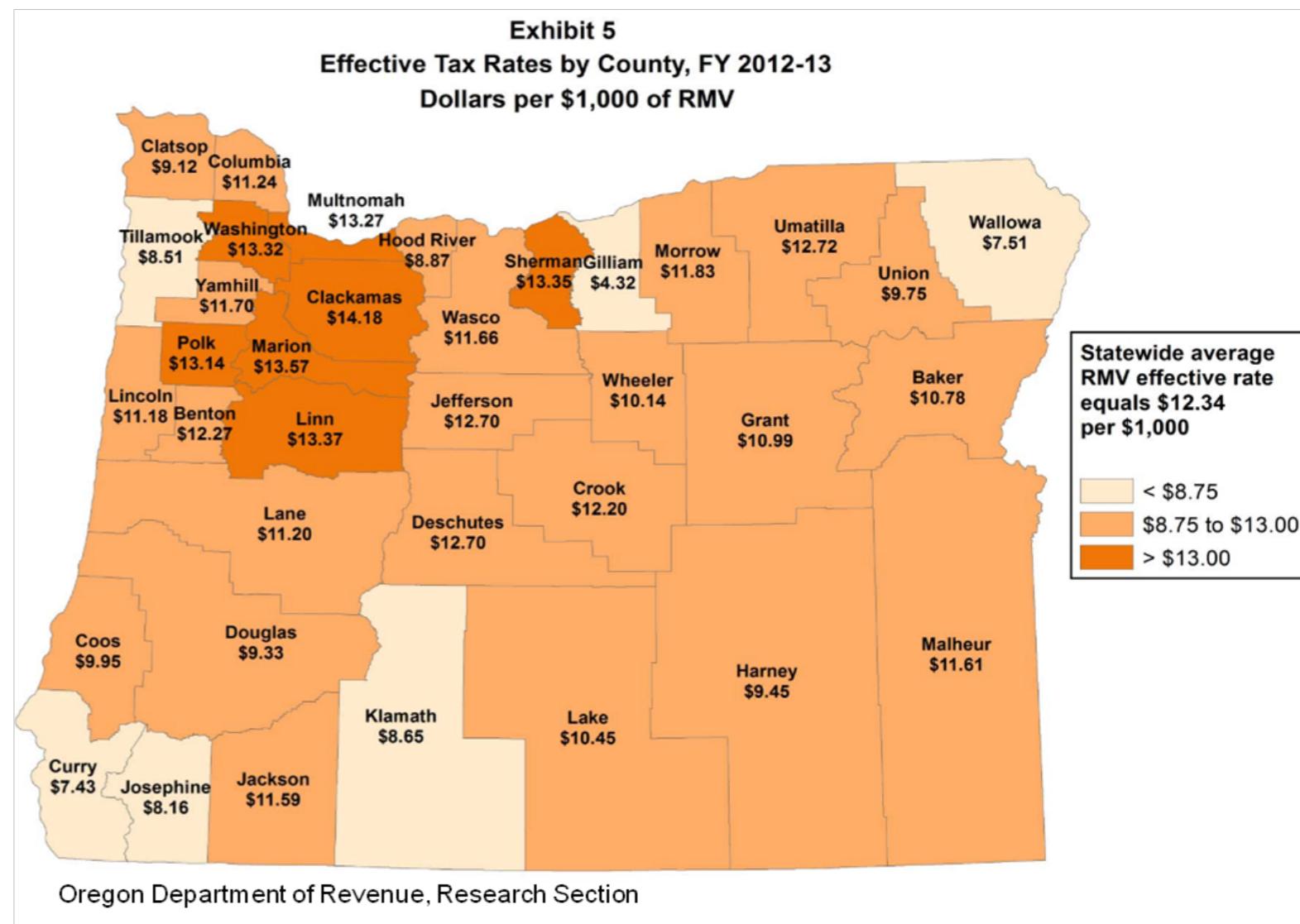
1 85 of 85	Geographic area name	2007 NAICS code	Meaning of 2007 NAICS code	Year	Percent estimated	Number of establishments	Establishments with 20 employees or more	Number of employees	Annual payroll (\$1,000)	Production workers avg per year	Production workers hours (1,000)	Production workers, nonleased employees wages (\$1,000)	Value added (\$1,000)	Total cost of materials (\$1,000)	Total value of shipments (\$1,000)	Total capital expenditures (new and used) (\$1,000)
Benton County, Oregon	334	Computer and electronic product manufacturing	2007	3	9	2	h	D	D	D	D	D	D	D	D	
Clackamas County, Oregon	311	Food manufacturing	2007	0	38	12	g	52,315	D	1,852	32,927	D	D	522,497	D	
Clackamas County, Oregon	321	Wood product manufacturing	2007	0	32	8	1,027	35,891	815	1,716	25,646	D	D	216,041	D	
Clackamas County, Oregon	322	Paper manufacturing	2007	0	12	7	f	40,647	D	D	28,240	D	D	D	D	
Clackamas County, Oregon	327	Nonmetallic mineral product manufacturing	2007	1	23	8	559	D	435	907	D	D	D	D	D	
Clackamas County, Oregon	331	Primary metal manufacturing	2007	0	12	7	g	D	D	D	41,111	D	D	D	D	
Clackamas County, Oregon	332	Fabricated metal product manufacturing	2007	0	164	35	3,663	161,203	2,713	5,484	105,559	535,010	247,049	764,720	22,333	
Clackamas County, Oregon	333	Machinery manufacturing	2007	4	51	17	1,824	89,706	1,196	2,419	46,027	328,348	270,262	595,878	D	
Clackamas County, Oregon	334	Computer and electronic product manufacturing	2007	0	29	10	3,572	239,640	1,625	D	49,912	D	D	1,913,541	D	
Clackamas County, Oregon	336	Transportation equipment manufacturing	2007	2	21	5	669	D	465	956	D	D	D	D	D	
Clackamas County, Oregon	339	Miscellaneous manufacturing	2007	1	57	8	f	D	D	D	D	D	D	D	D	
Clatsop County, Oregon	322	Paper manufacturing	2007	0	1	1	f	D	D	D	D	D	D	D	D	
Coos County, Oregon	321	Wood product manufacturing	2007	4	17	6	960	34,552	845	1,790	28,412	60,792	110,617	173,504	6,695	

while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties

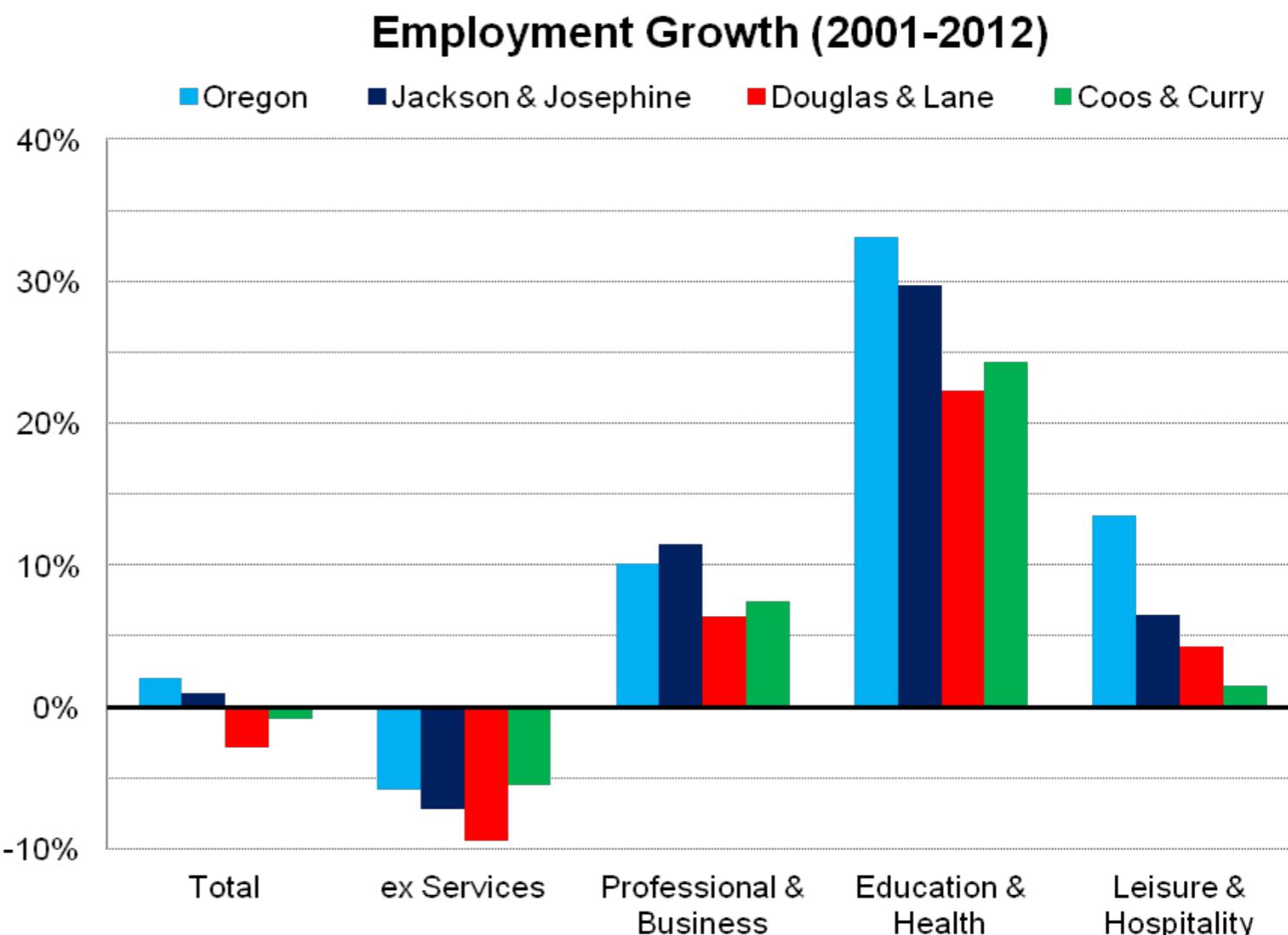
while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



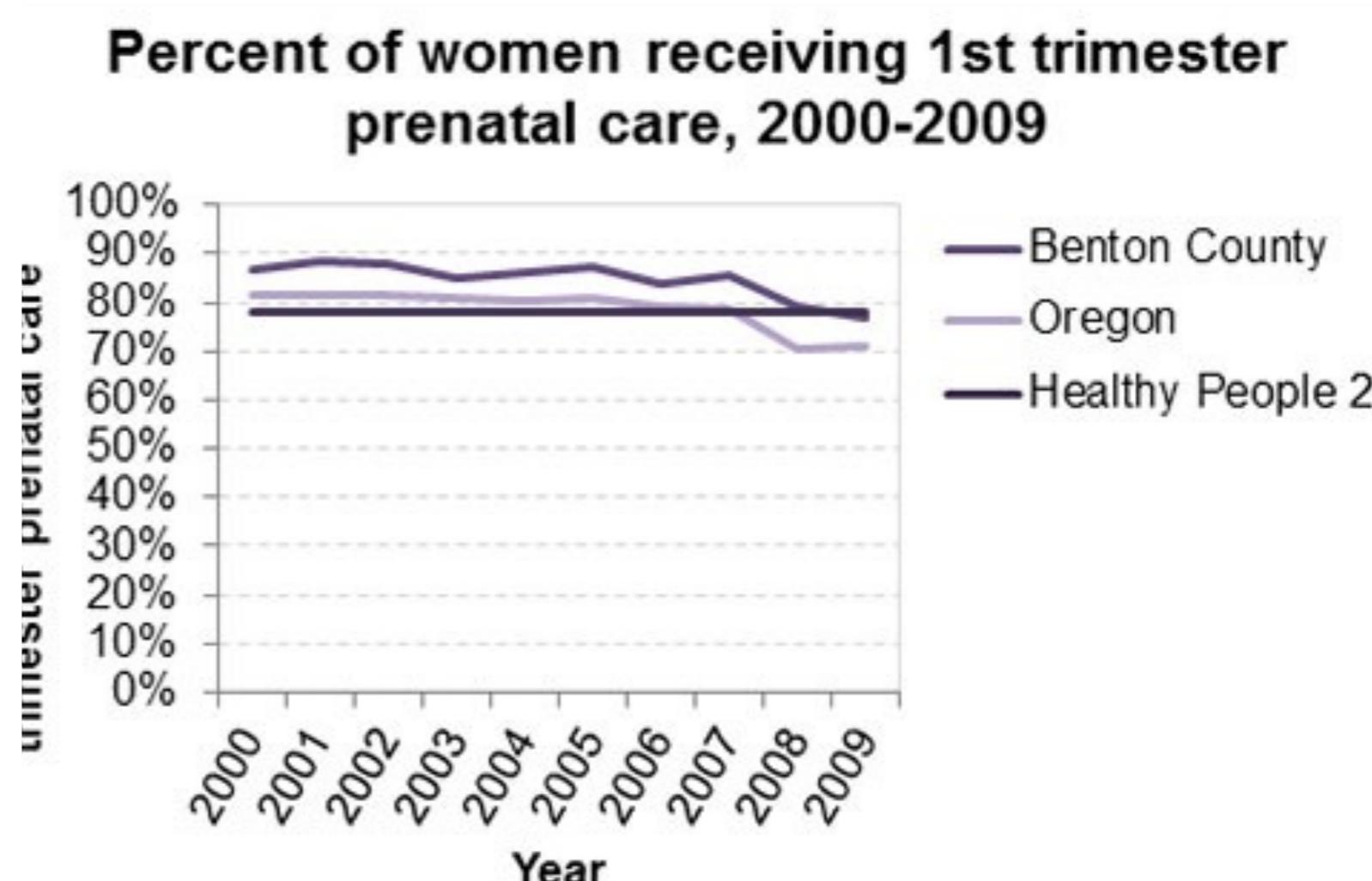
while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



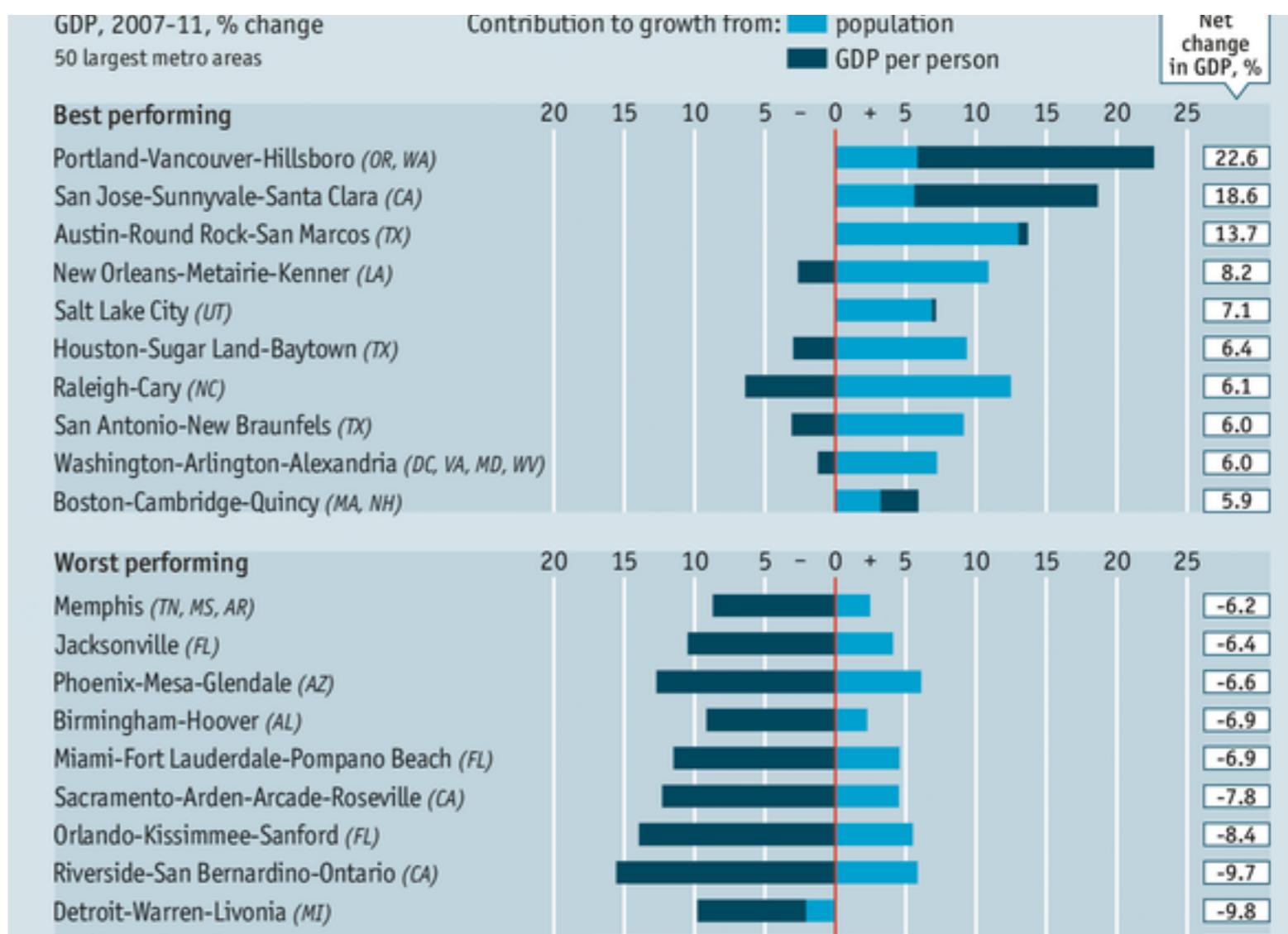
while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



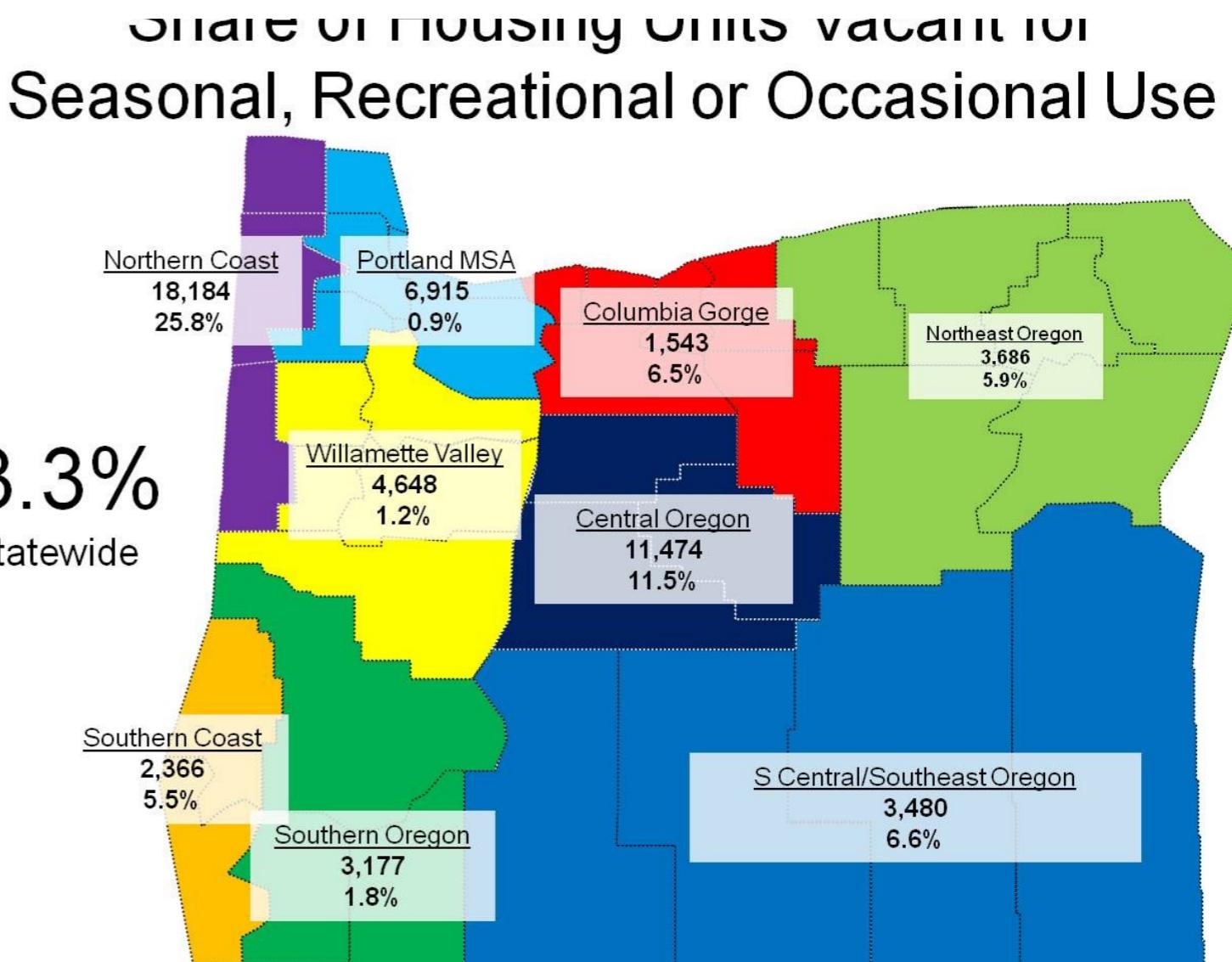
while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



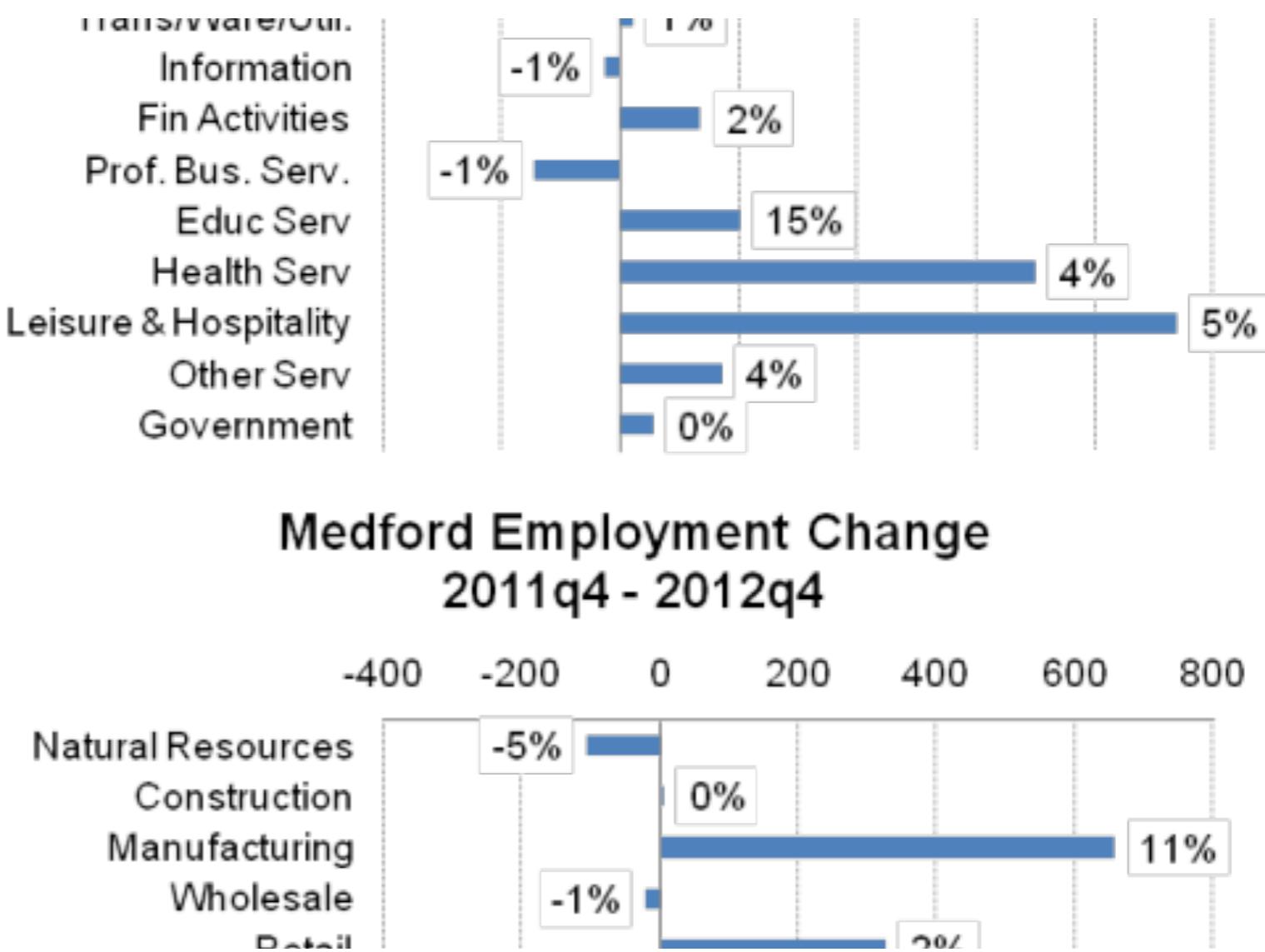
while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



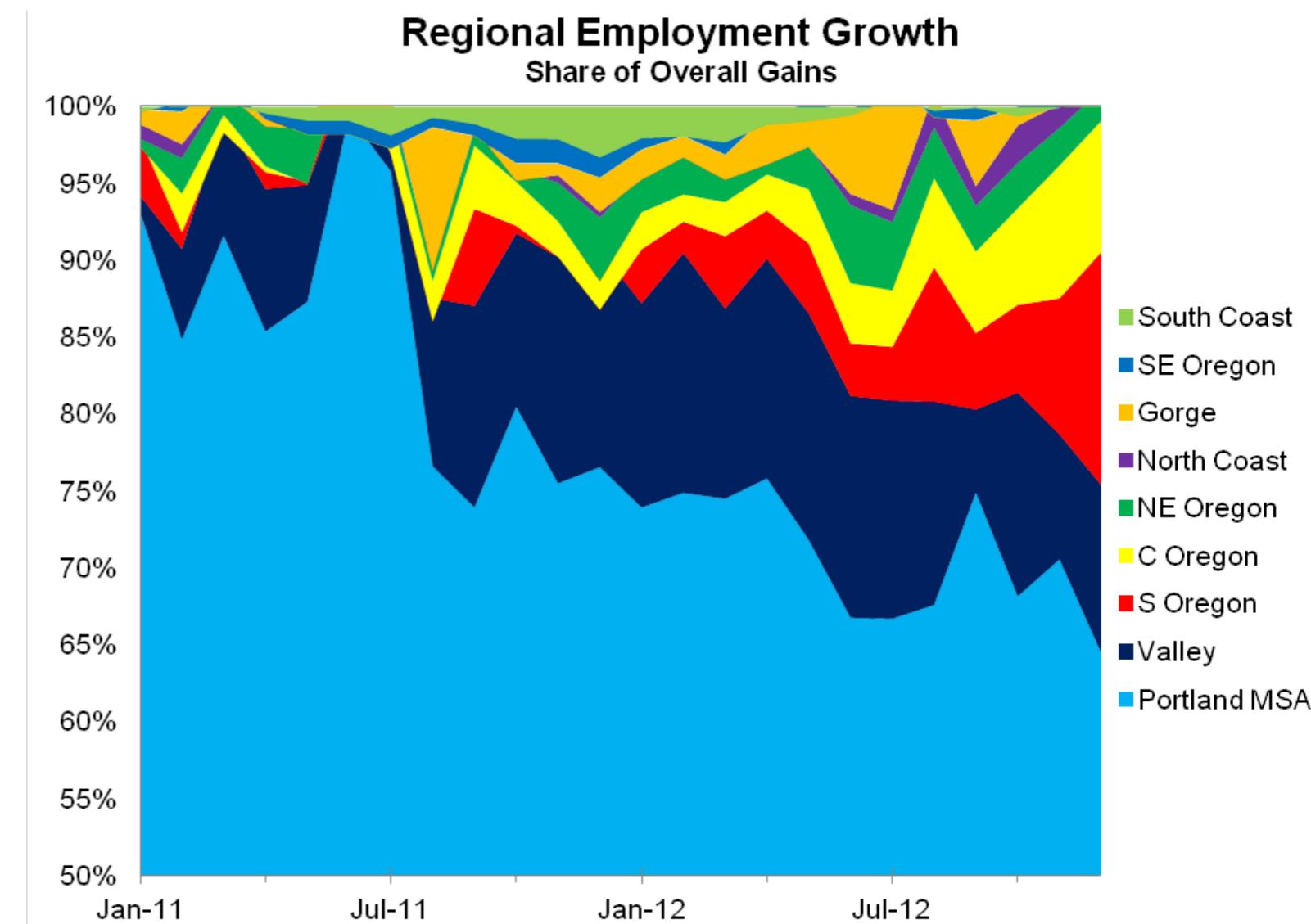
while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



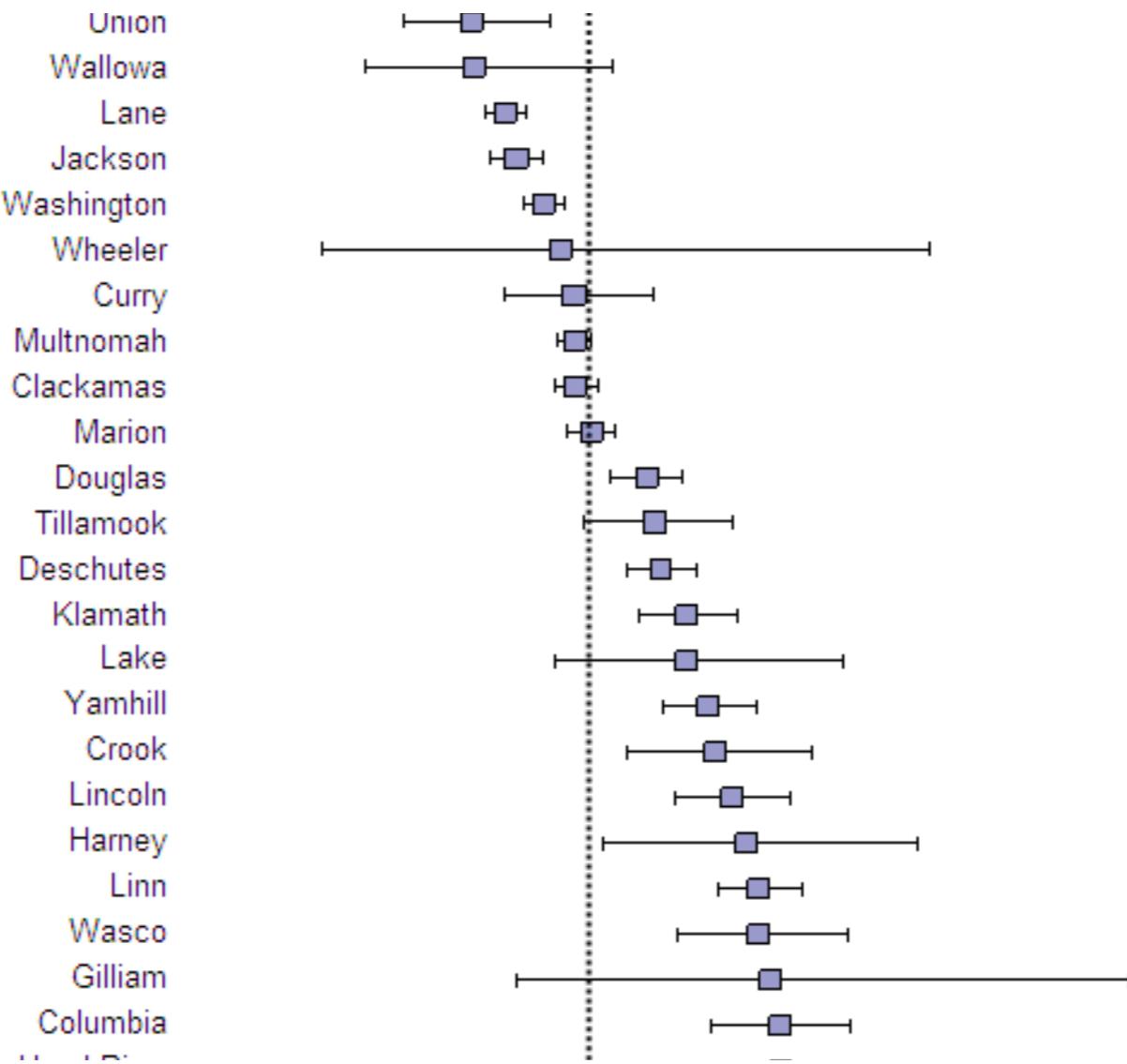
while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



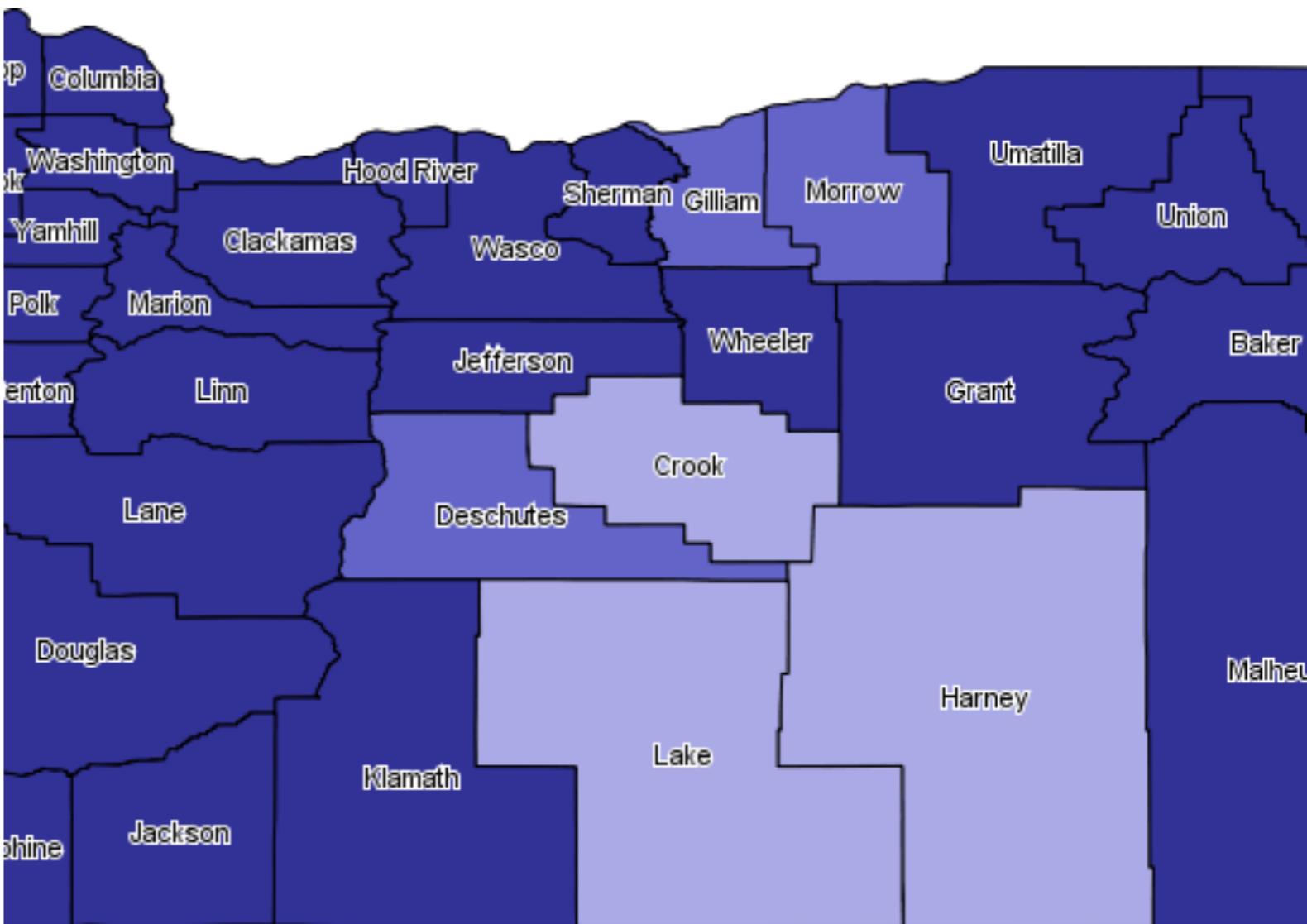
while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



while you
do that
I'll show
some
images

I image googled
statistics
on
Oregon
counties



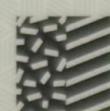
this
textbook
was unknown
in English-
speaking
countries
until

...

JACQUES BERTIN

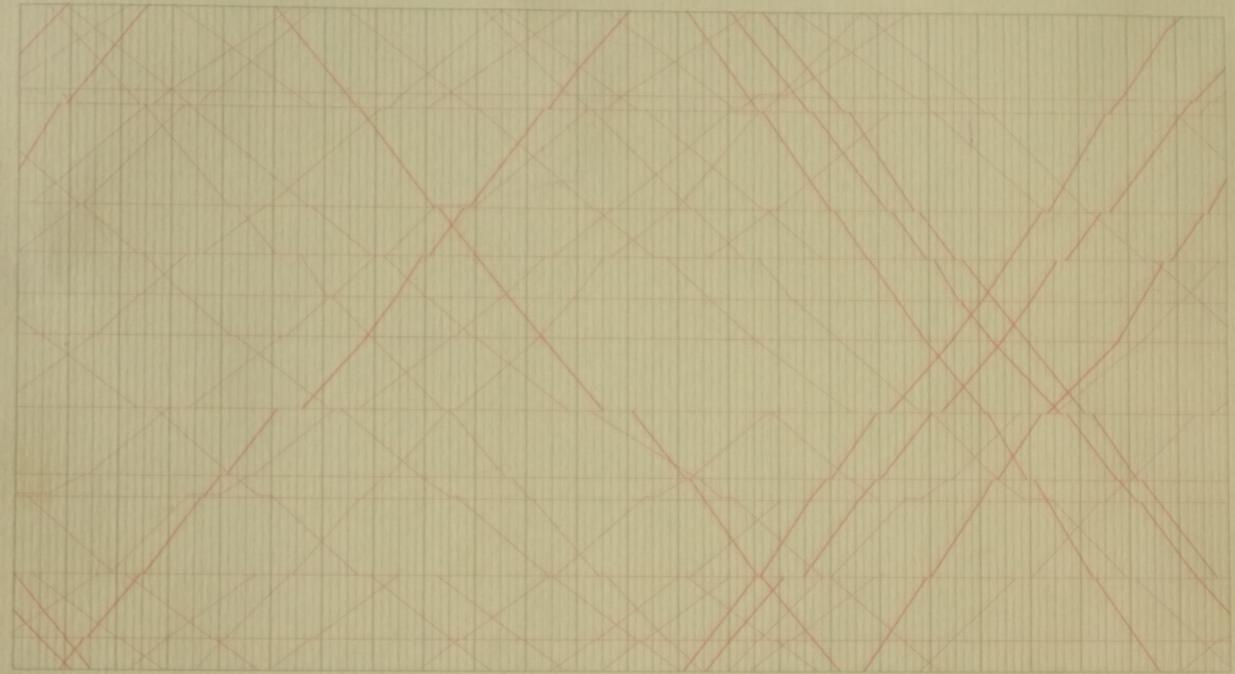
Semiology of Graphics

*diagrams
networks
maps*



... this very
popular book
made
it okay for quant
people to talk
about graphics

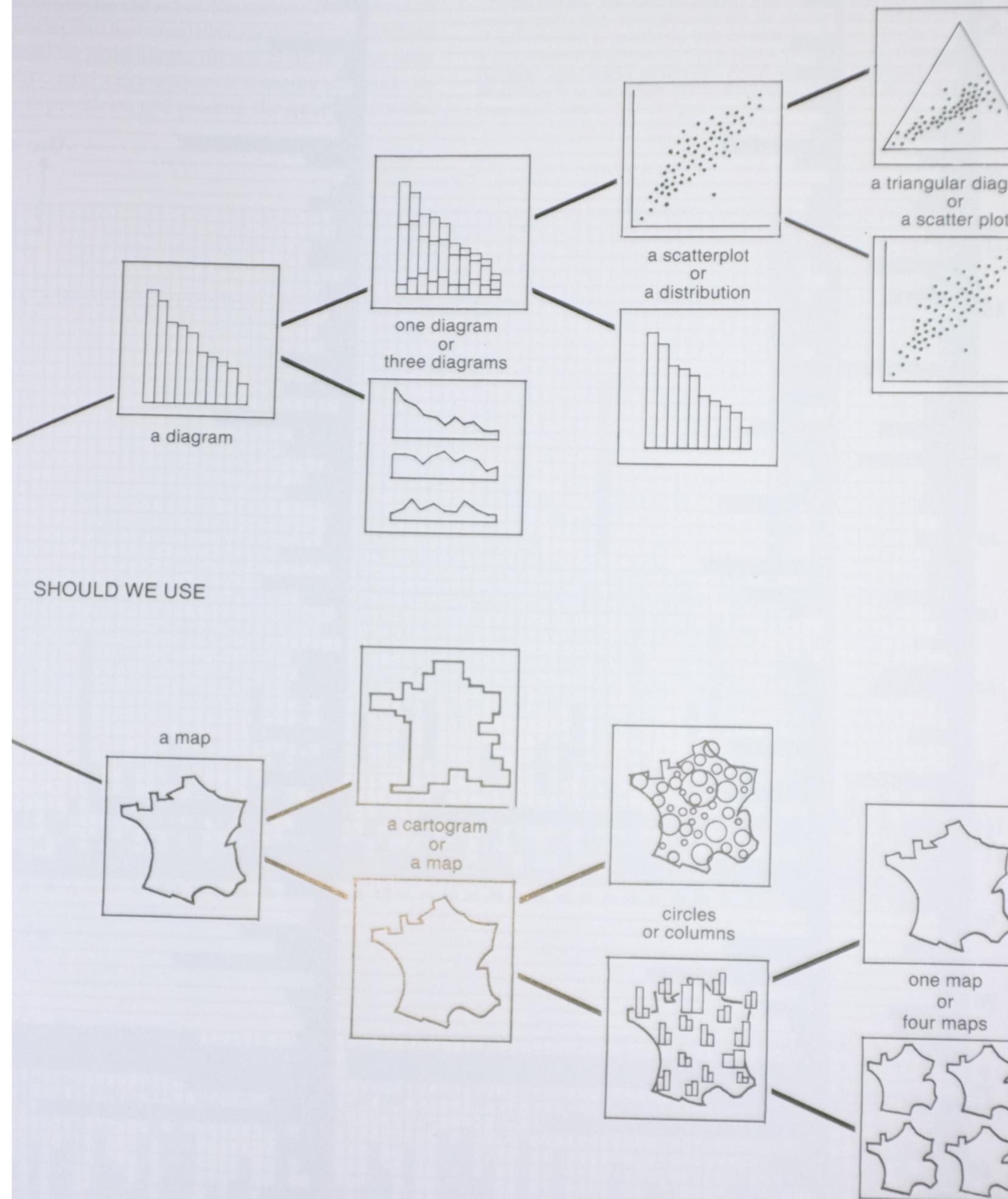
...



The Visual Display
of Quantitative Information

EDWARD R. TUFTE

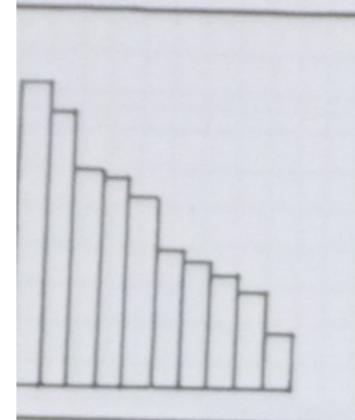
the basic problem you just tackled



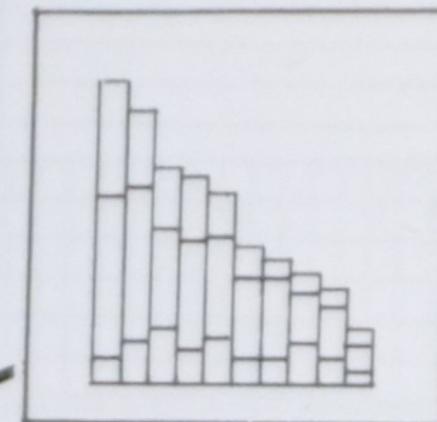
the basic problem you just tackled

E USE

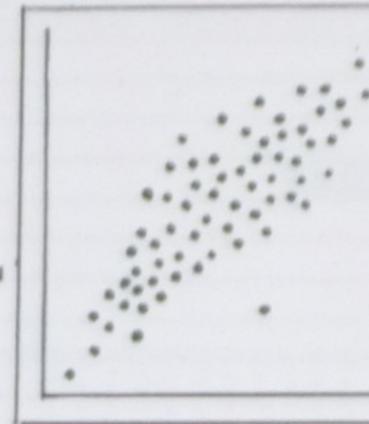
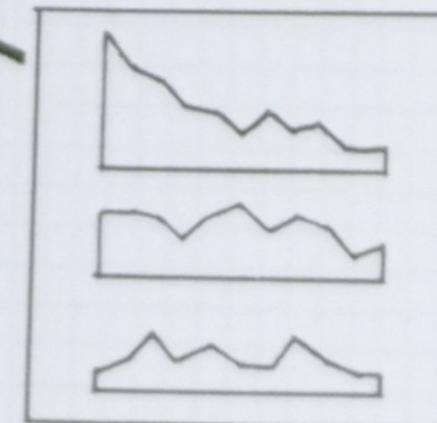
a map



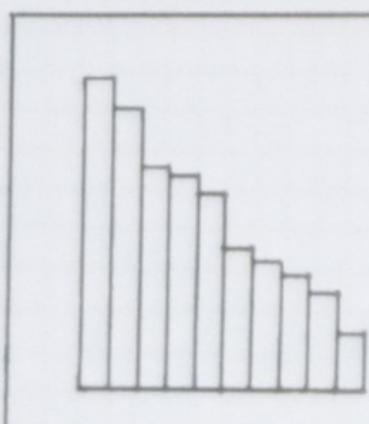
a diagram



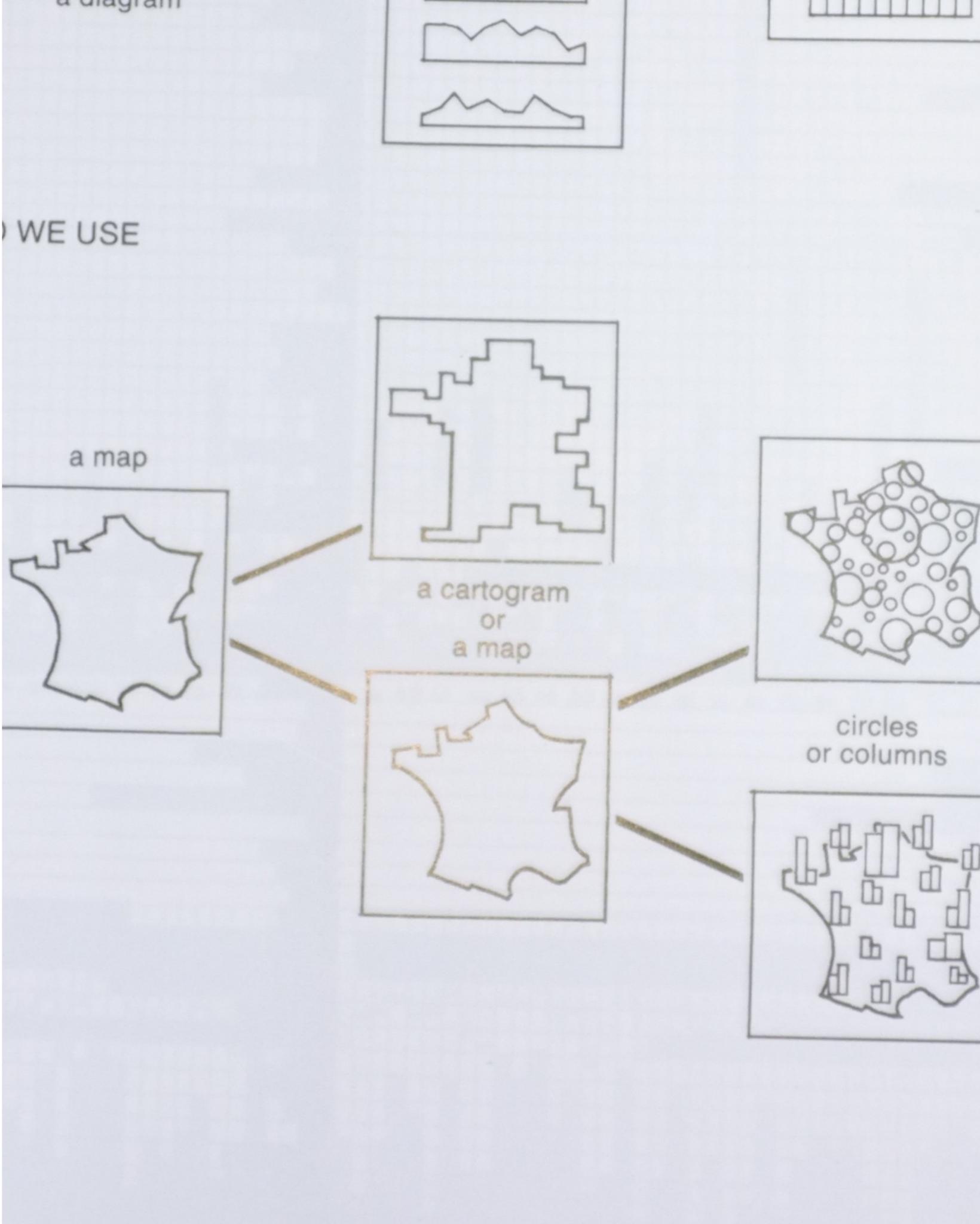
one diagram
or
three diagrams



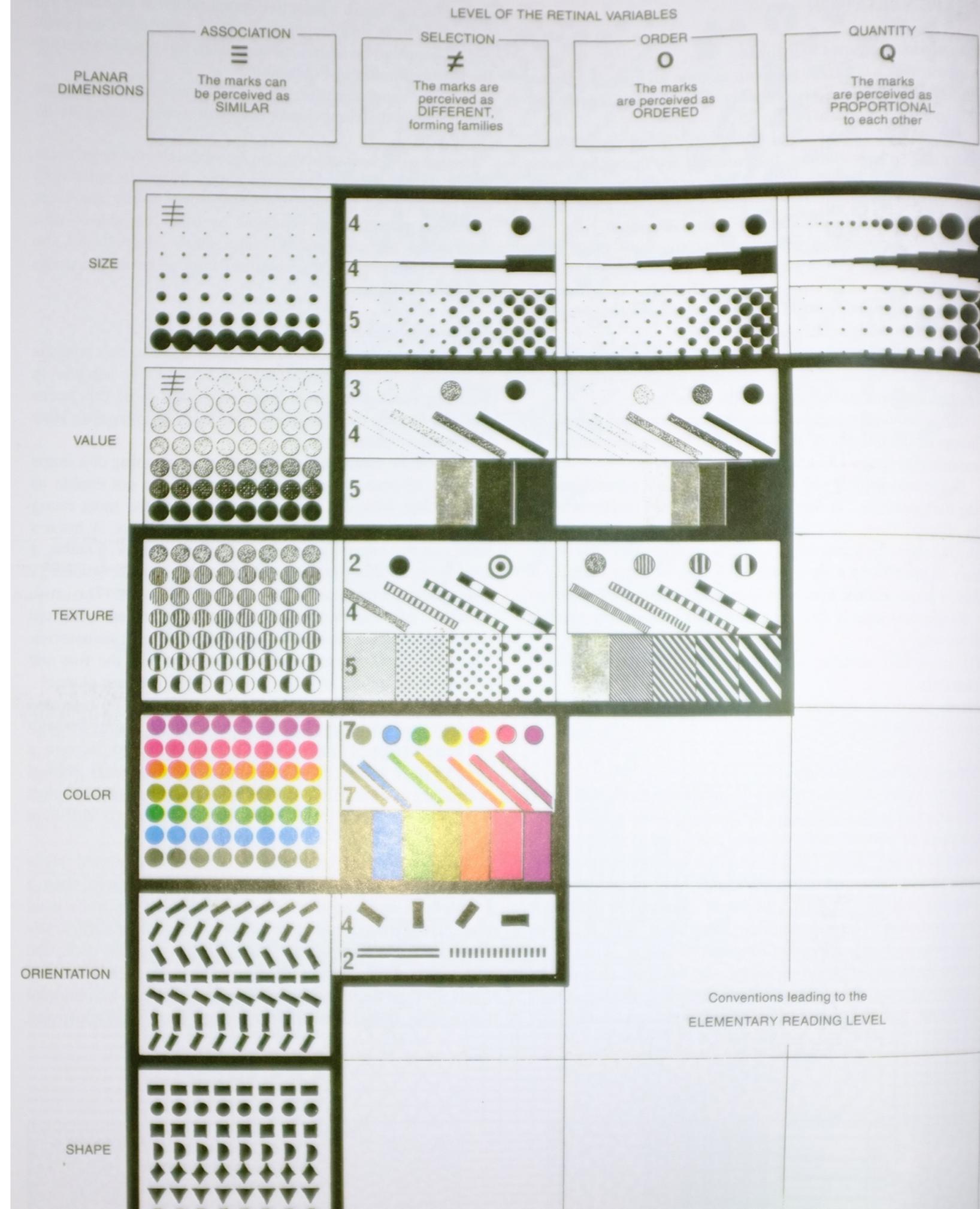
a scatterplot
or
a distribution



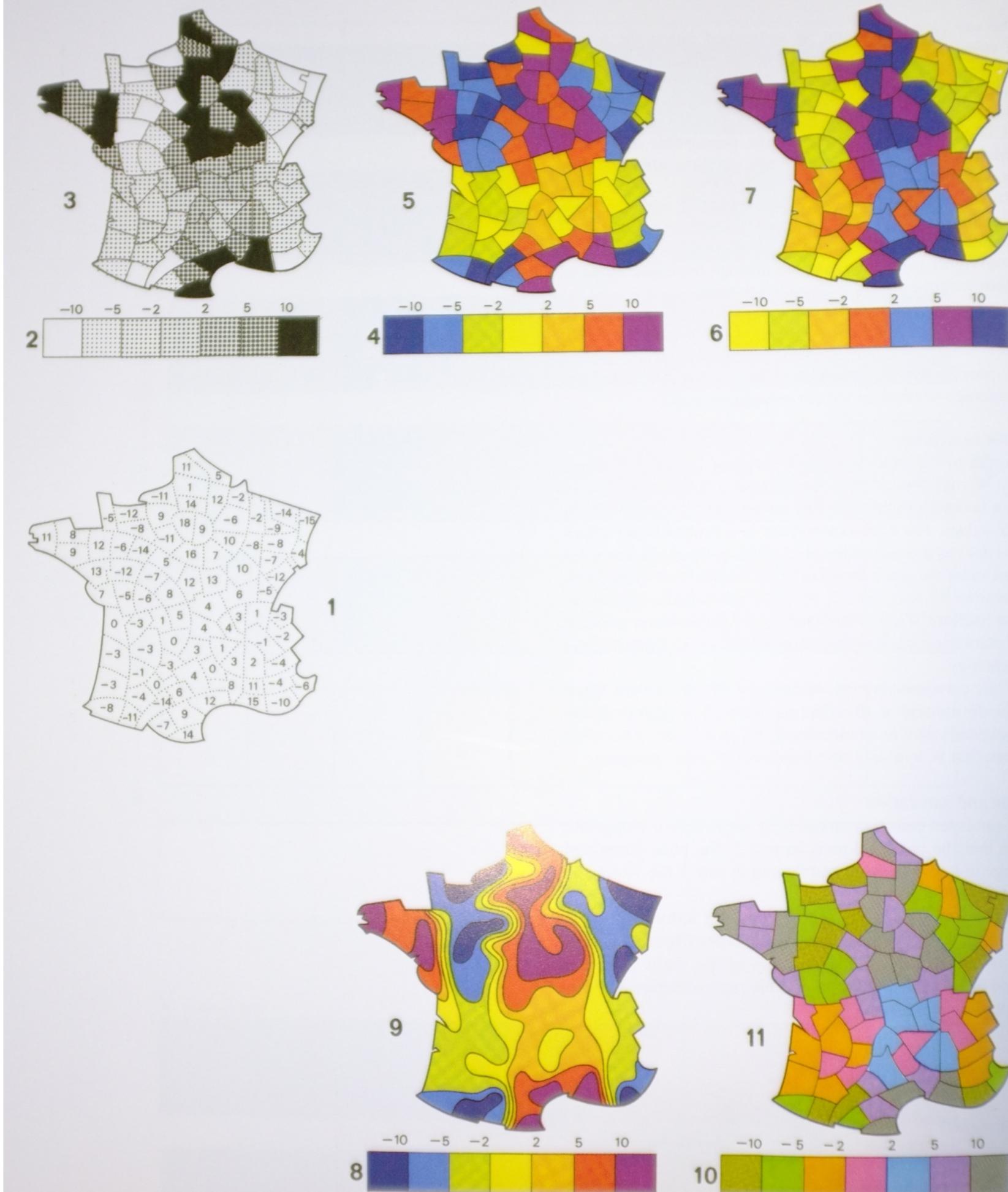
the
basic
problem
you just
tackled



you chose
retinal
variables
matched to
relationships



let's drill
down into
one retinal
variable,
color



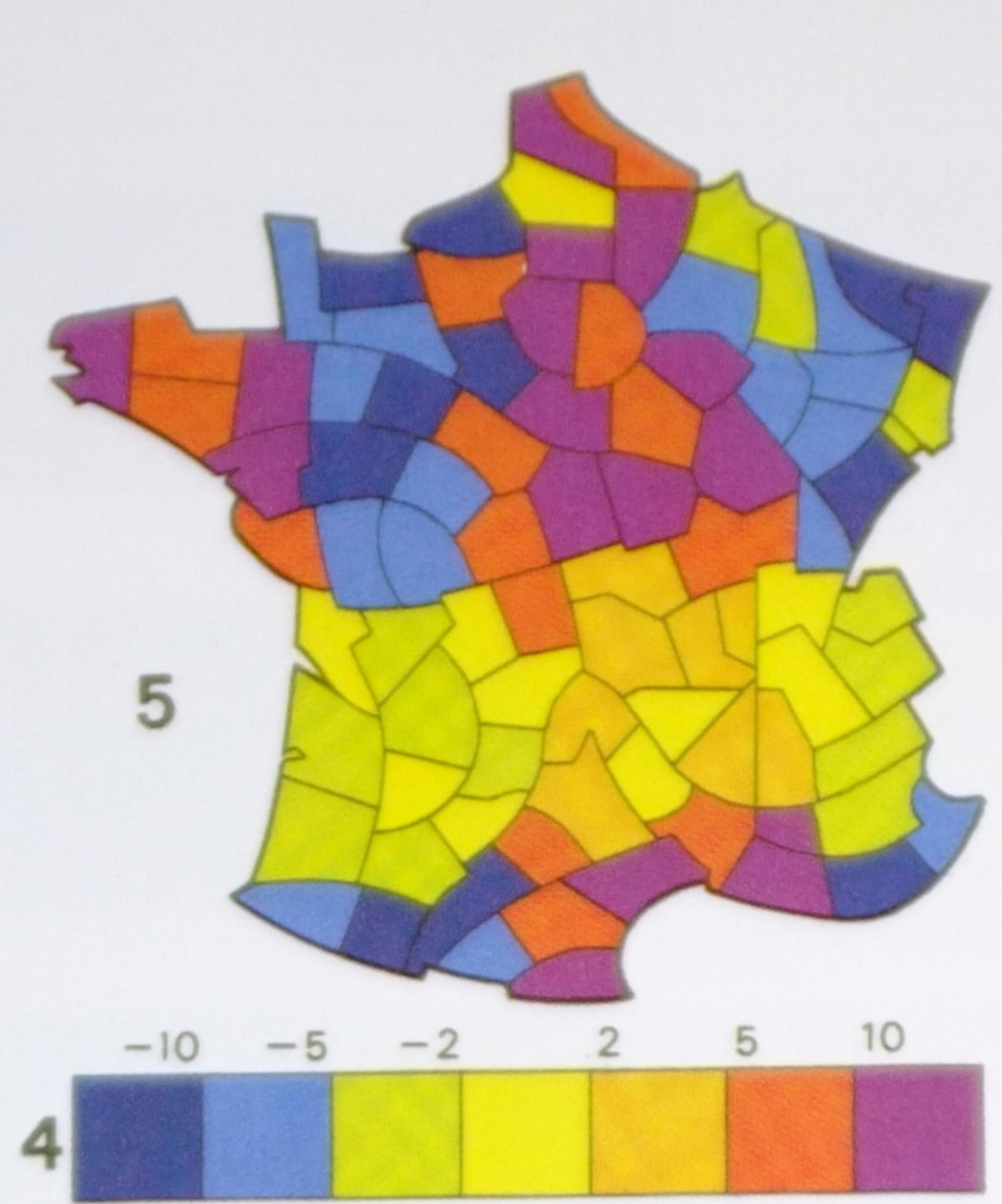
imagine
some
statistic
for each
county

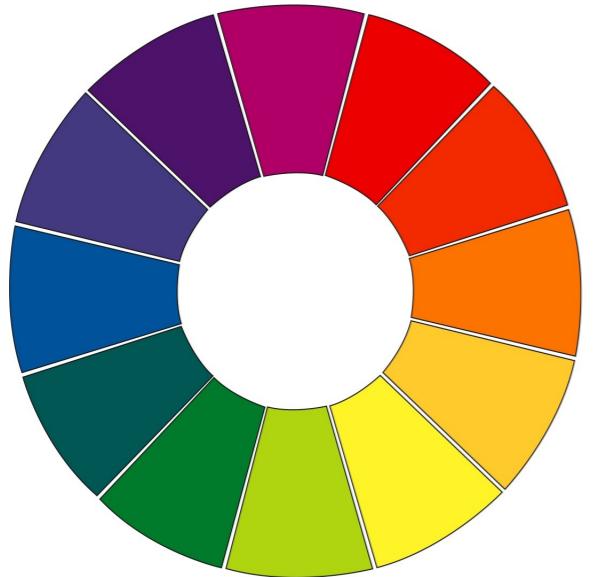


we can
easily
perceive
bins by
value

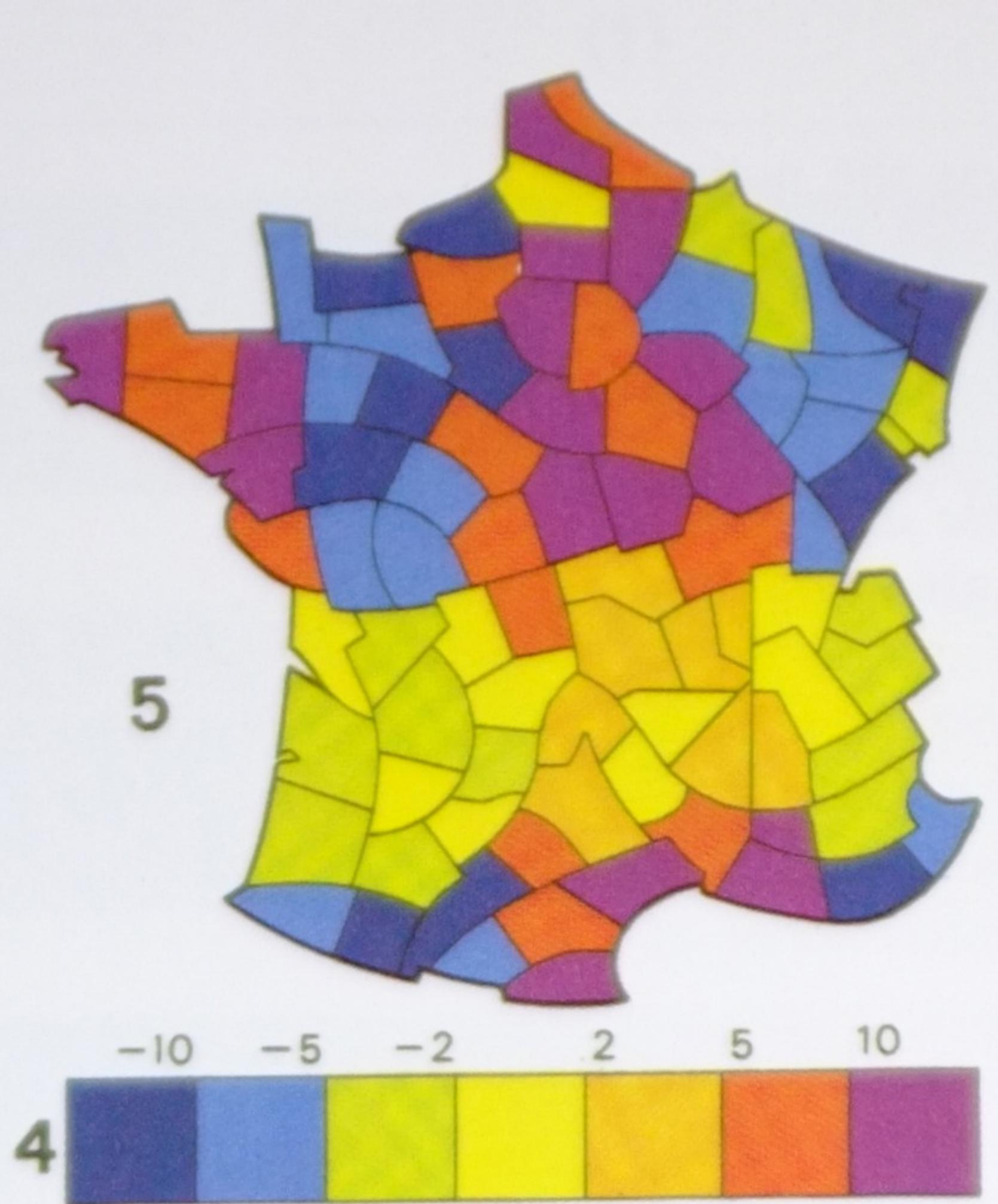


we can try
the color
spectrum
but what's
wrong?

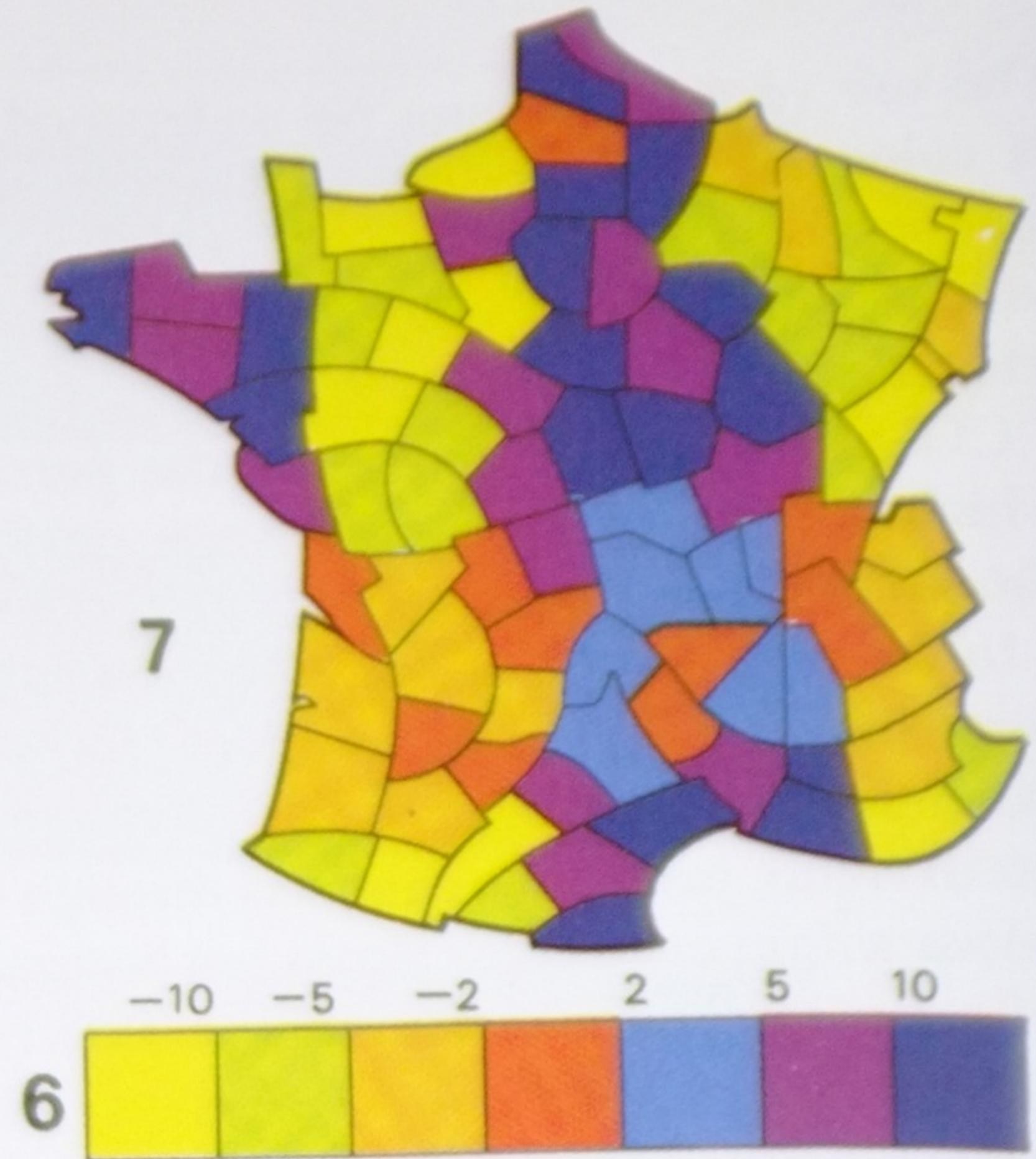




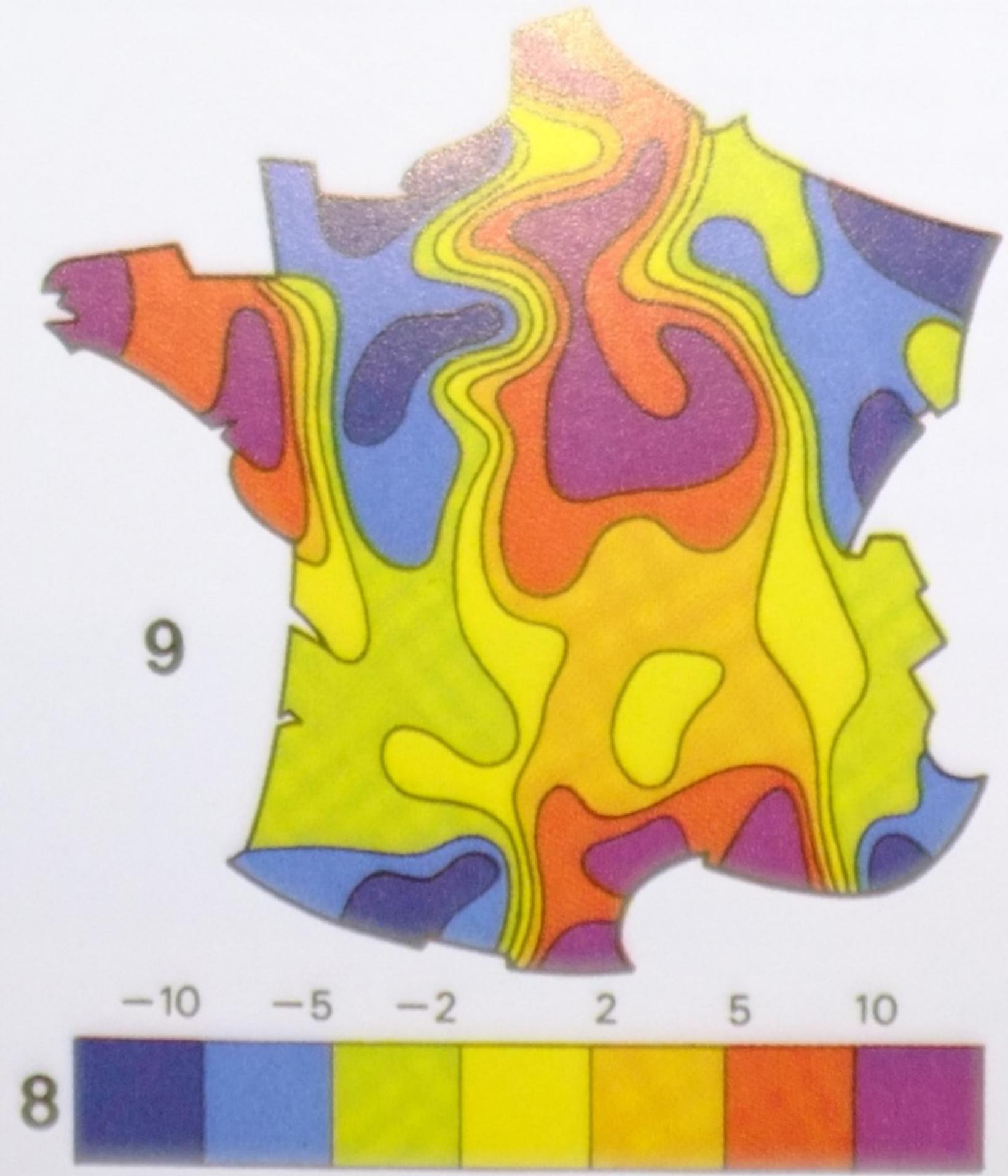
we see the
spectrum
as a wheel
not as a
line



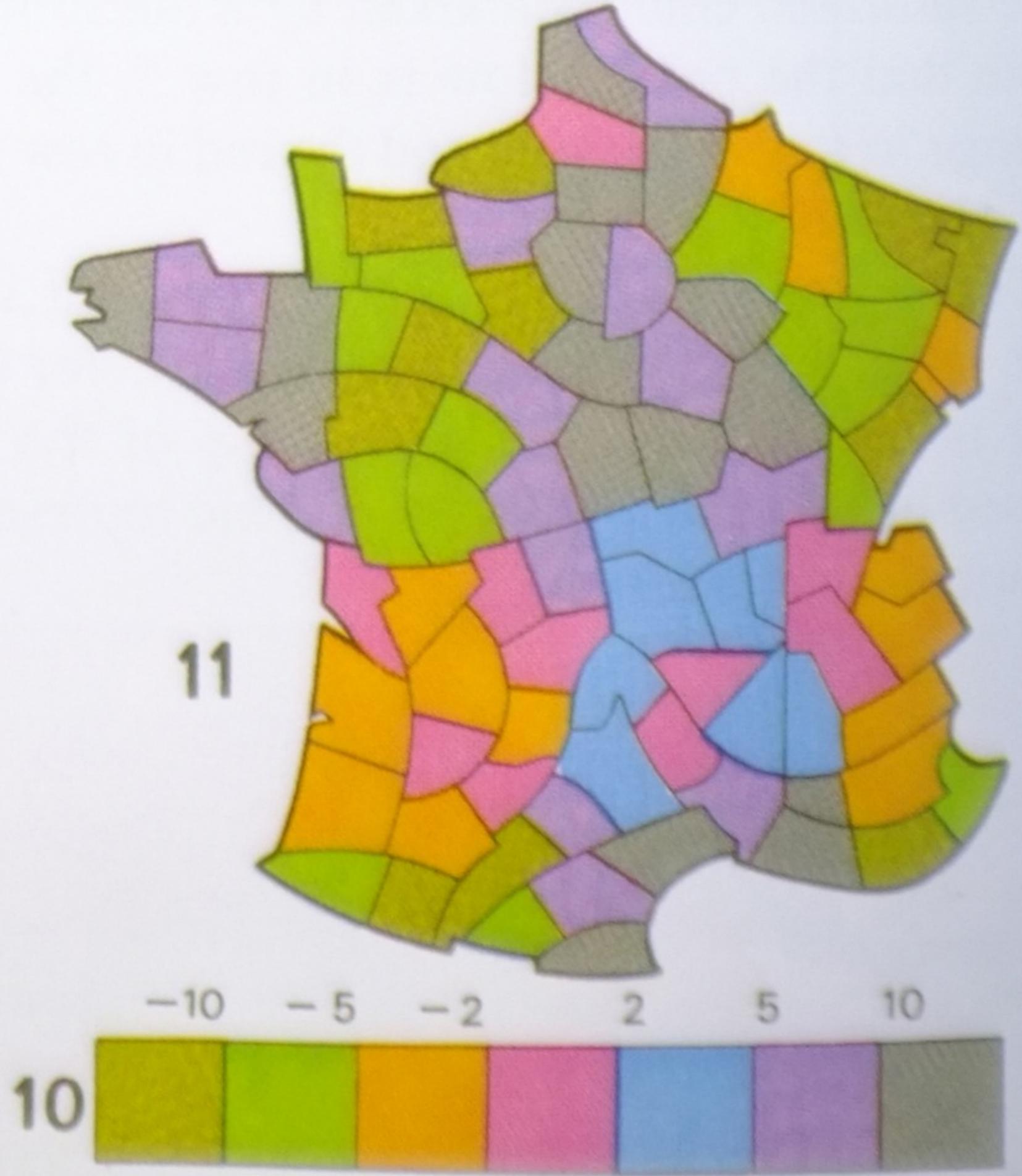
we can do
better by
'cutting' the
wheel in a
different
place



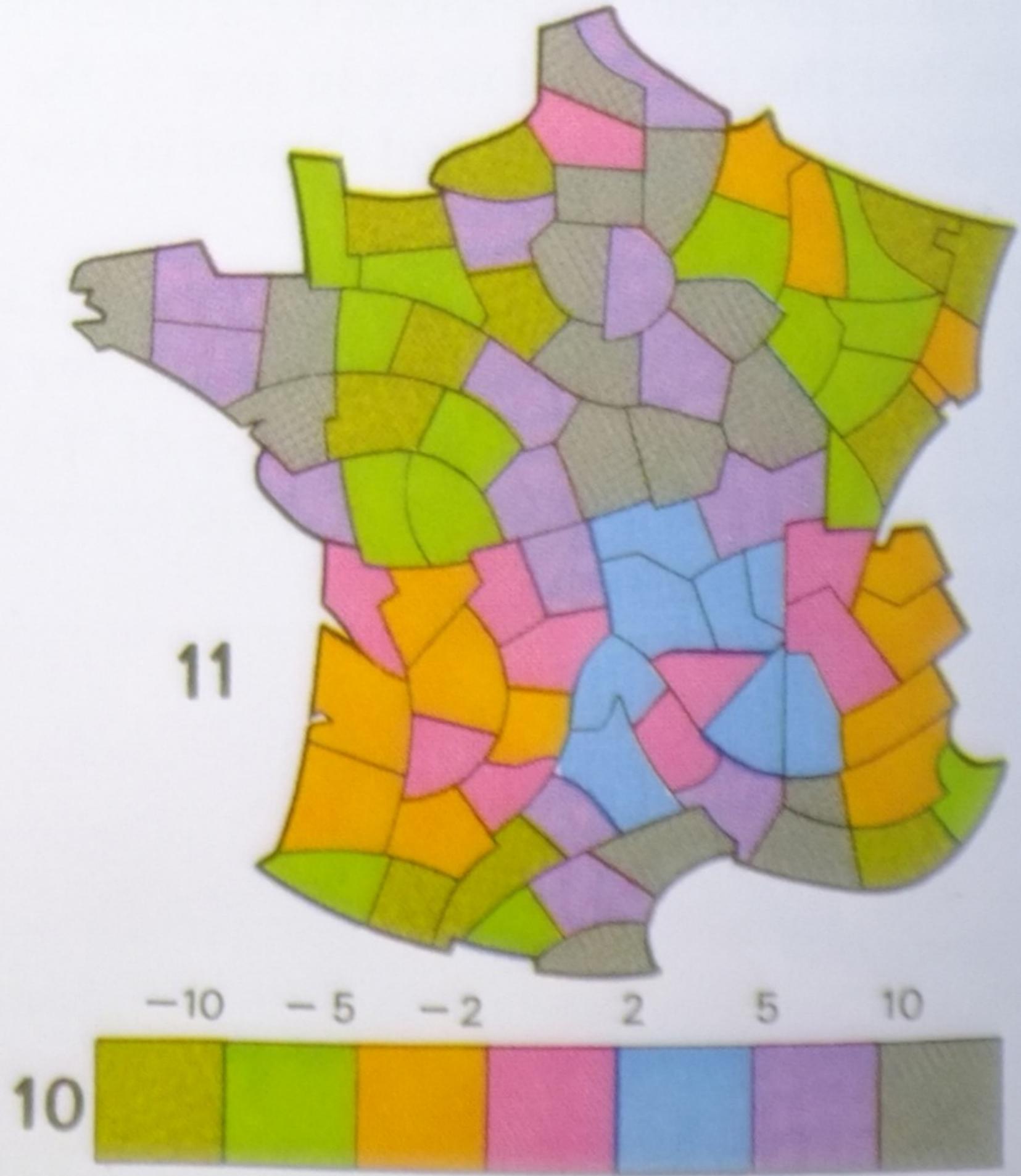
another
solution uses
contours
with the
original color
choice



what do
you think
of this
color
choice?



pretty
and
without
meaning



back
to the
exercise

please
think about
how you
would do it now

a system for producing graphics

underlying these examples is a process for making graphics in which we analyze the information to determine visual aspects best suited to each kind of information ... let's look at that process

1. the invariant

begin to analyze the information by identifying the invariant, the thing that will stay the same across all relationships in the graphic, before considering the components, the things that change

1. the invariant

the invariant is the topic of the graphic, for instance sales by county, or labor by county ... the invariant gives us the title for the graphic

limits of the system

step 1 takes no account of persuasion or provocation because the system strives for the single goal of supporting immediate answers to simple questions about the information

2. the components

each component will be represented by a legend on the graph ... the components are what varies, such as sales, type of timber, market rank

2. the components

each component has three properties to analyze to determine next steps: order, length, and level ... three words given precise definitions in the system

2. the components

**order ranges from components
considered as raw values to
fractions of components governed
by some criteria ... for instance
workers and workers by county**

2. the components

length of a component refers to the number of divisions we can identify in it ... fewer than four will lead to special constructions while more than a dozen will lead to standard constructions

2. the components

level of a component refers to whether the concept is nominal, ordered, or quantitative

**back
to the
exercise**

**please
think again about
how you
would do it now**

FIN