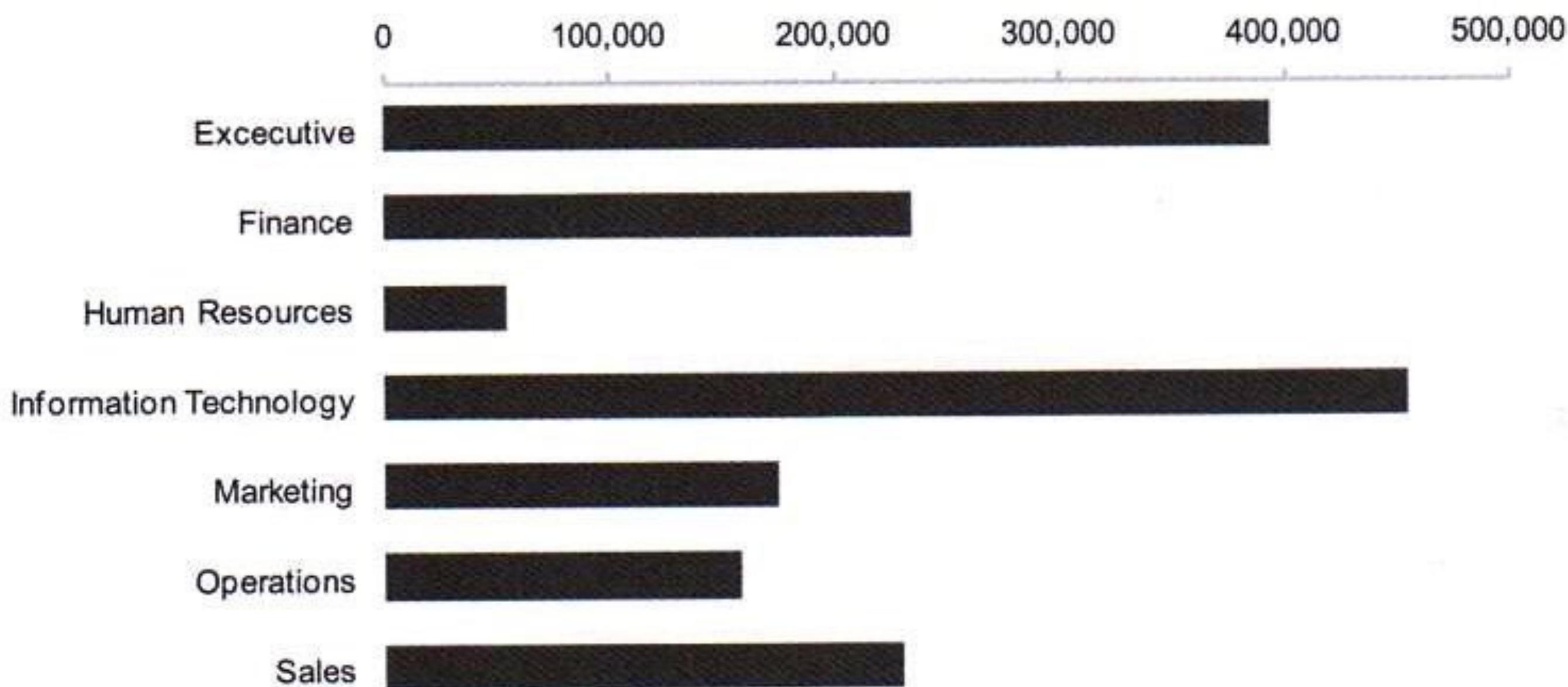


III

PARTE-TODO E RANKING

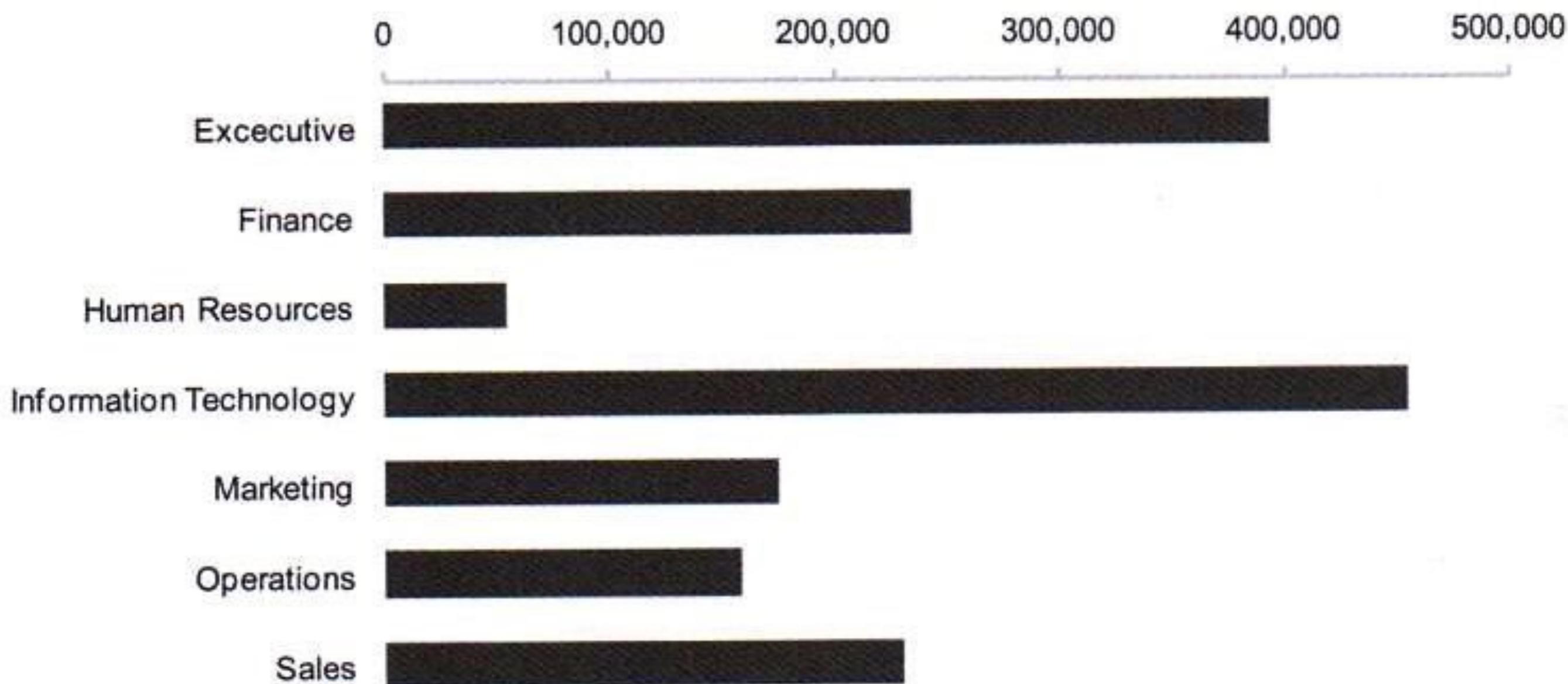
Profa. Raquel C. de Melo Minardi

**January 2008 Expenses
(USD)**



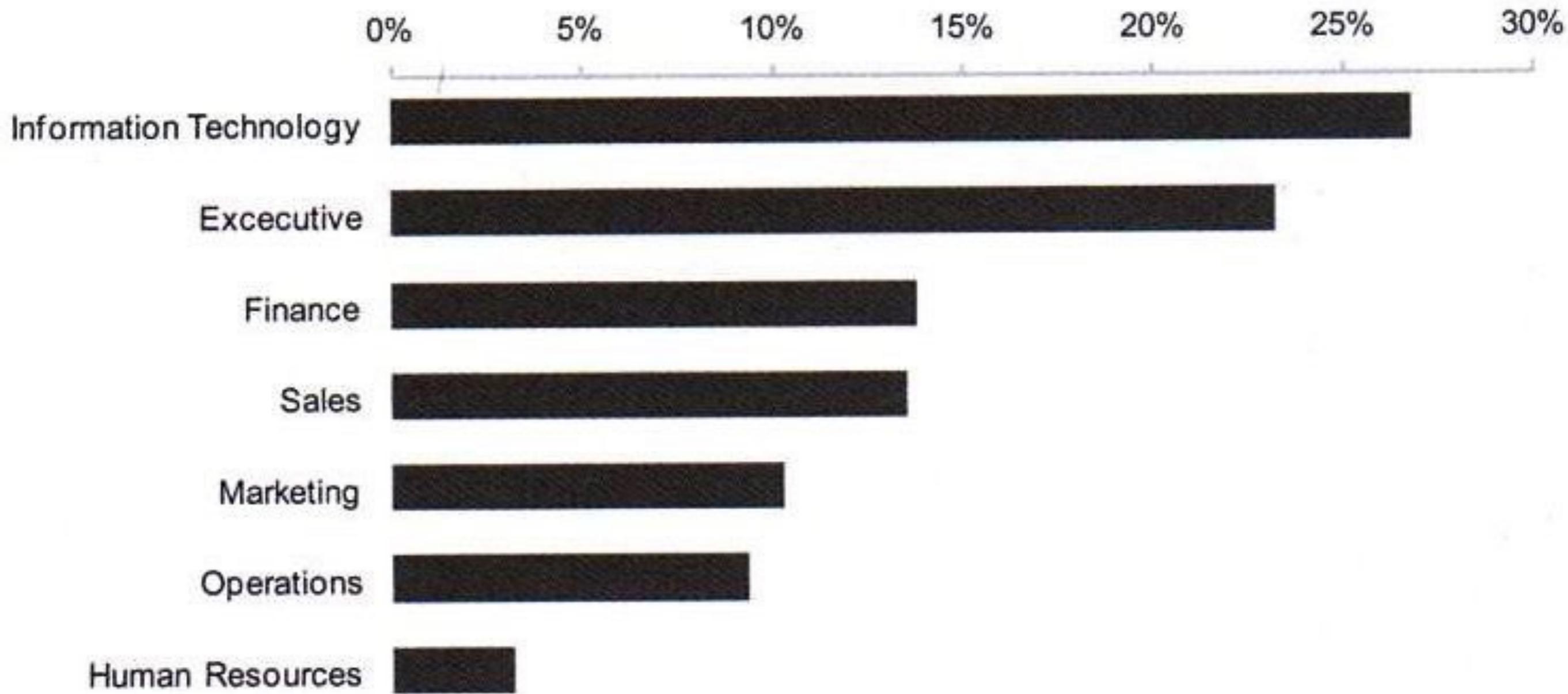
As despesas dos vários departamentos de uma empresa representam partes de um todo

**January 2008 Expenses
(USD)**



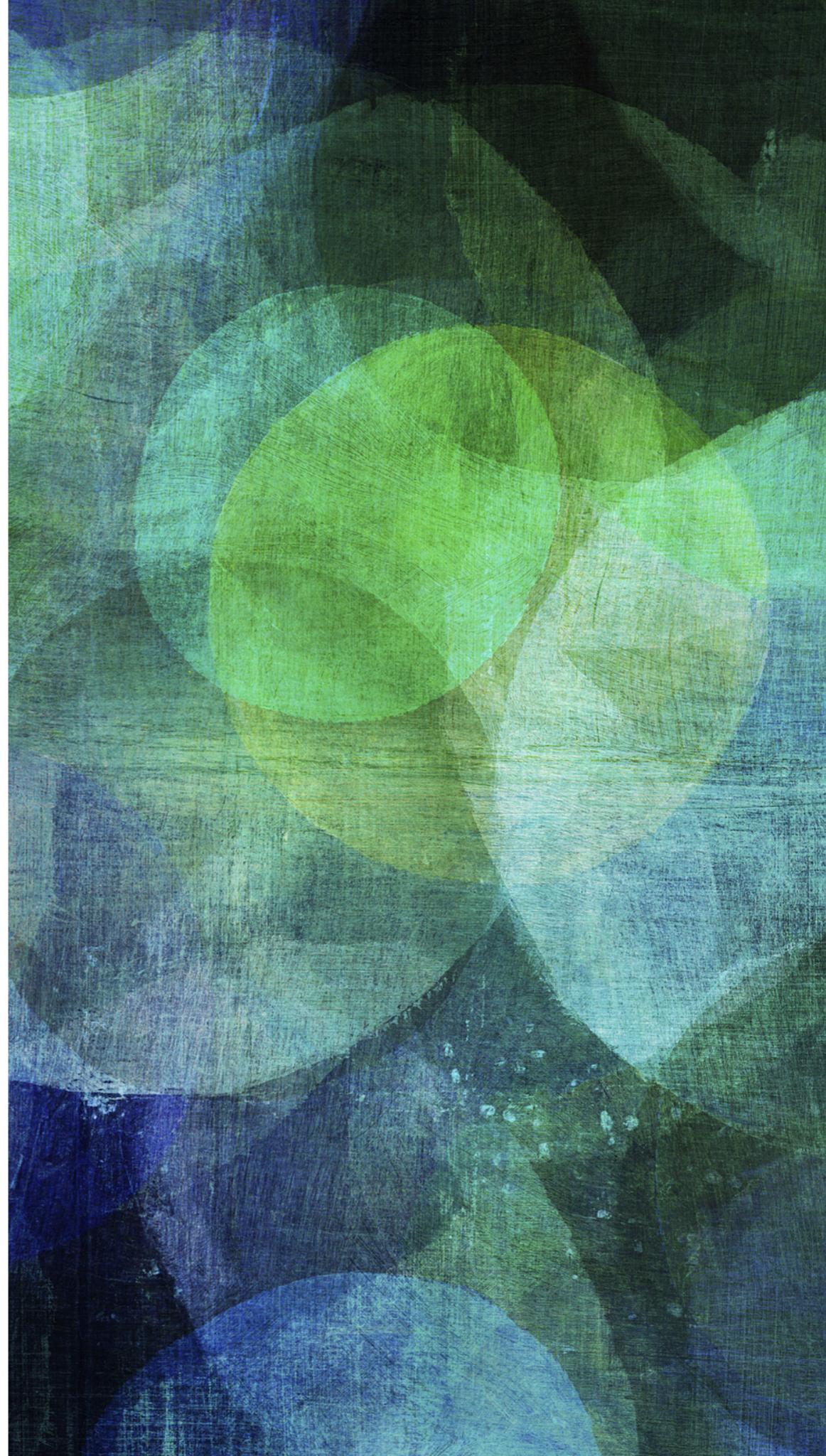
A **ordenação alfabética** e a **unidade** usada para medição
dificultam a visualização deste tipo de relacionamento

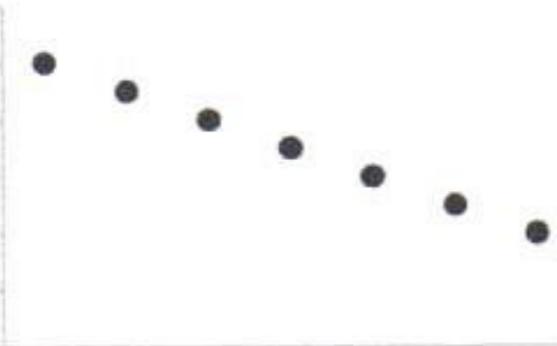
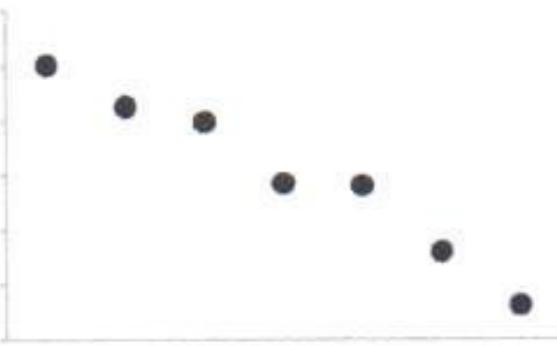
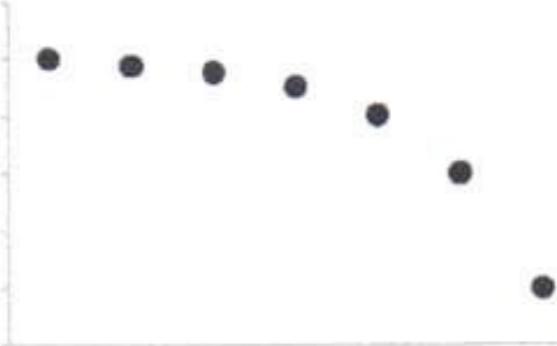
January 2008 Expenses



A **ordenação decrescente** e o uso de percentuais evidenciam o **relacionamento parte-todo**

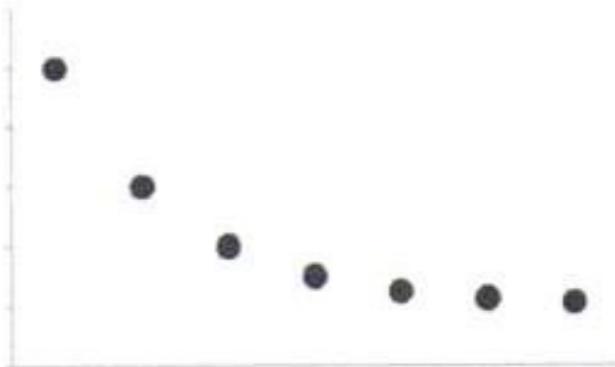
PADRÕES ANALÍTICOS



Pattern	Description	Visual Example
Uniform	All values are roughly the same.	
Uniformly different	Differences from one value to the next decrease by roughly the same amount.	
Non-uniformly different	Differences from one value to the next vary significantly.	
Increasingly different	Differences from one value to the next increase.	

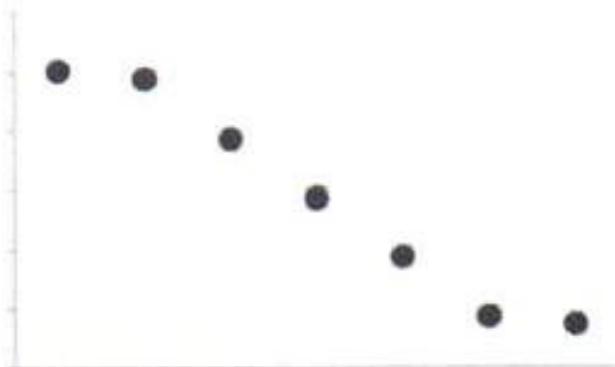
Decreasingly different

Differences from one value to the next decrease.



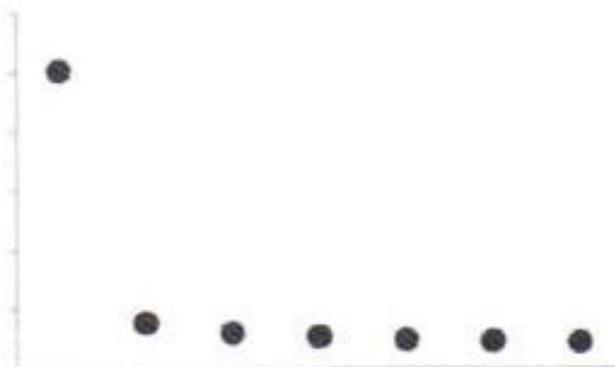
Alternating differences

Differences from one value to the next begin small and then shift to large and finally shift back again to small.

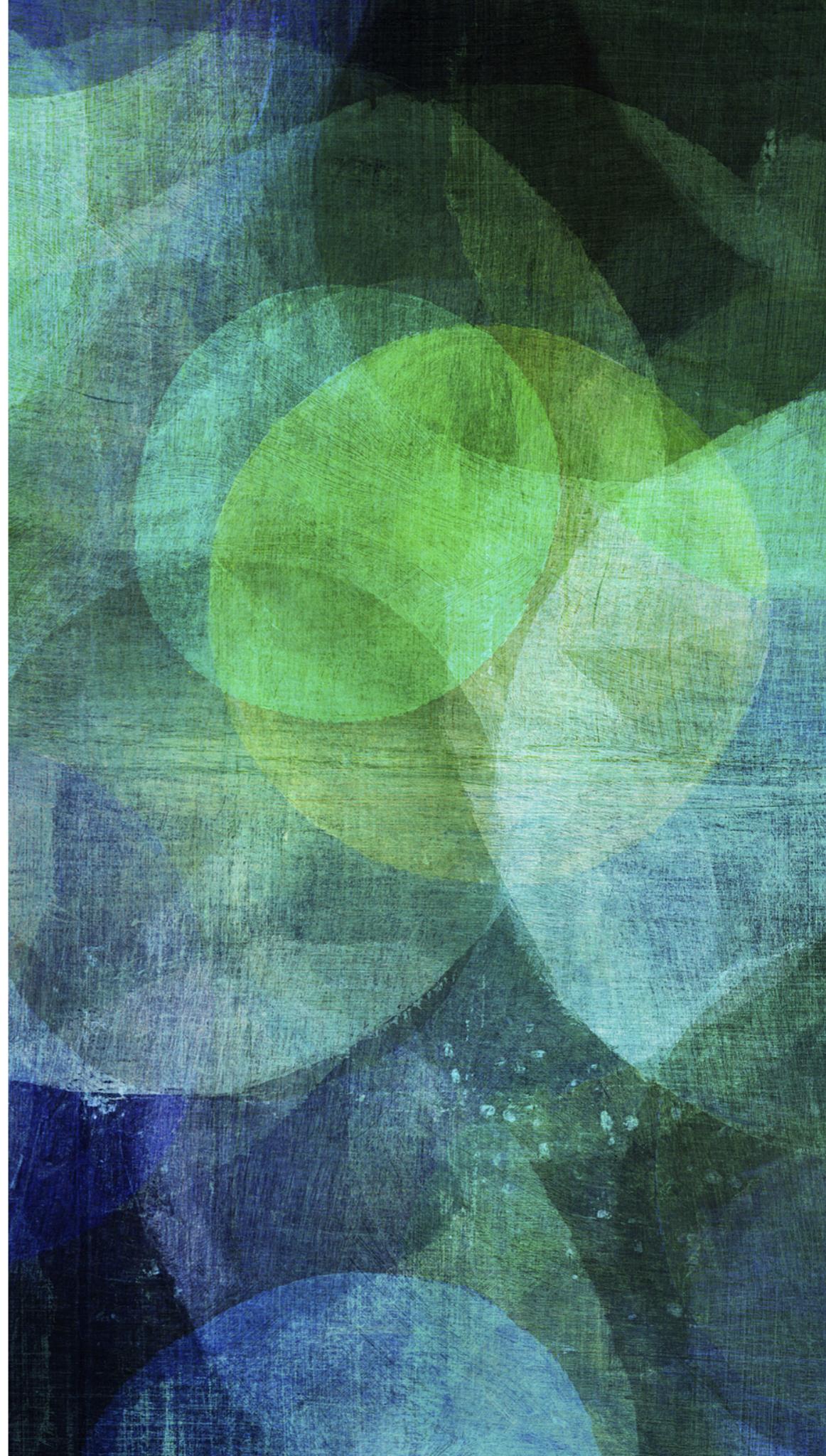


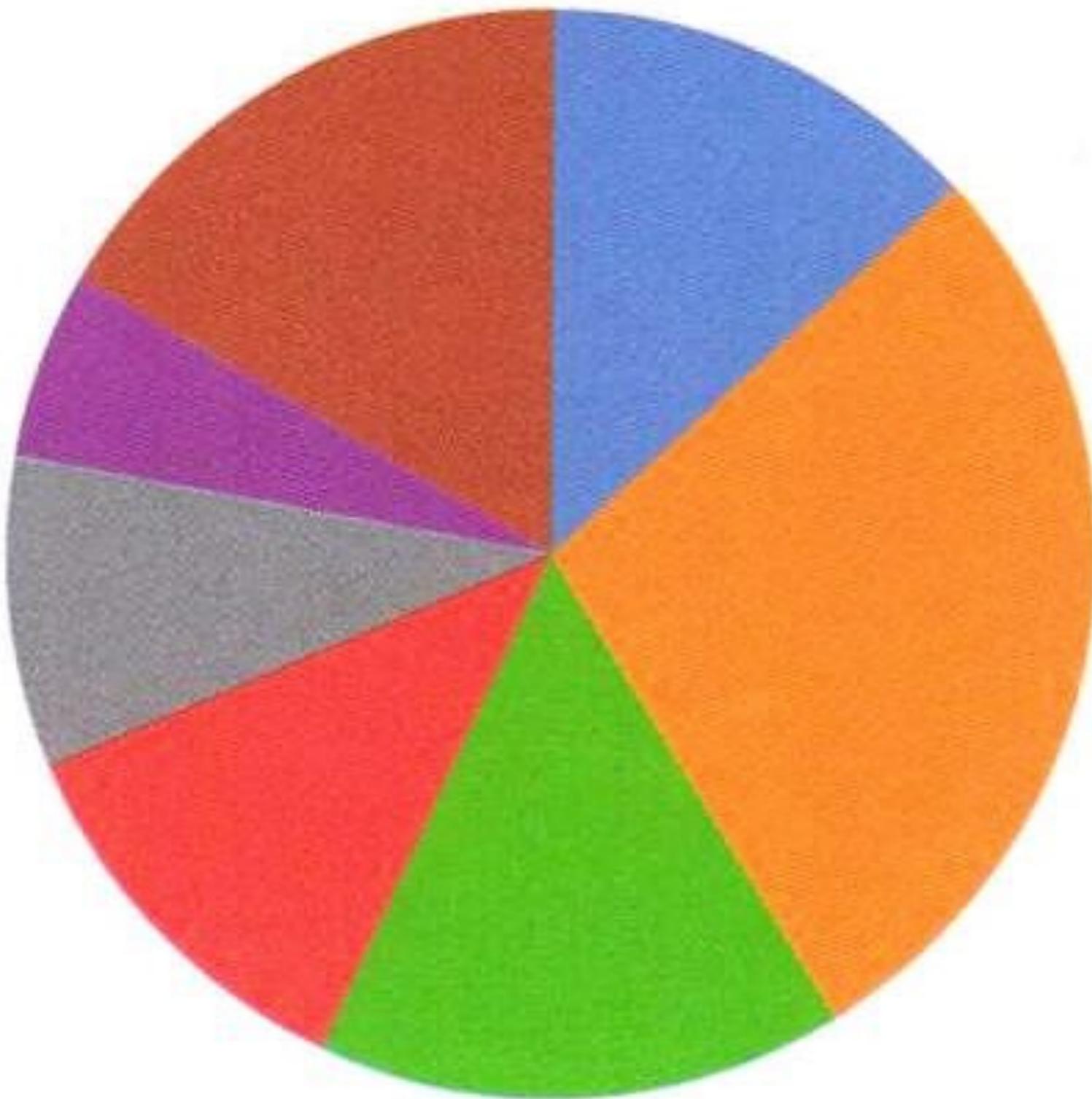
Exceptional

One or more values are extraordinarily different from the rest.

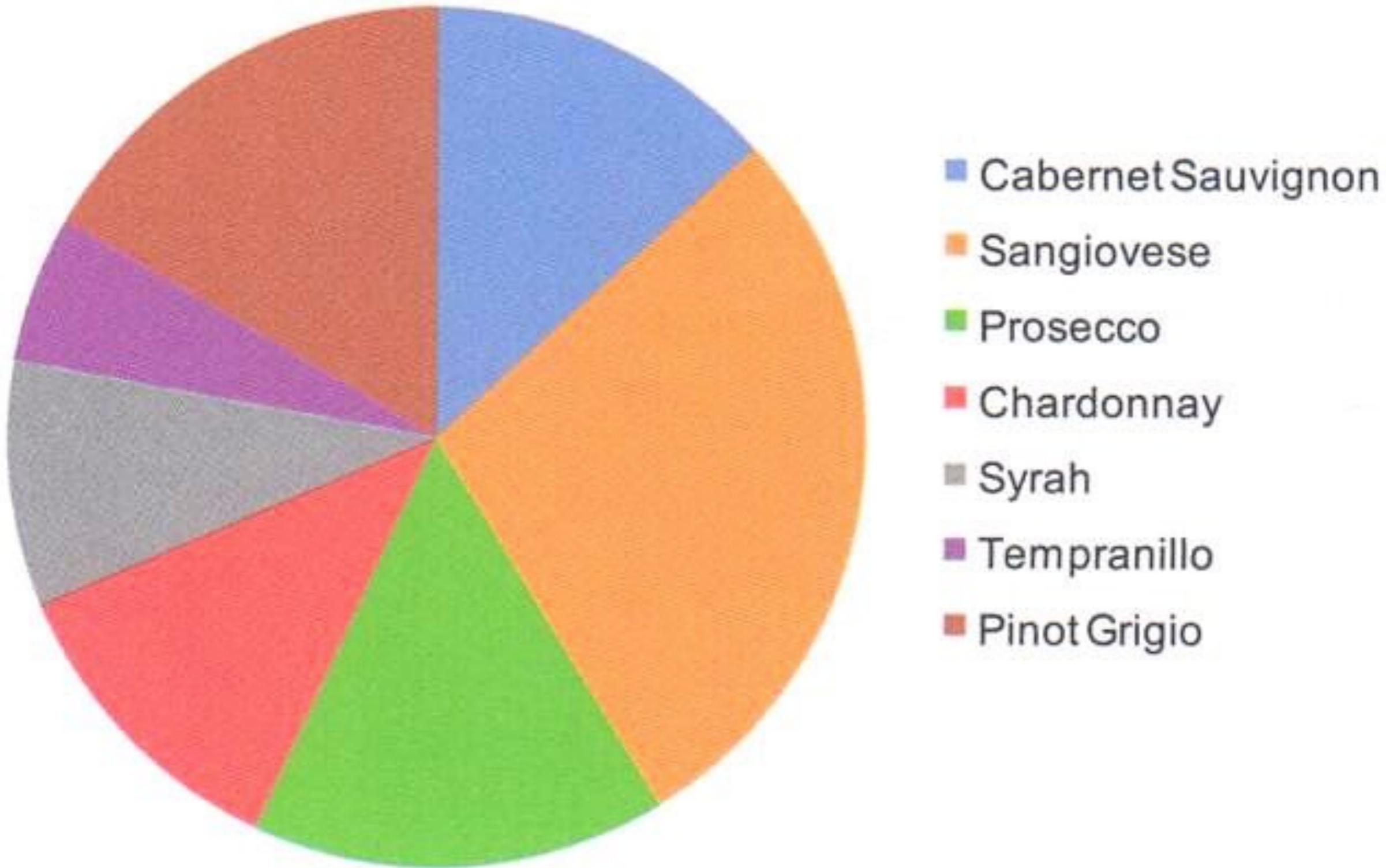


REPRESENTAÇÕES VISUAIS

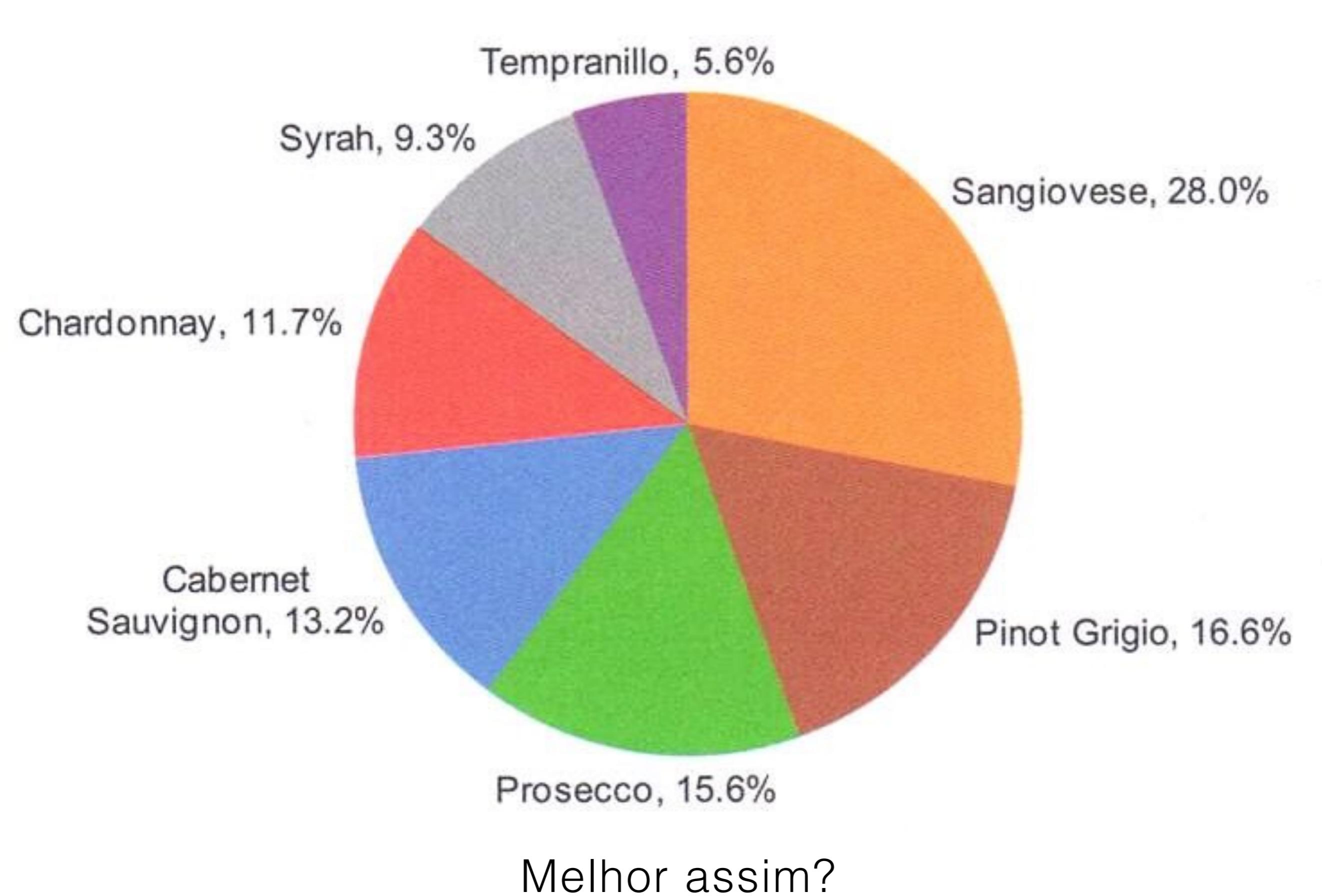




Quanto trabalho para ordenar as fatias?
E para obter a diferença entre os percentuais representados?



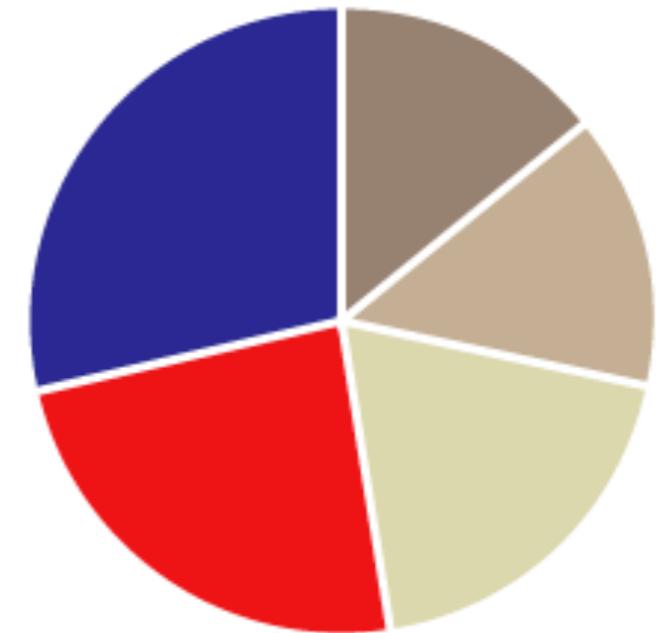
O uso de legendas em separado é especialmente difícil pois força o deslocamento dos olhos entre gráfico e legenda



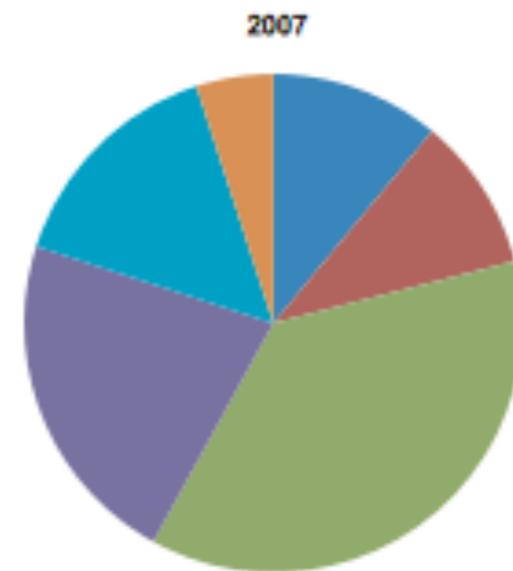
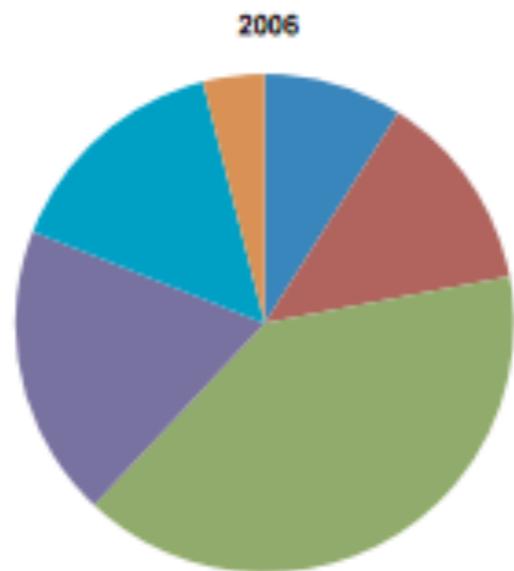
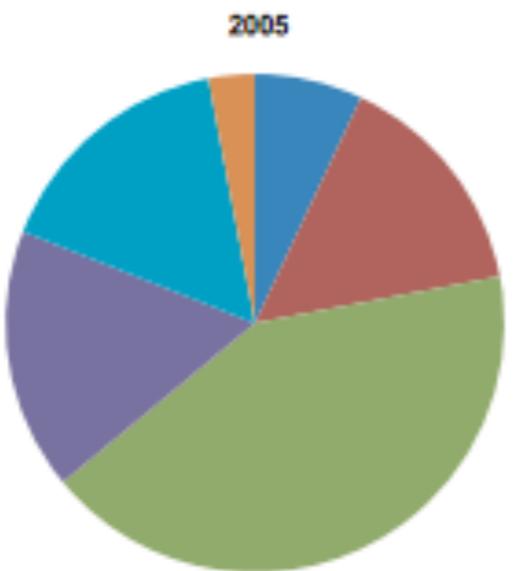
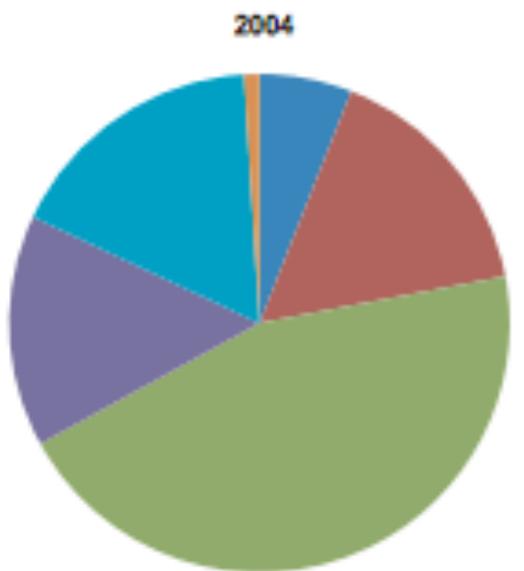
Wine	Percent
Sangiovese	28.0%
Pinot Grigio	16.6%
Prosecco	15.6%
Cabernet Sauvignon	13.2%
Chardonnay	11.7%
Syrah	9.3%
Tempranillo	5.6%
Total	100.0%

Ou assim?

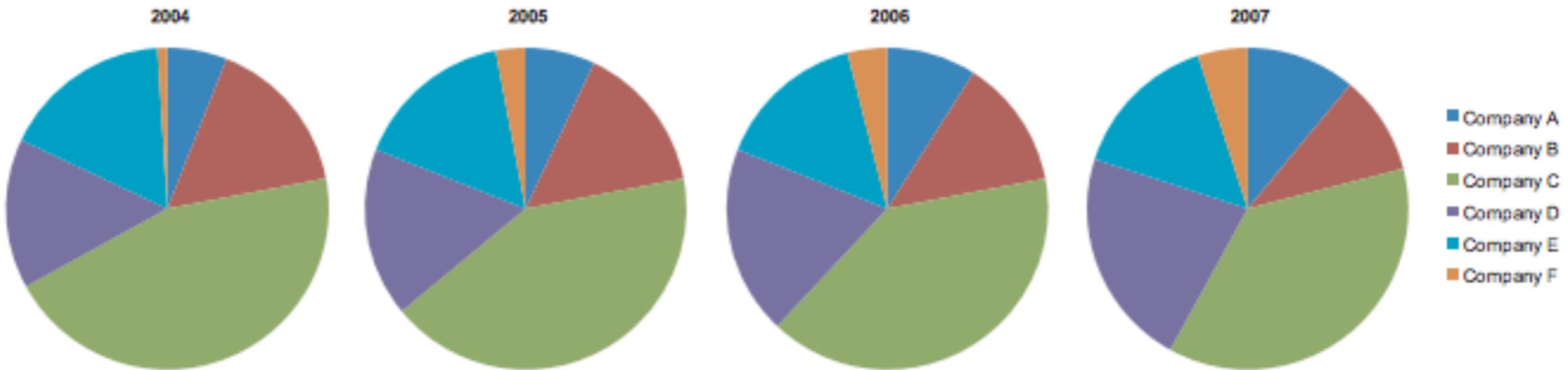
PIE CHART (GRÁFICO DE PIZZA)



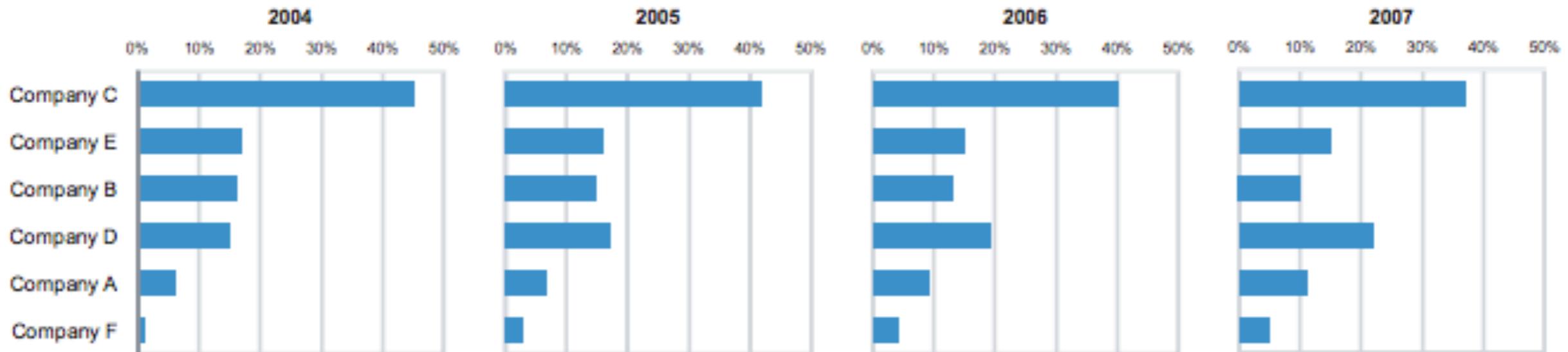
- Não conseguimos estimar precisamente os valores de áreas
- Não podem ser usados para gráficos com muitas séries
- Ocupam muito espaço (necessidade de legenda)
- Não são eficazes para uso comparativo com outros gráficos de pizza

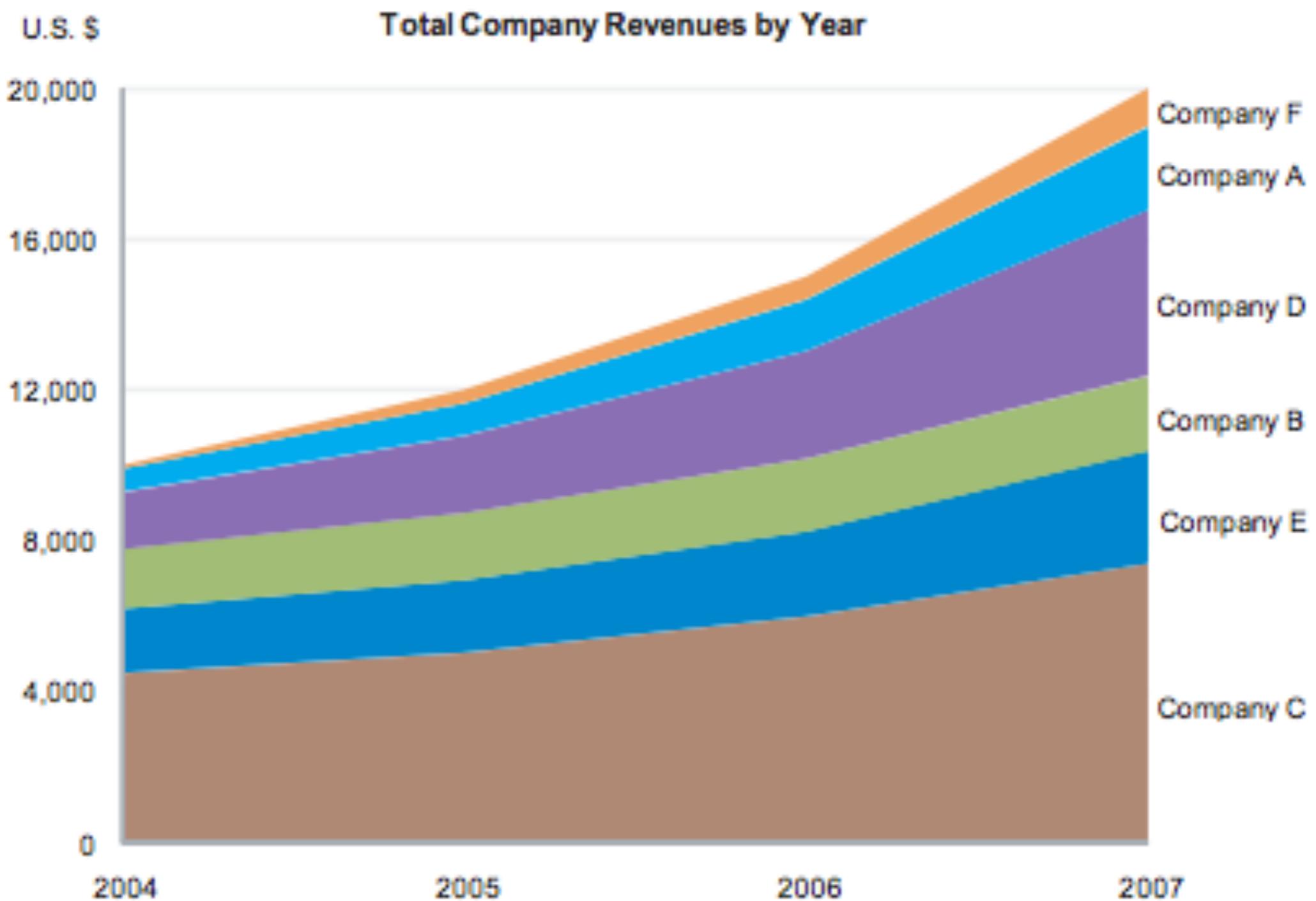


- Company A
- Company B
- Company C
- Company D
- Company E
- Company F



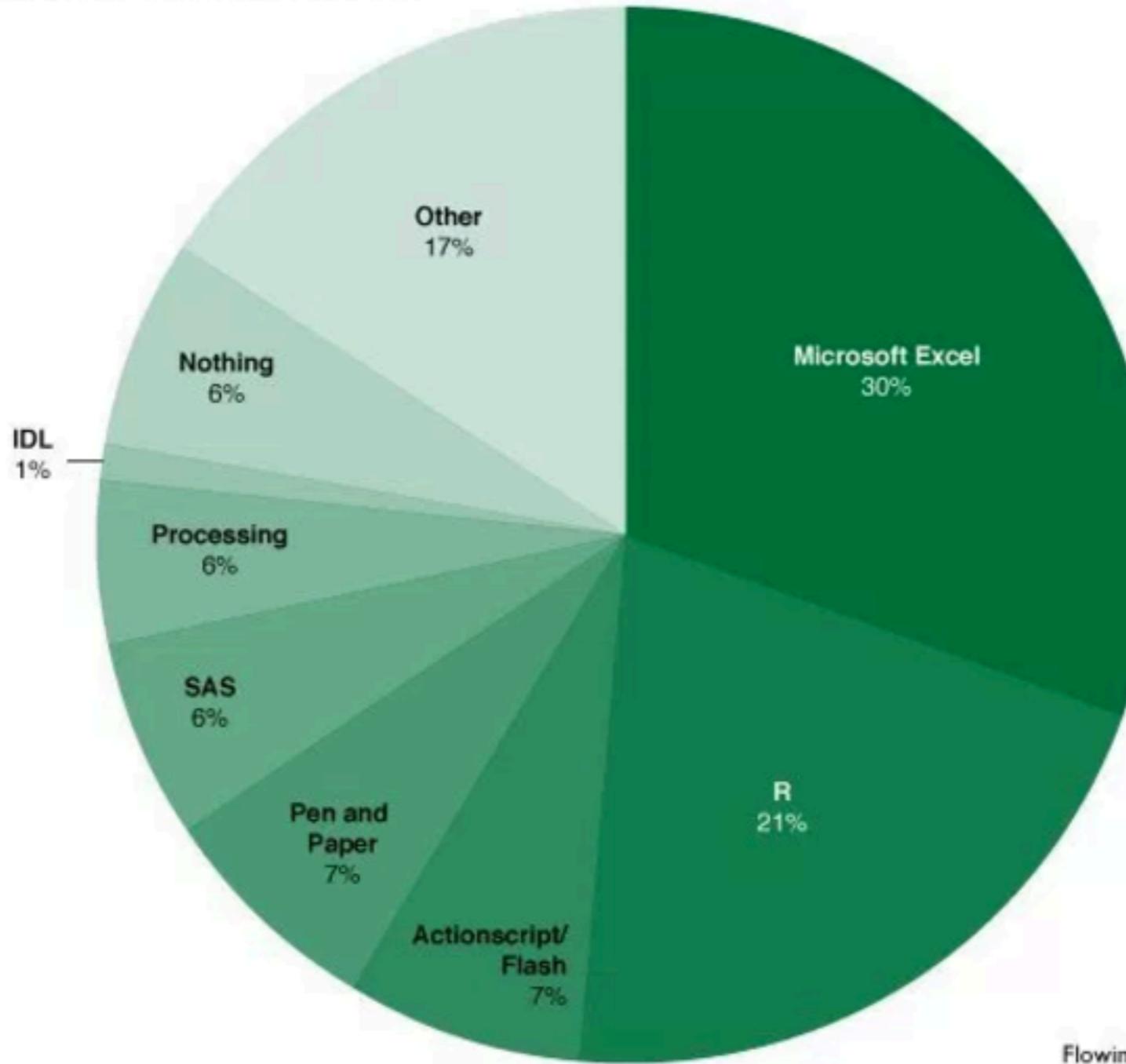
Try to follow the changes of these various companies and how they compare to one another through time. It is nearly impossible. Notice how easily you can do it, however, using the following display:



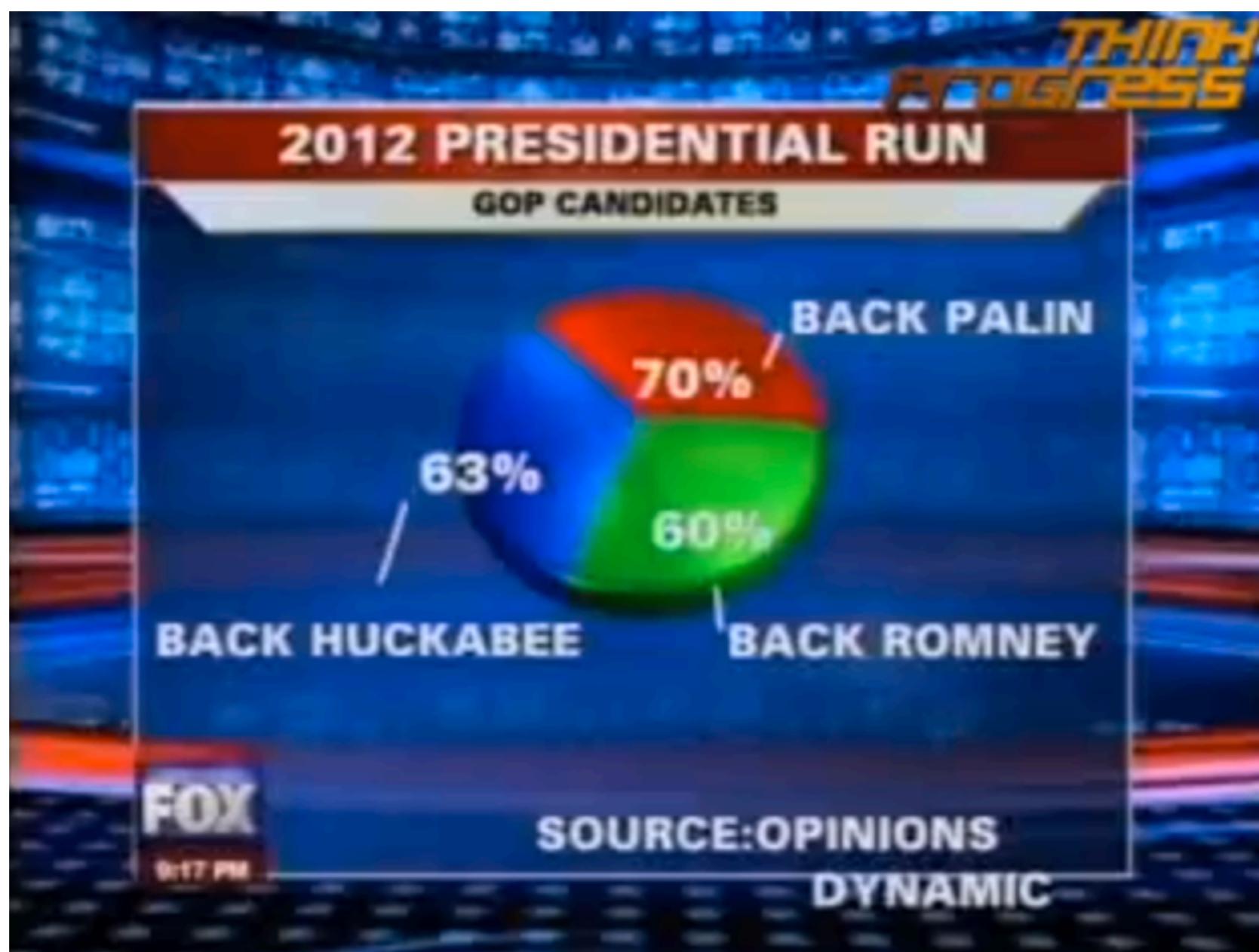


Visualization and Analysis Tools of Choice

A recent FlowingData poll asked readers what they used to visualize and analyze data. Microsoft Excel and R dominated.



FlowingData



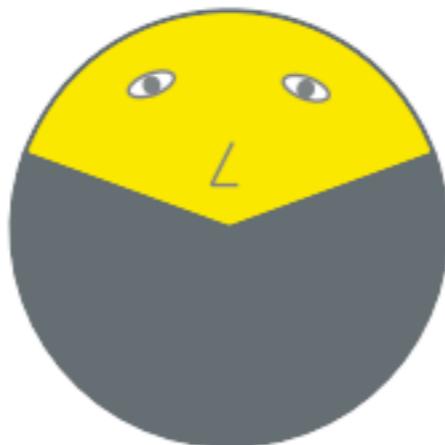
Save the Pies for Dessert

Stephen Few, Perceptual Edge
Visual Business Intelligence Newsletter

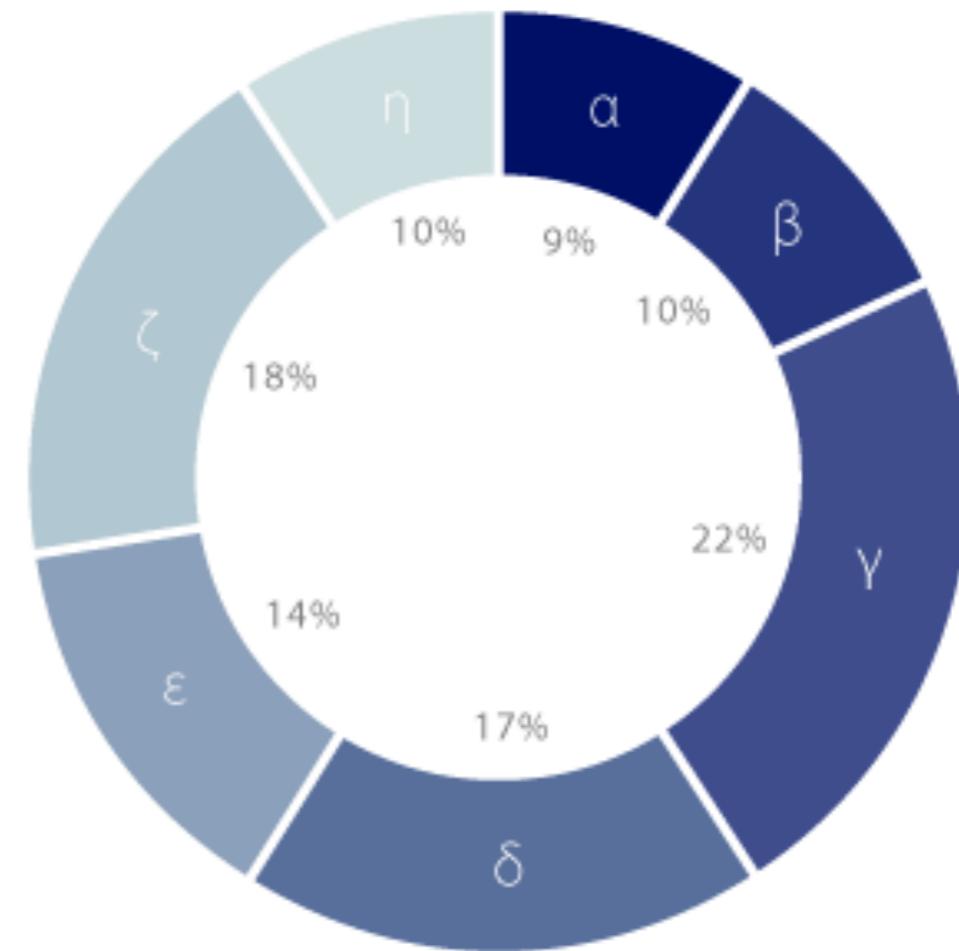
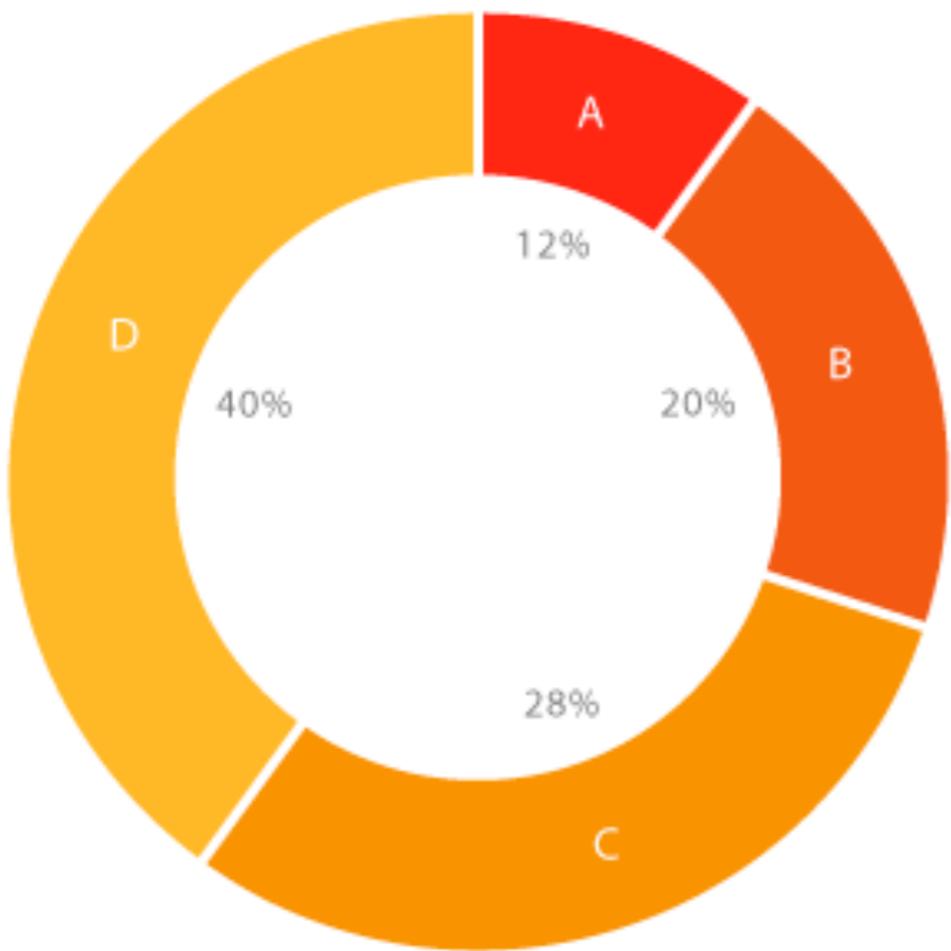
August 2007

Not long ago I received an email from a colleague who keeps watch on business intelligence vendors and rates their products. She was puzzled that a particular product that I happen to like did not support pie charts, a feature that she assumed was basic and indispensable. Because of previous discussions between us, when I pointed out ineffective graphing practices that are popular in many BI products, she wondered if there might also be a problem with pie charts. Could this vendor's omission of pie charts be intentional and justified? I explained that this was indeed the case, and praised the vendor's design team for their good sense.

Here sits the friendly pie chart:

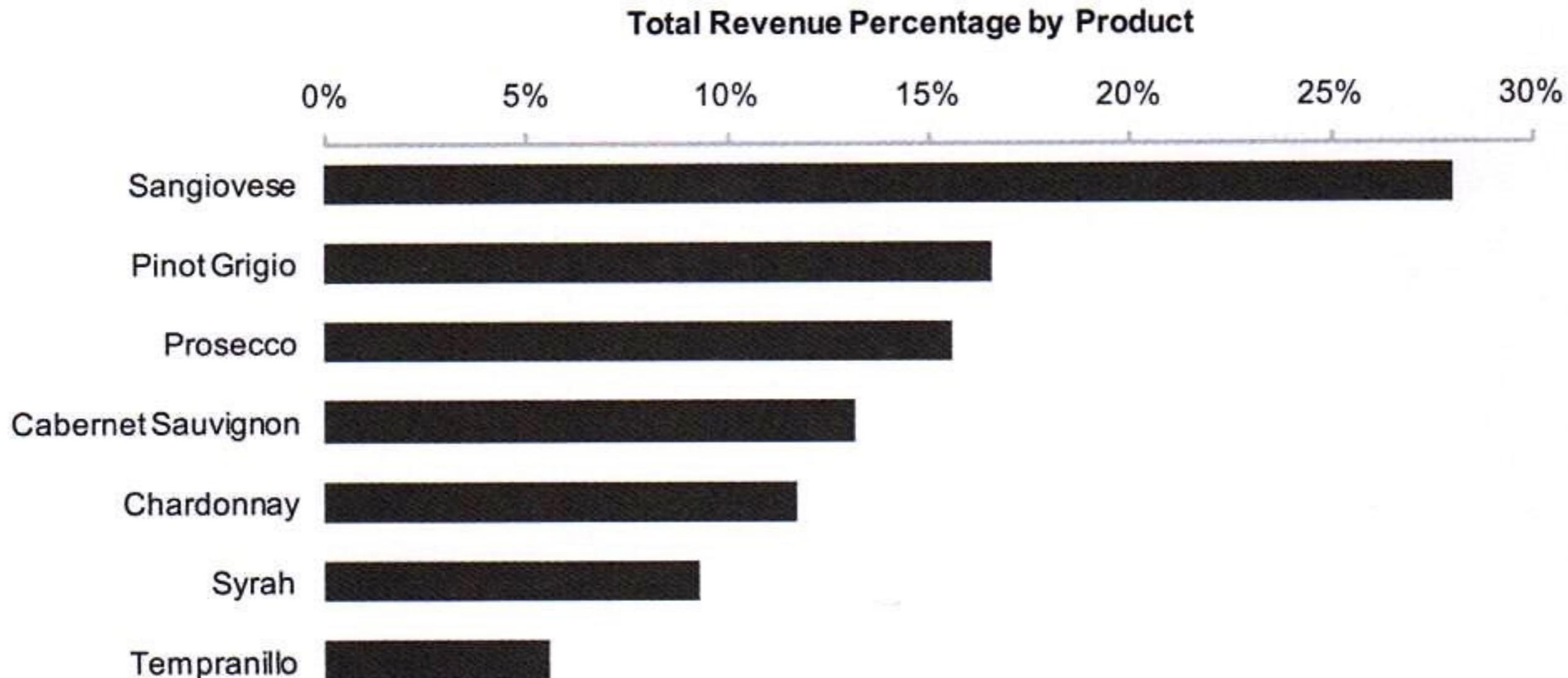


DOUGHNUT CHART (GRÁFICO DE ROSQUINHA)

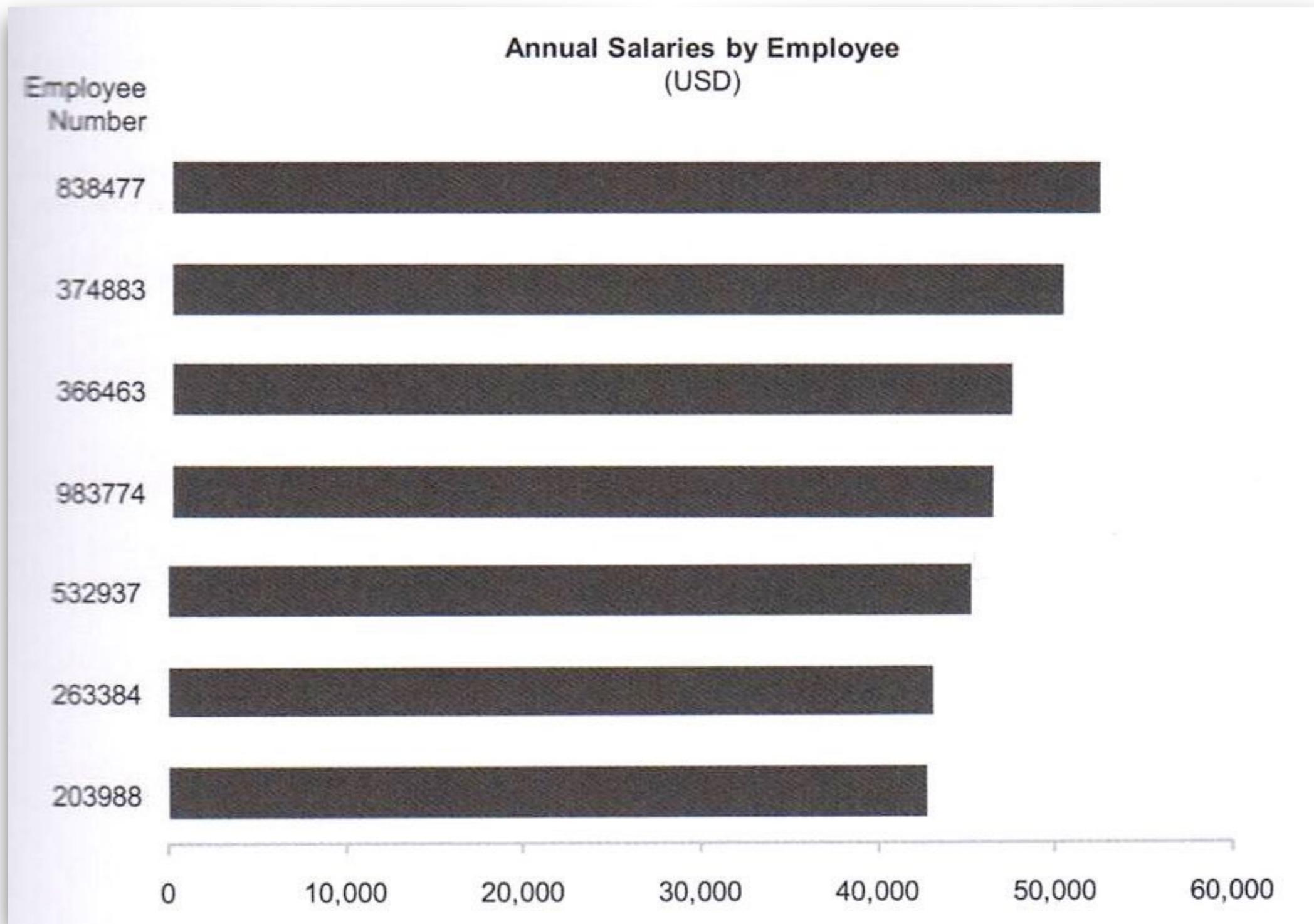


- Essencialmente o mesmo que um gráfico de pizza
- Há quem defenda que eles são melhores pois o foco está na comparação dos comprimentos dos arcos e não nas áreas dos setores
- Uma vantagem é ocupar menos espaço e a possibilidade de se colocar valores ou texto no centro

GRÁFICOS DE BARRA

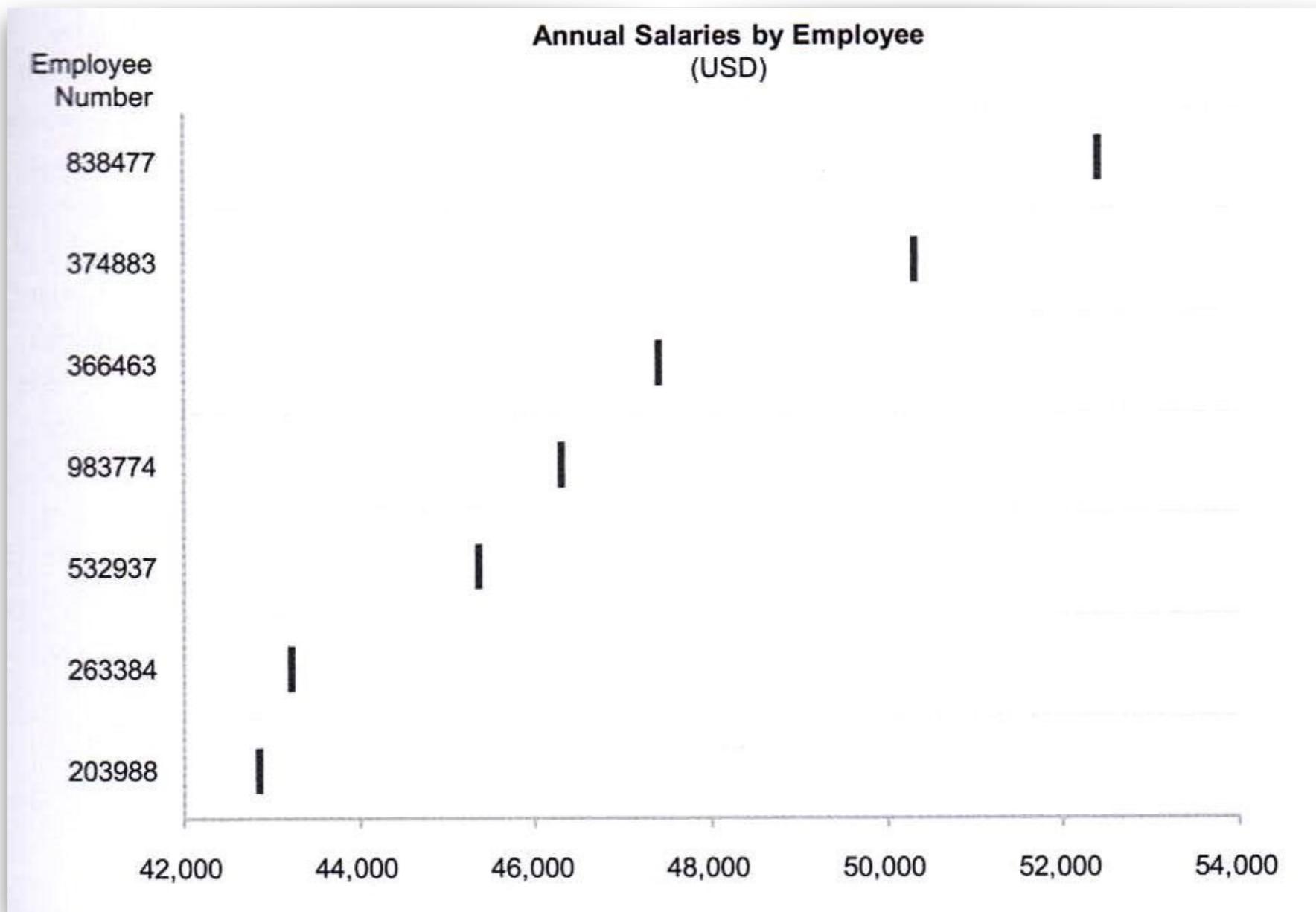


- Gráficos de barra são muito mais efetivos para representar relacionamentos do tipo ranking e parte-todo



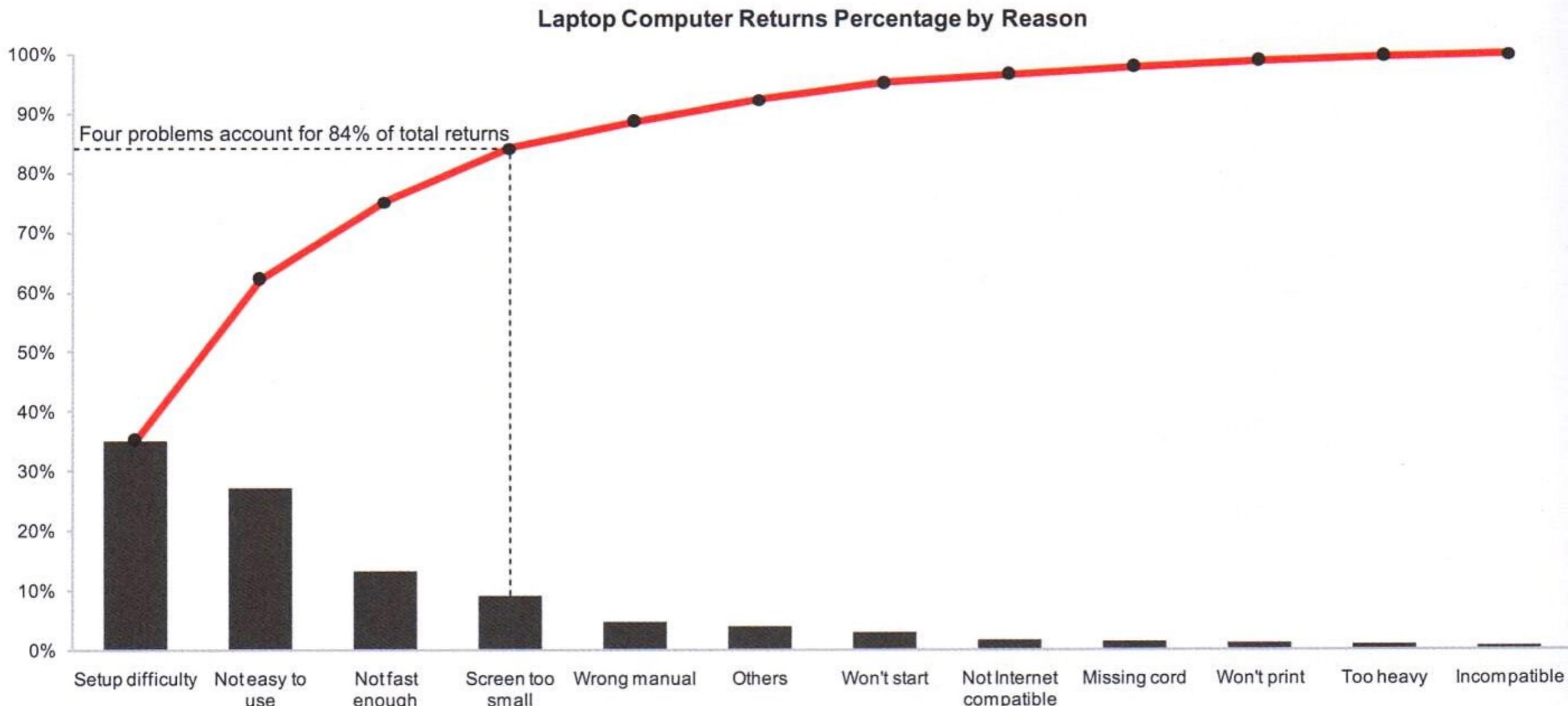
Quando as barras tem **comprimentos parecidos**, são menos efetivas na estimativa das diferenças

GRÁFICO DE PONTOS



- Nesses casos, o uso de gráficos de pontos facilita essa diferenciação visto que podemos usar eixos que não iniciam de zero

GRÁFICO OU DIAGRAMA DE PARETO



- Barras ordenadas representando o ranking e linha mostrando valores acumulados representando assim a parte do todo

GRÁFICO DE ÁREAS EMPILHADO

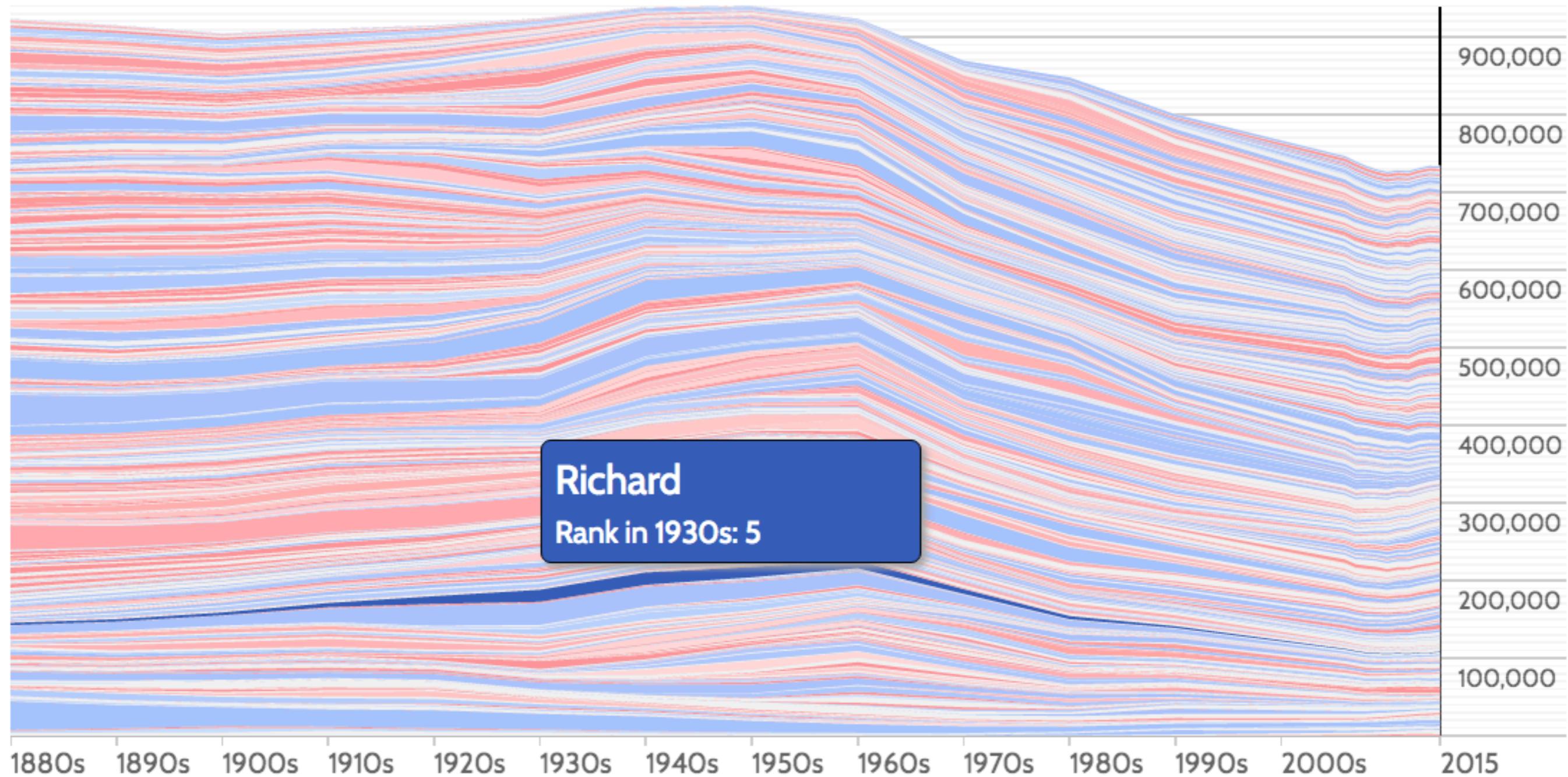
Baby Name >

Both Boys Girls

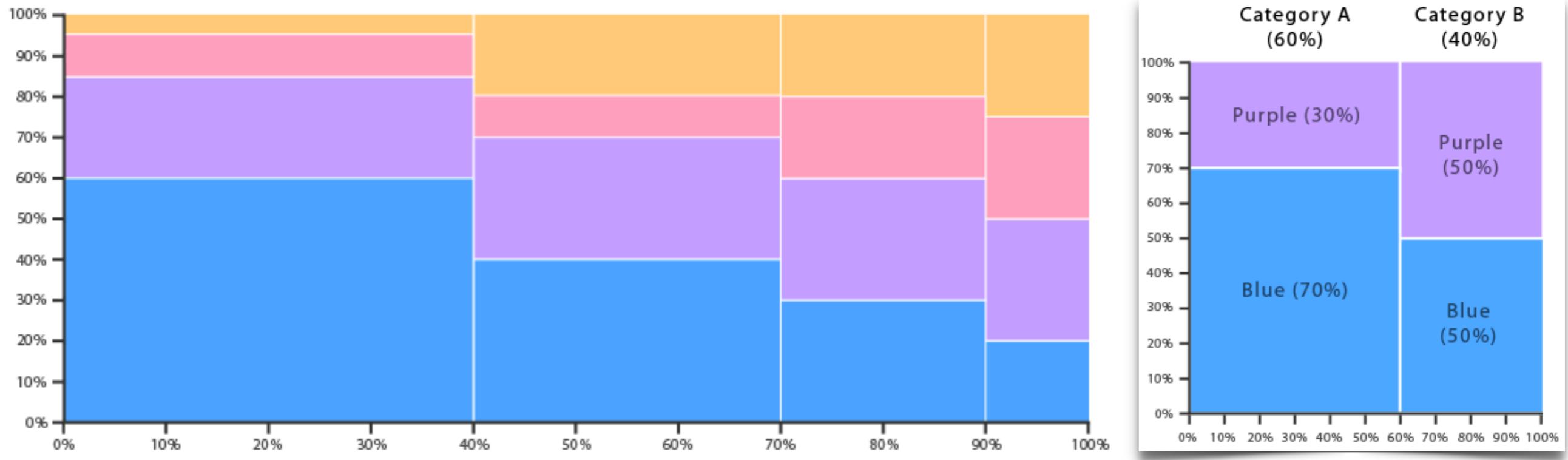
boys	1000	500	100	25	1
girls	1000	500	100	25	1

Current rank:

per million births



MARIMEKKO CHART (MOSAIC PLOT)

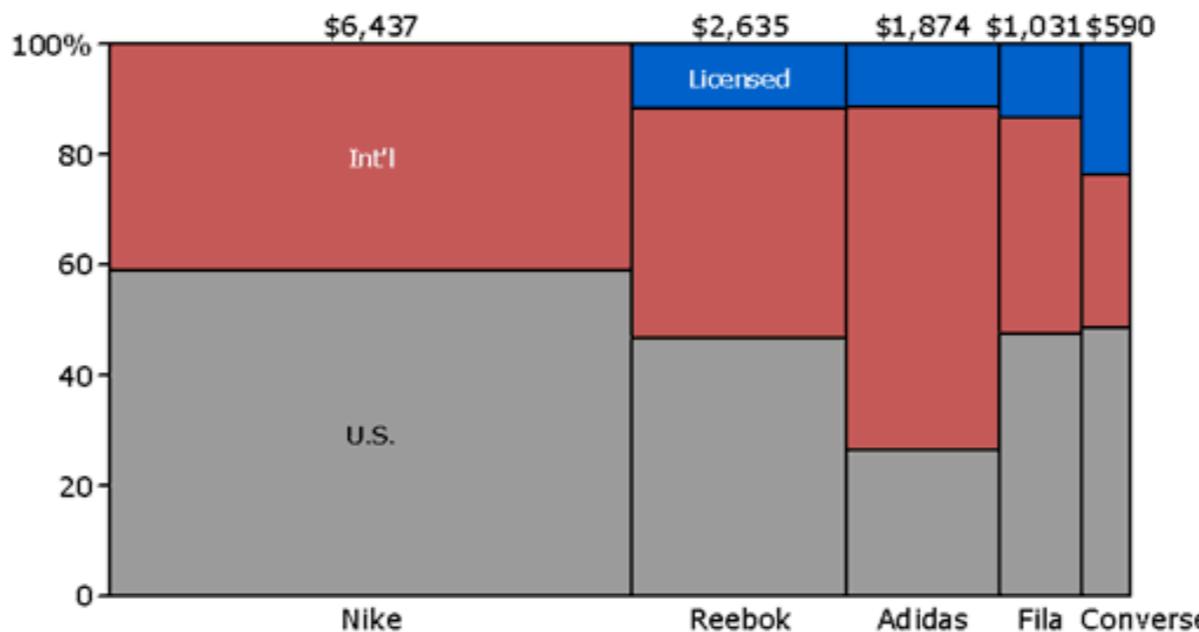


- Codifica duas variáveis quantitativas: uma na largura e outra na altura
- De difícil leitura, especialmente quando há muitos segmentos
- De difícil comparação já que os segmentos não se apoiam na mesma base

Marimekko Chart

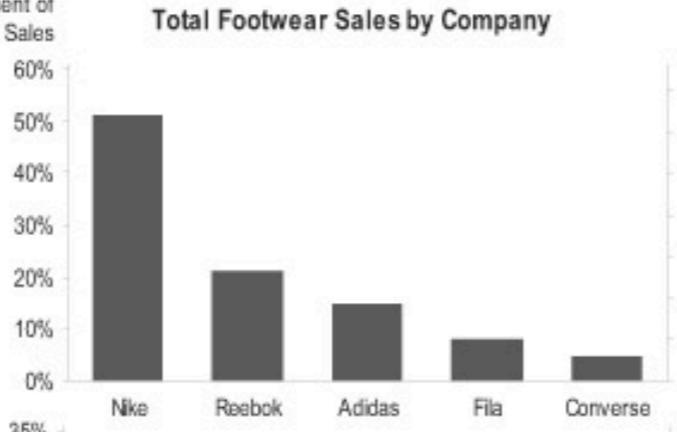
Nike dominates its top four competitors with a mix of U.S. and international sales.

Footwear Sales in \$ Million



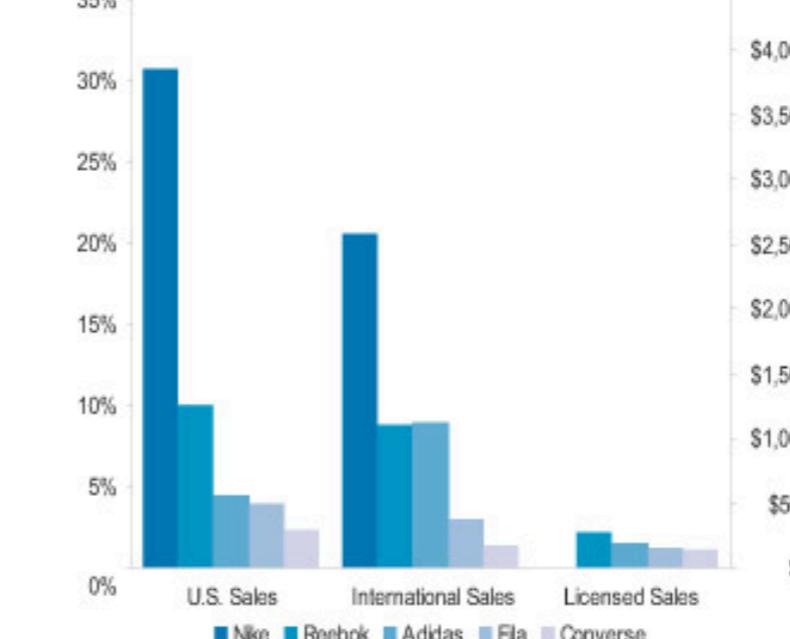
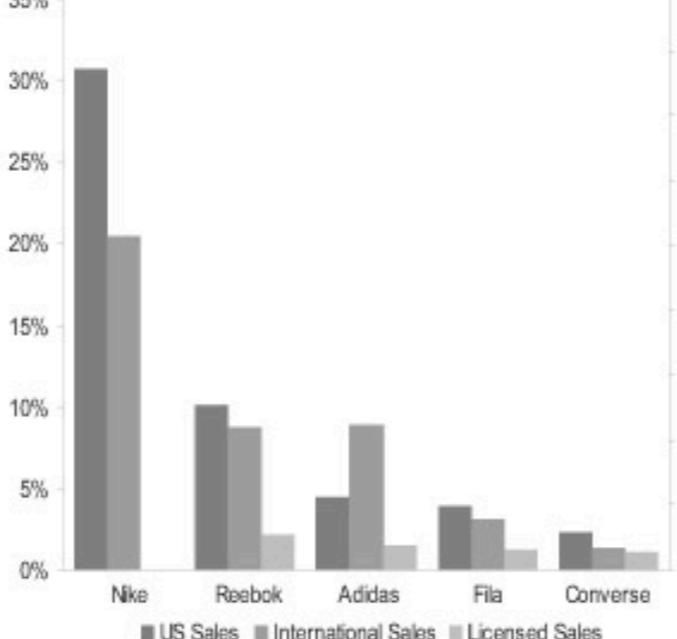
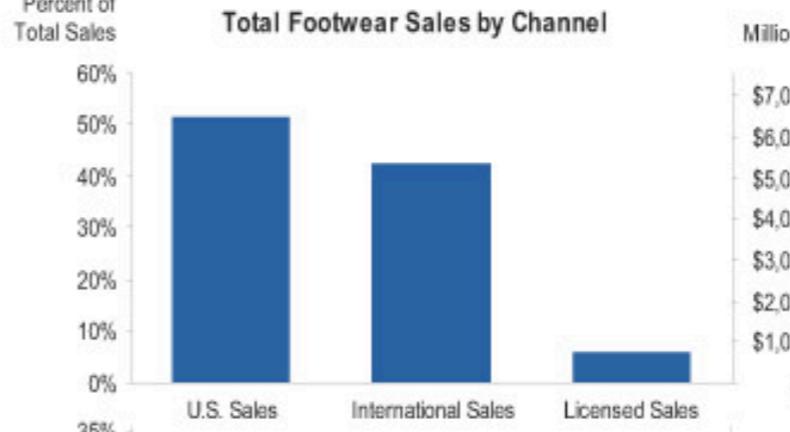
Percent of Total Sales

Total Footwear Sales by Company



Percent of Total Sales

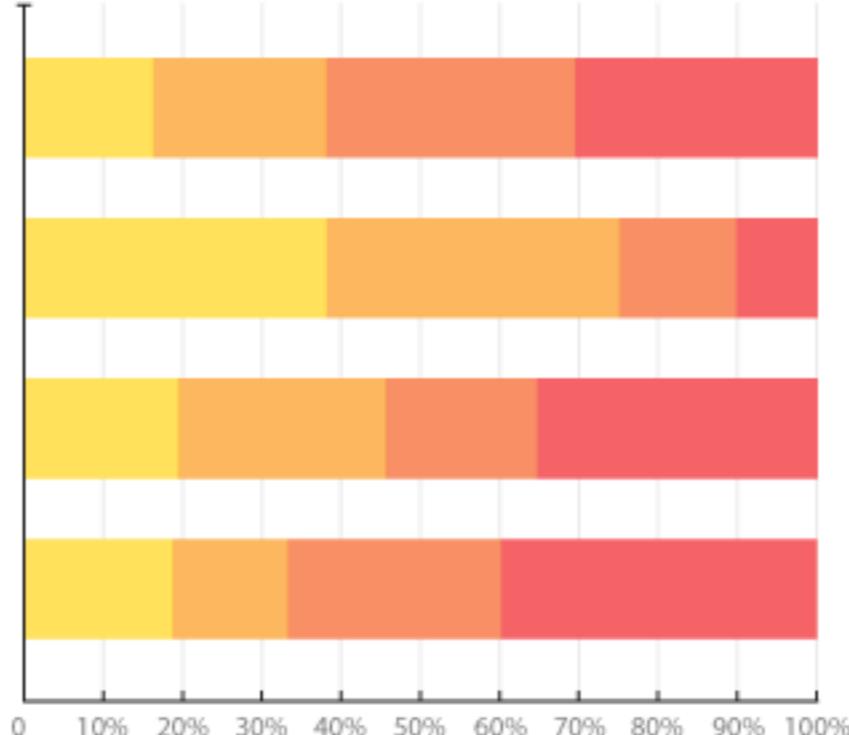
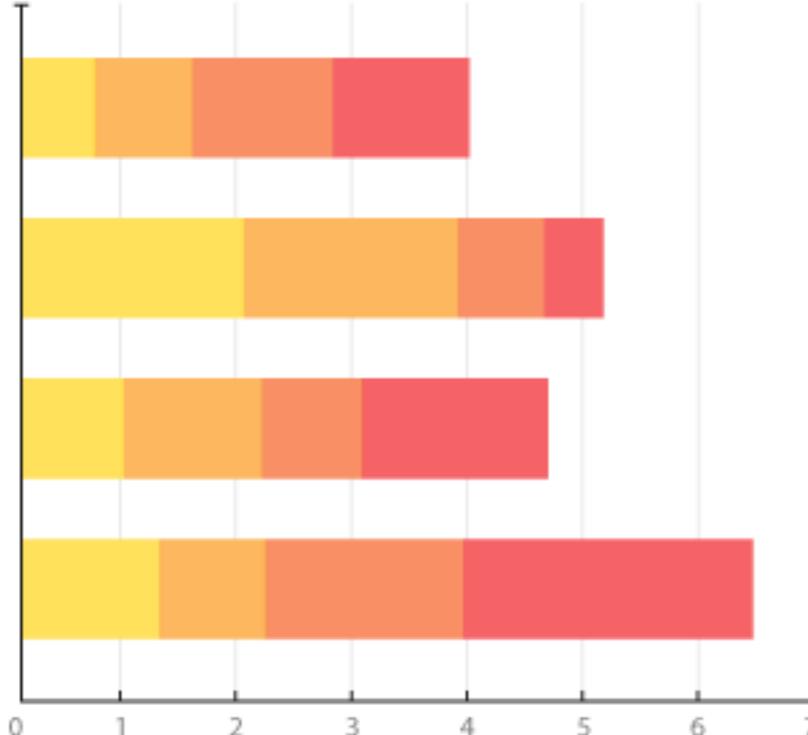
Total Footwear Sales by Channel



■ US Sales ■ International Sales ■ Licensed Sales

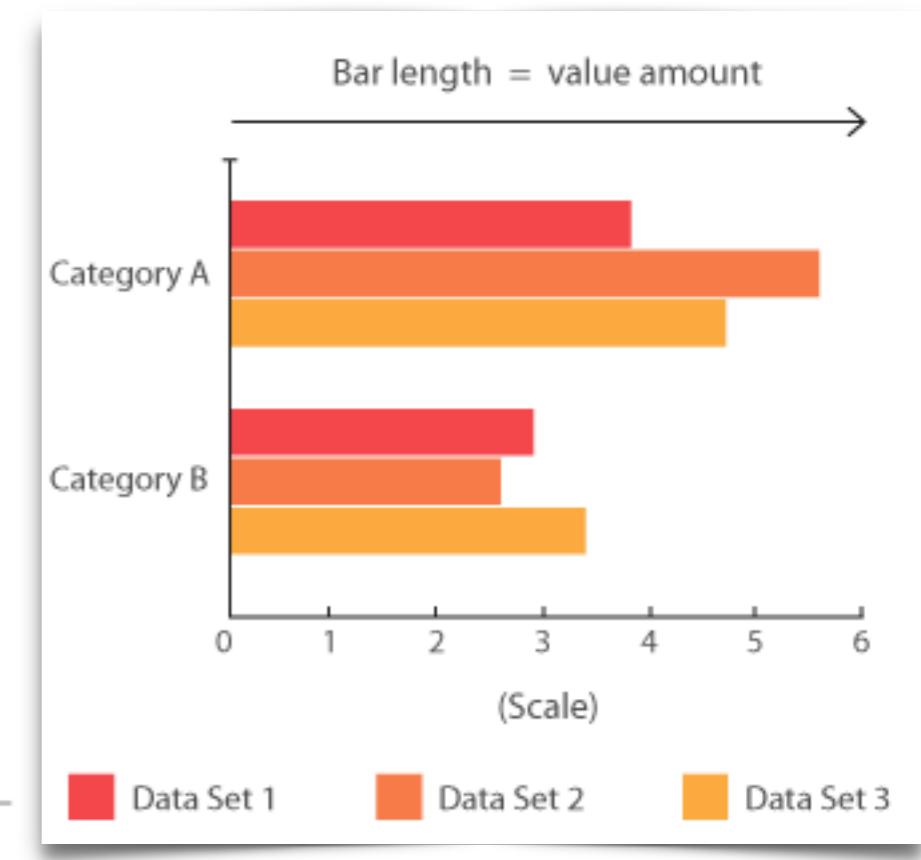
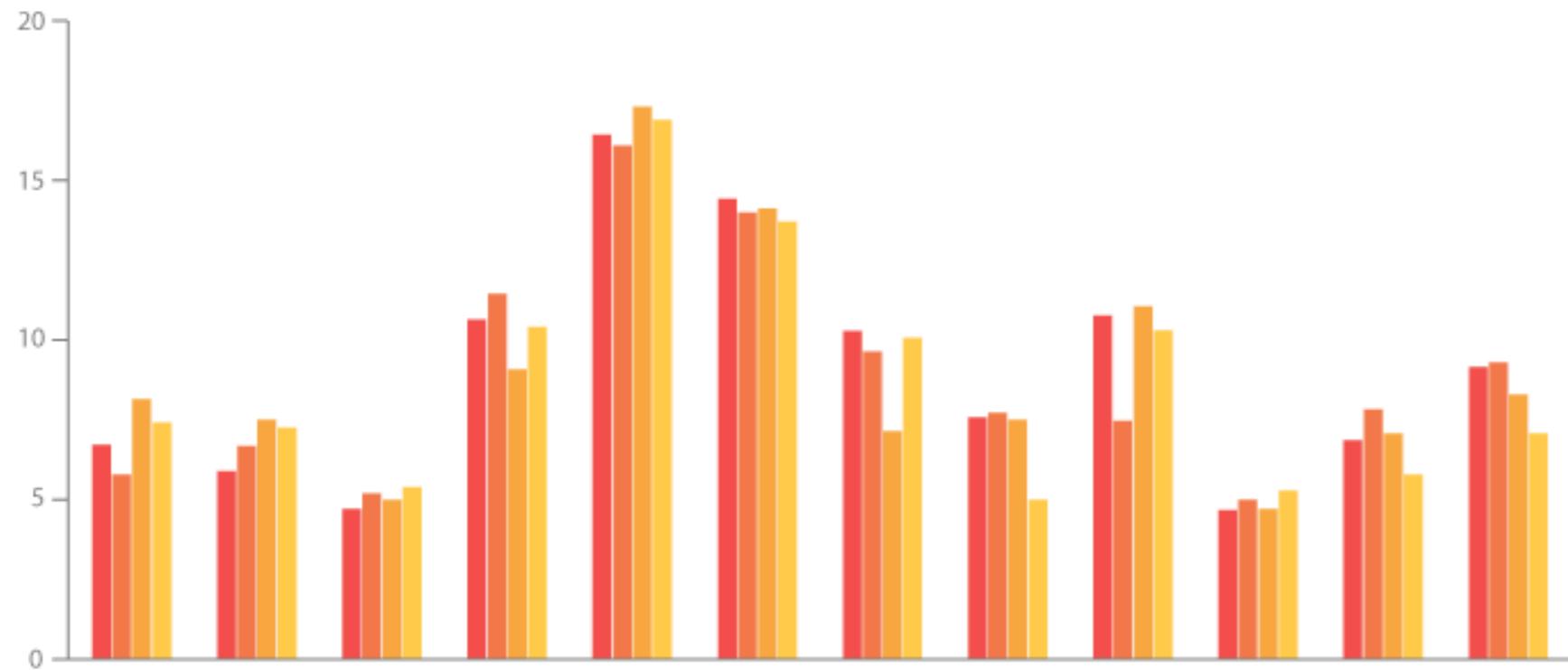
■ Nike ■ Reebok ■ Adidas ■ Fila ■ Converse

GRÁFICO DE BARRAS EMPILHADO



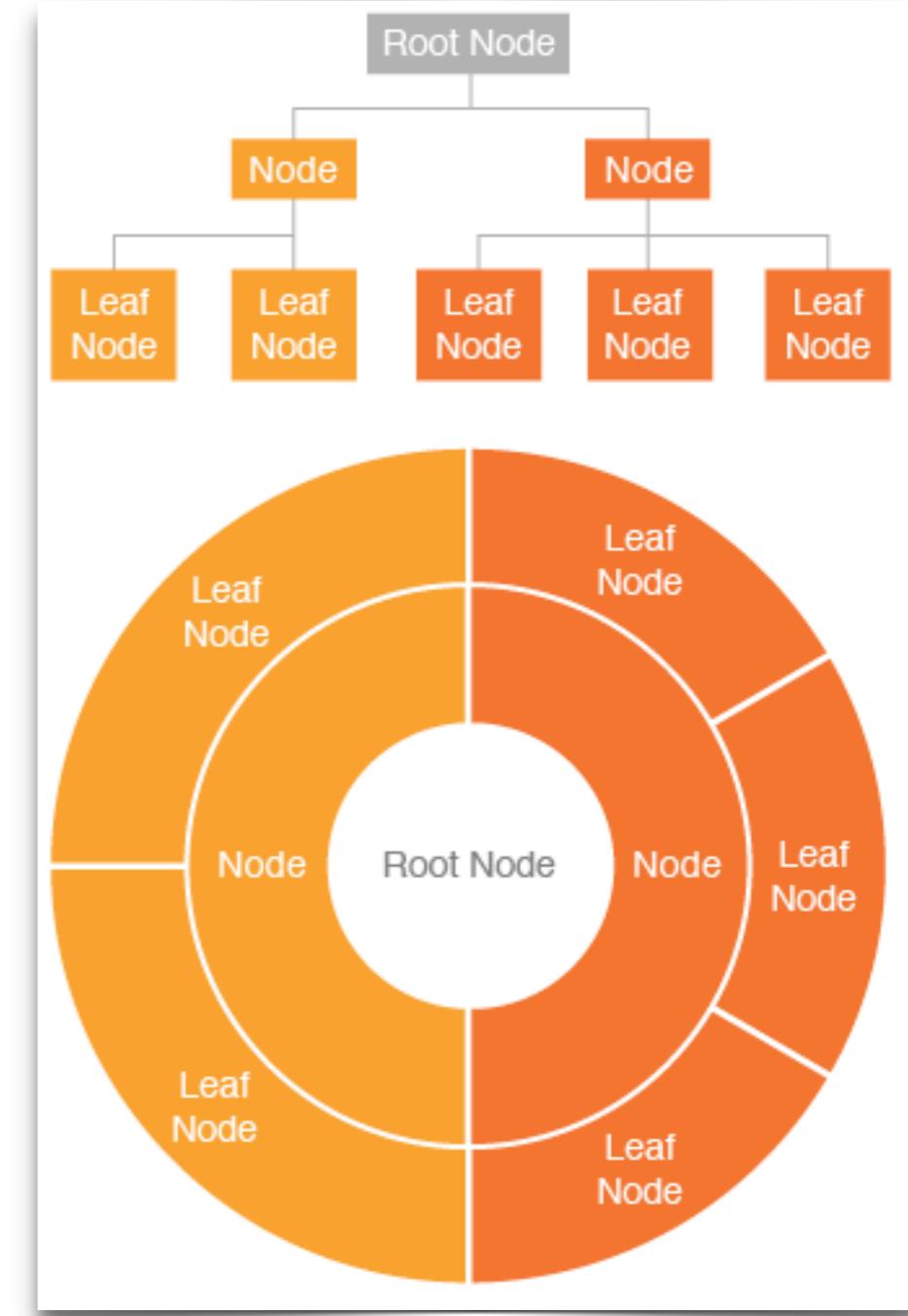
- Quanto mais categorias, mais difícil a leitura
- A comparação entre os segmentos também é dificultada pois não se apoiam sobre a mesma base

GRÁFICO DE BARRAS EMPILHADO



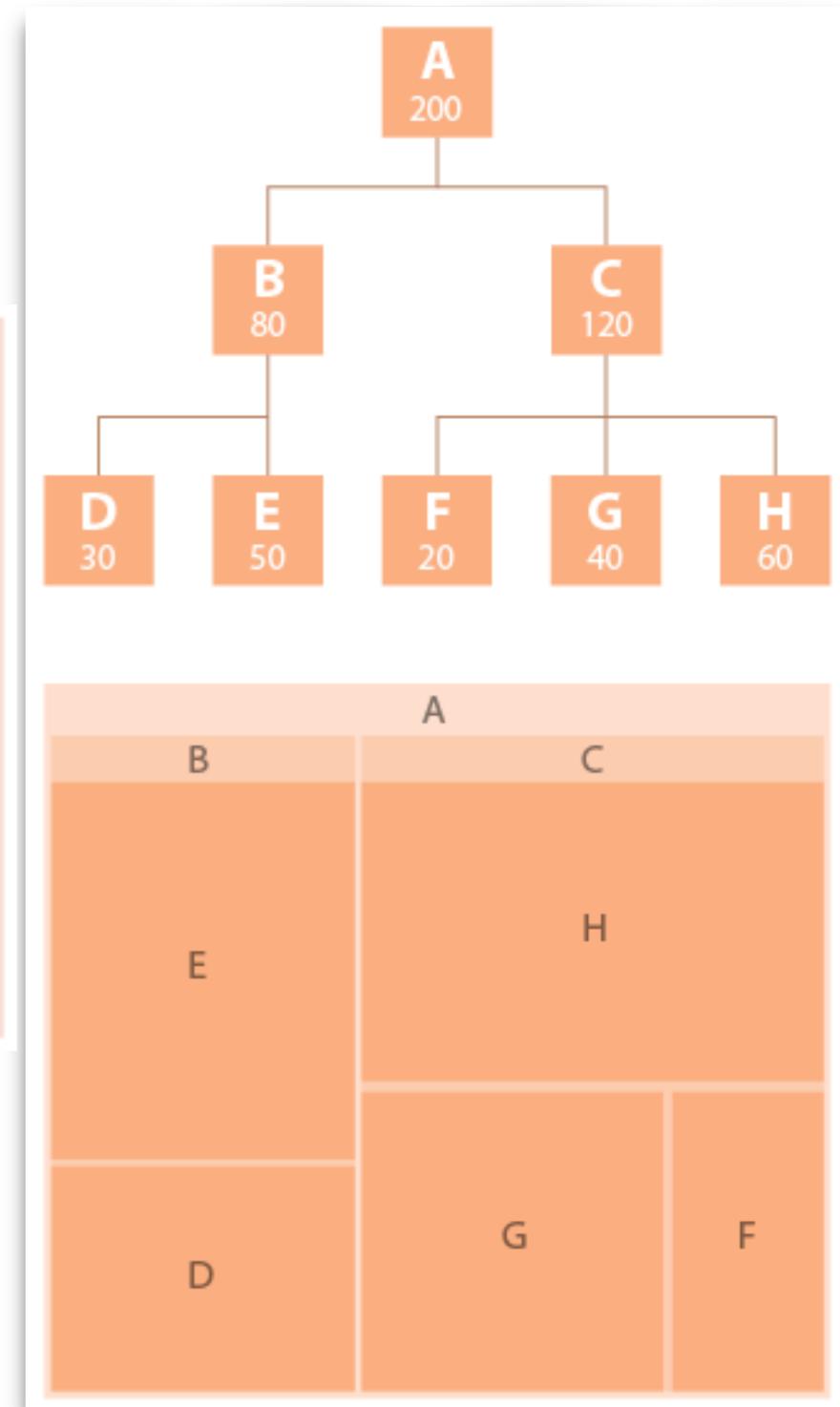
- Uma alternativa seria o gráfico de barras agrupado usando uma escala percentual
- Não passa tão bem a noção de parte-todo

SUNBURST



- Conhecido por vários outros nomes: *ring chart*, *multi-level pie chart*, *belt chart*, *radial treemap*

TREEMAP



NIGHTINGALE

2.
APRIL 1855 to MARCH 1856.

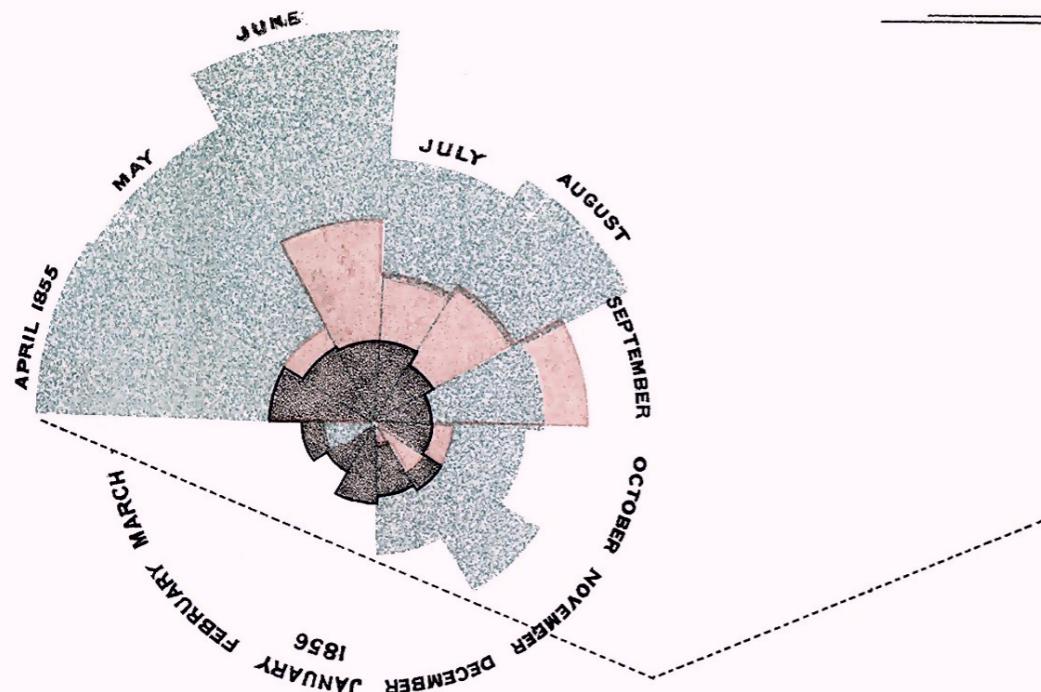
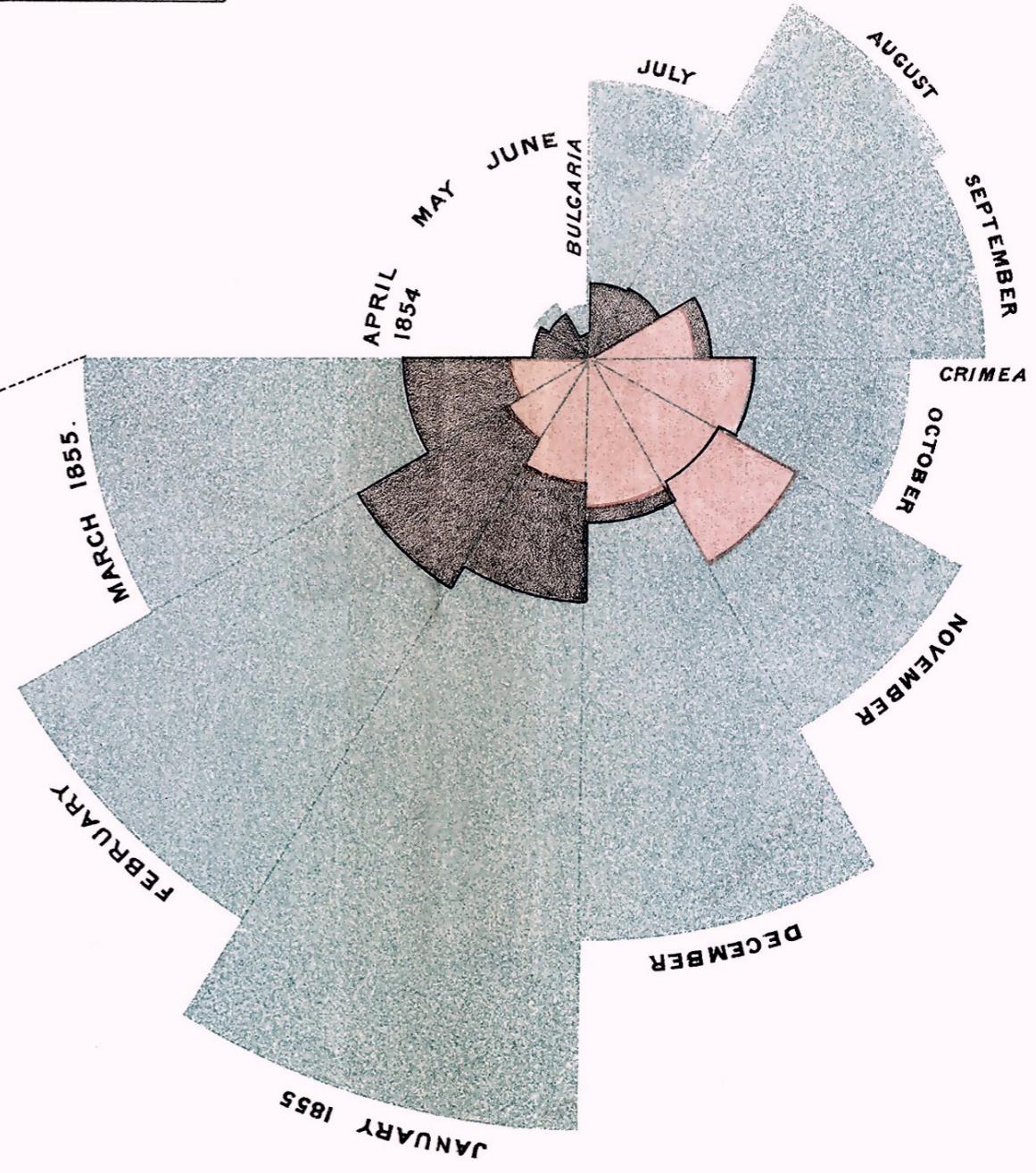


DIAGRAM OF THE CAUSES OF MORTALITY
IN THE ARMY IN THE EAST.

1.
APRIL 1854 to MARCH 1855.



The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.

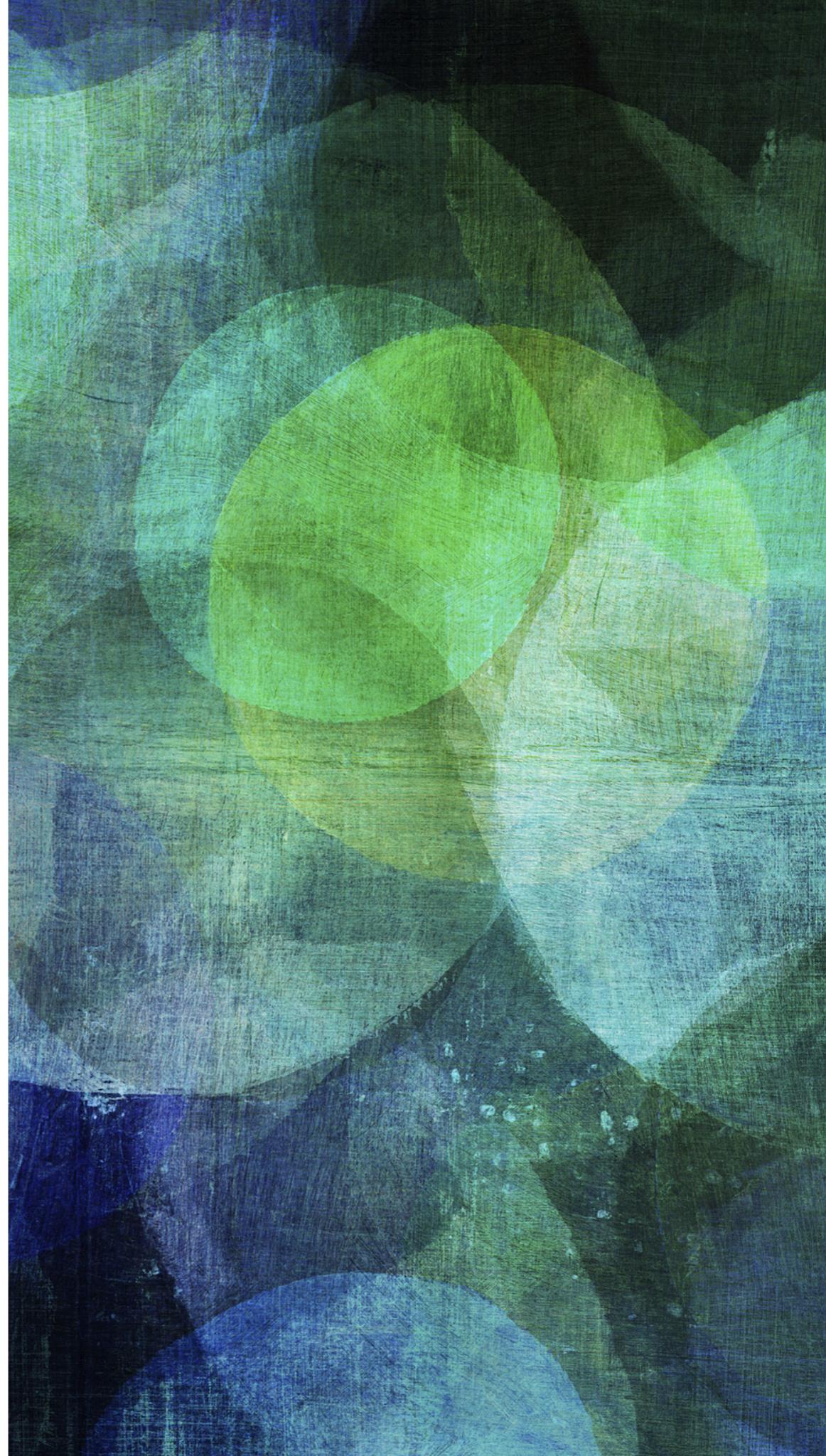
The blue wedges measured from the centre of the circle represent area for area the deaths from Preventible or Mitigable Zymotic diseases; the red wedges measured from the centre the deaths from wounds; & the black wedges measured from the centre the deaths from all other causes.

The black line across the red triangle in Nov. 1854 marks the boundary of the deaths from all other causes during the month.

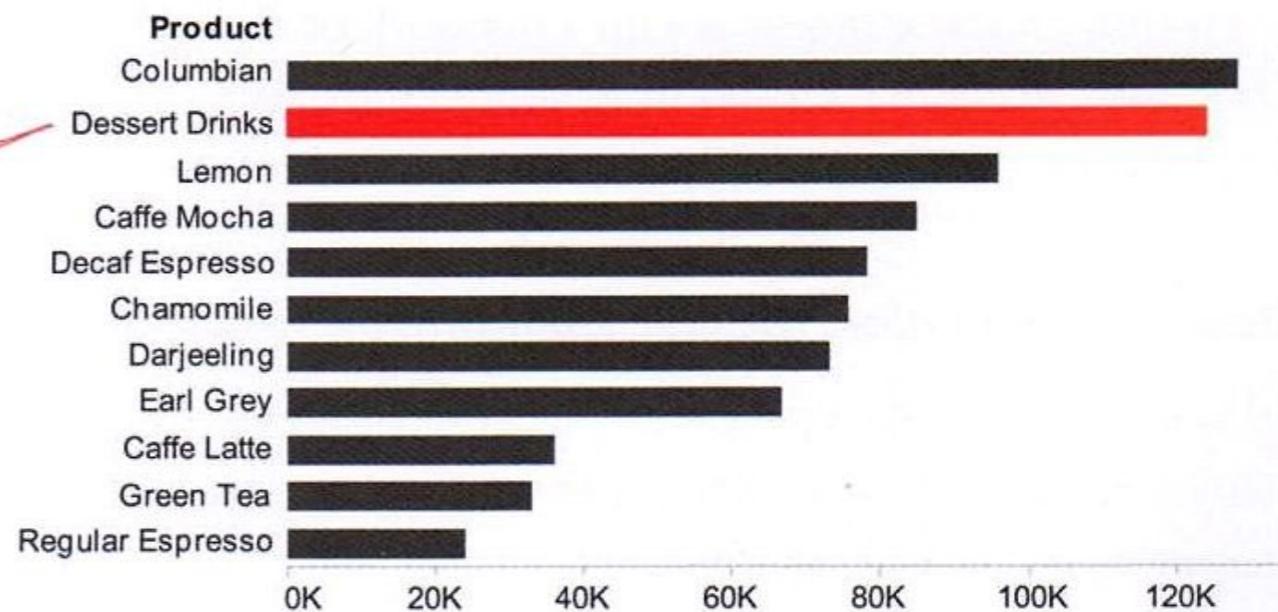
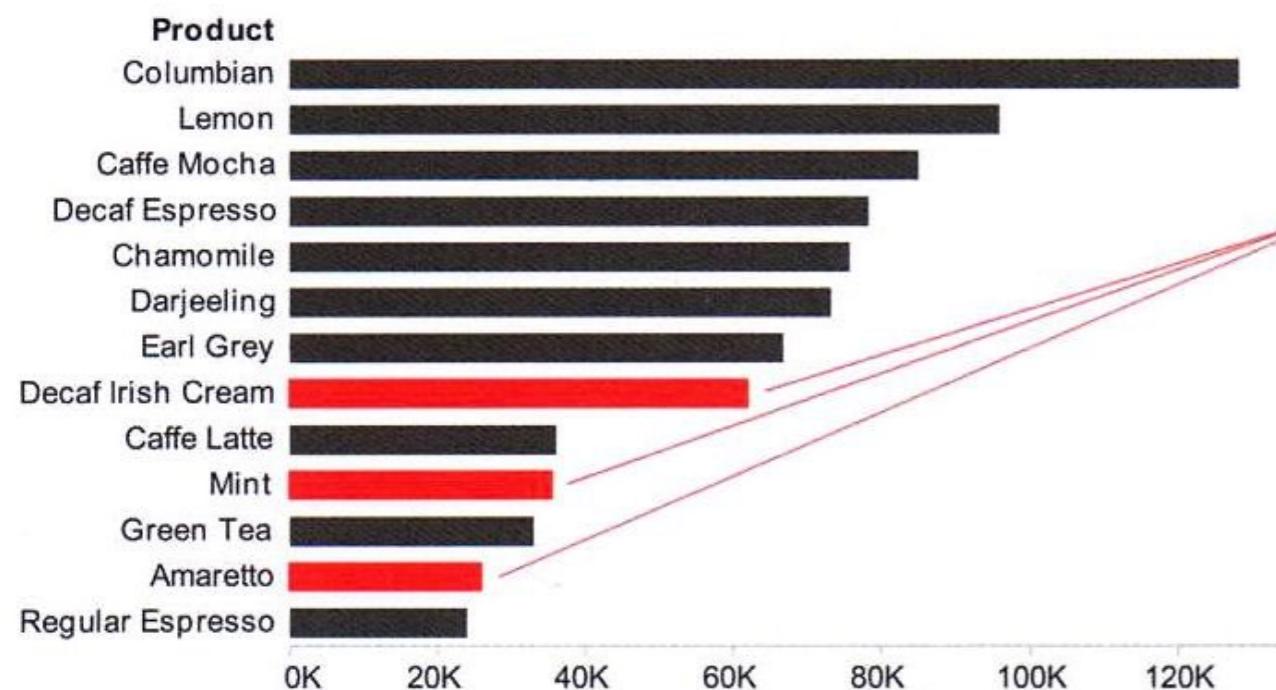
In October 1854, & April 1855, the black area coincides with the red; in January & February 1856, the blue coincides with the black.

The entire areas may be compared by following the blue, the red & the black lines enclosing them.

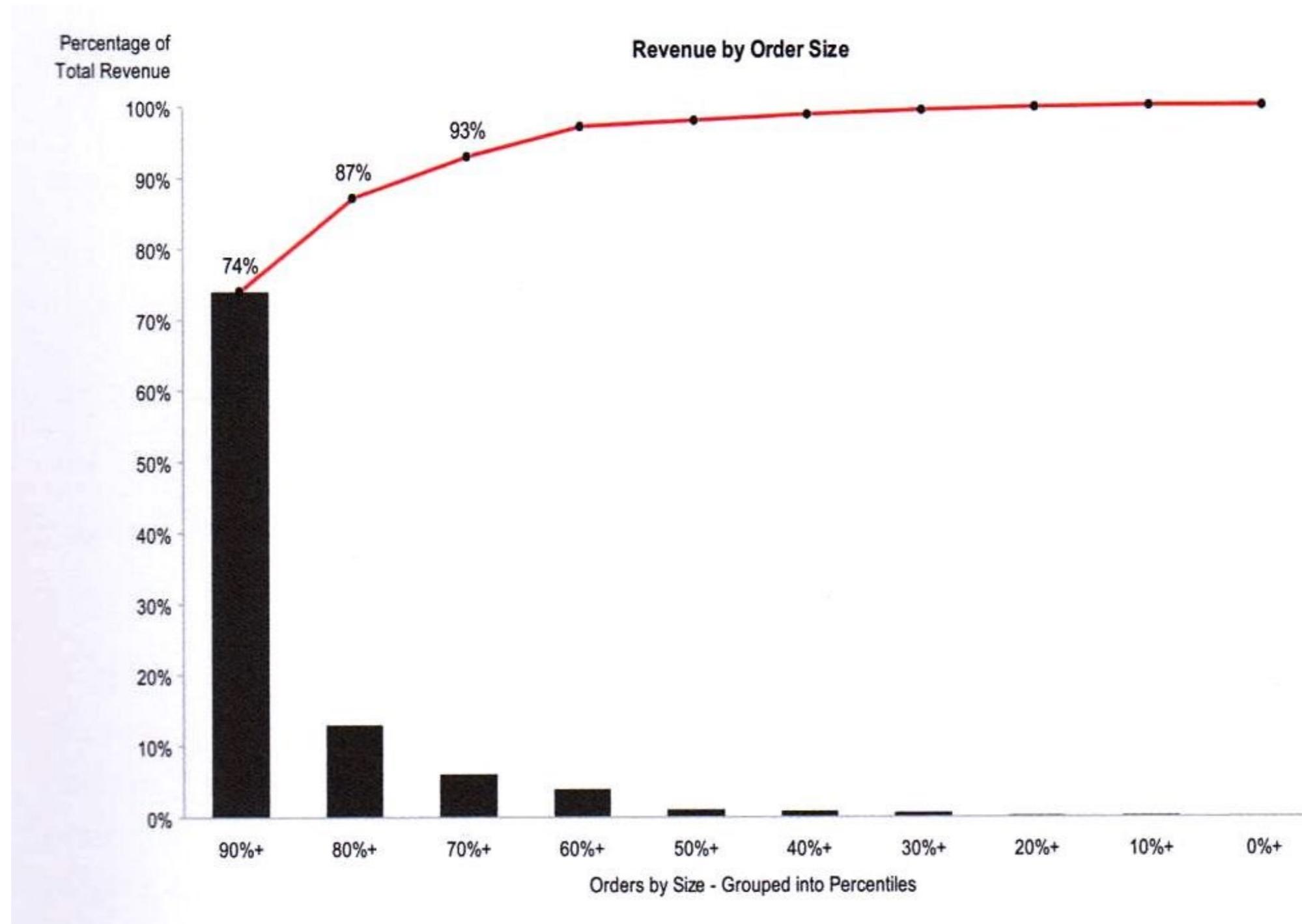
BOAS PRÁTICAS



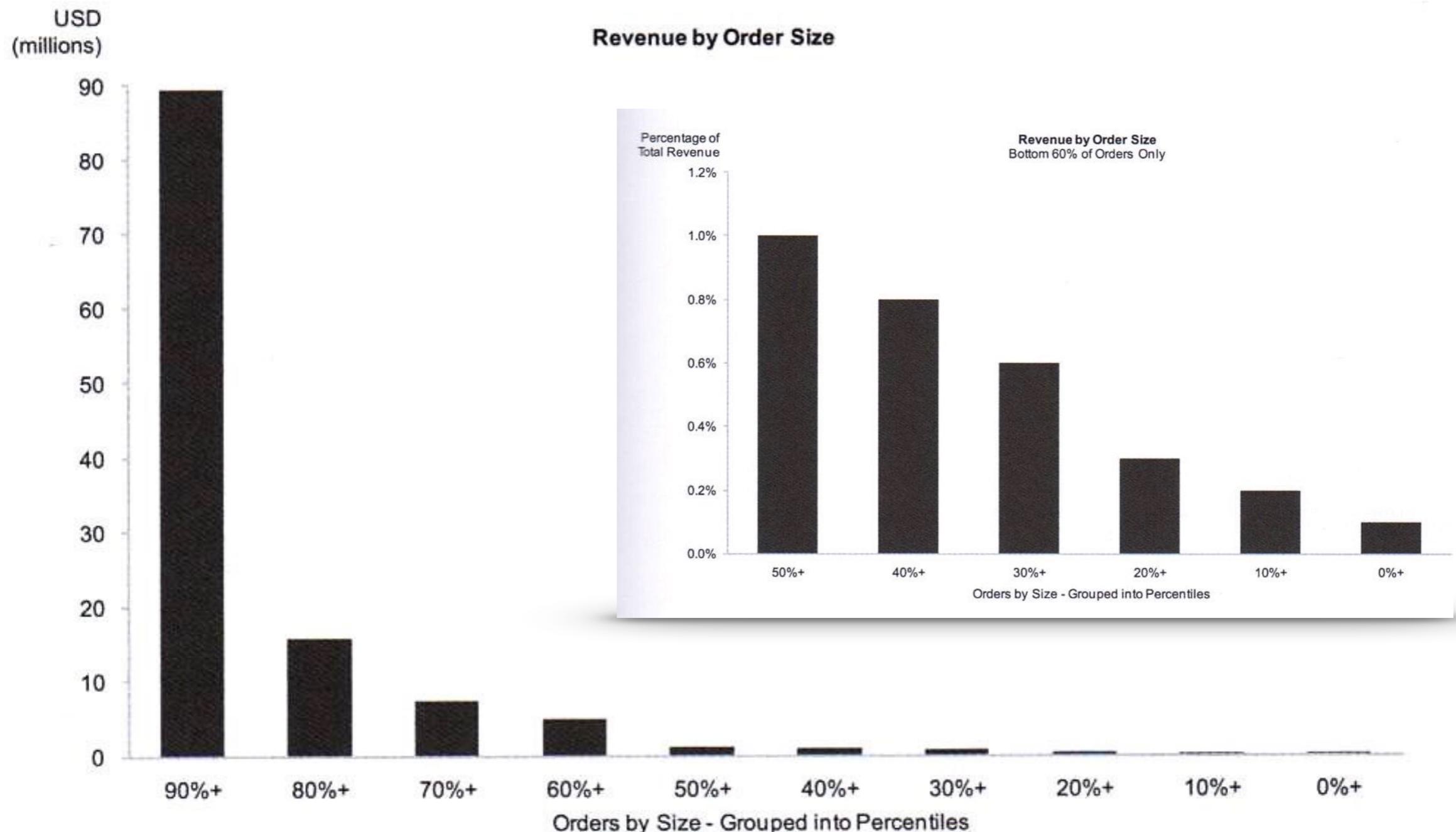
PERMITA A CATEGORIZAÇÃO DE ITENS DE UMA MANEIRA AD-HOC



USE GRÁFICOS DE PARETO COM PERCENTIS

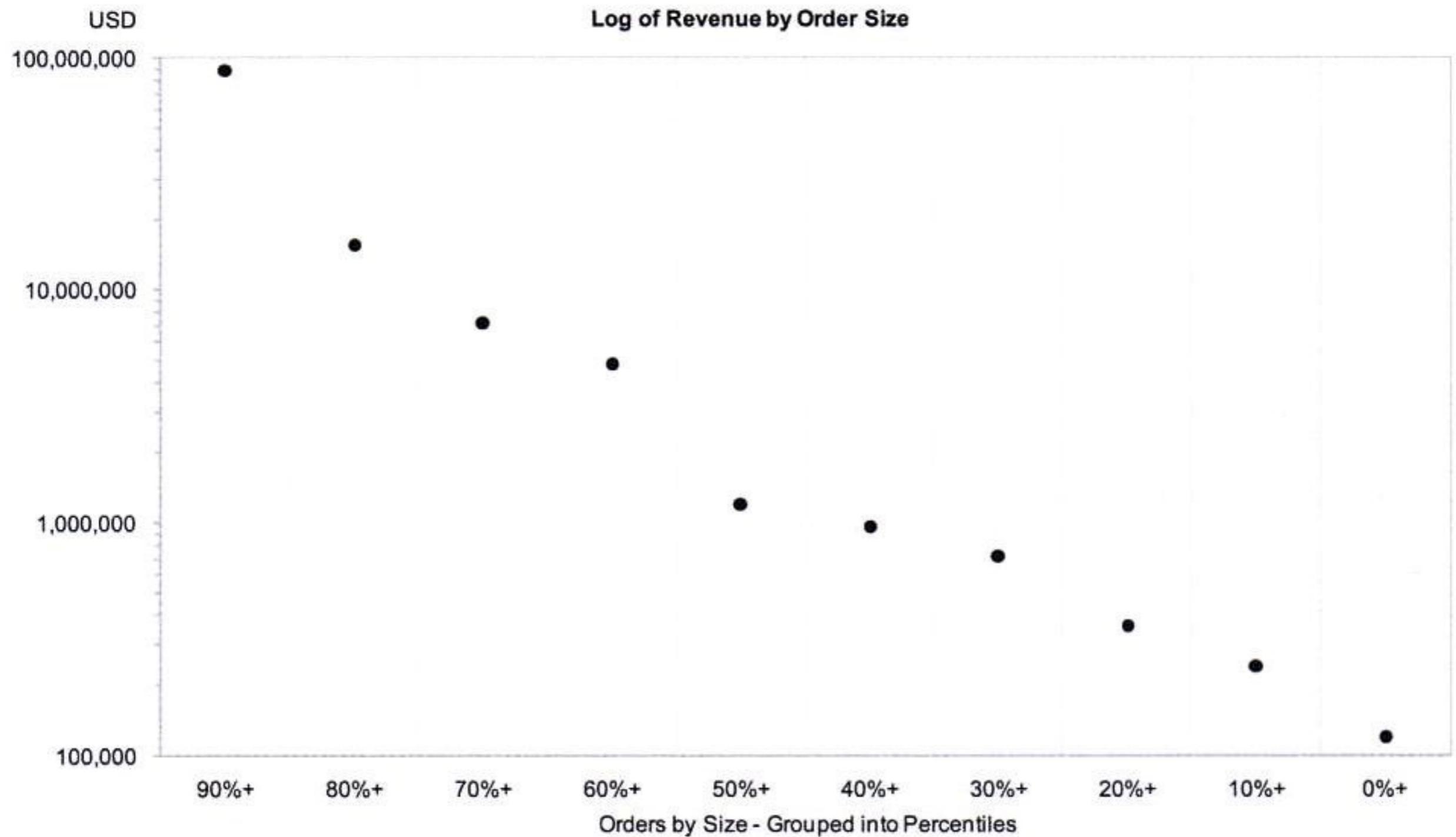


TESTE DIFERENTES ESCALAS

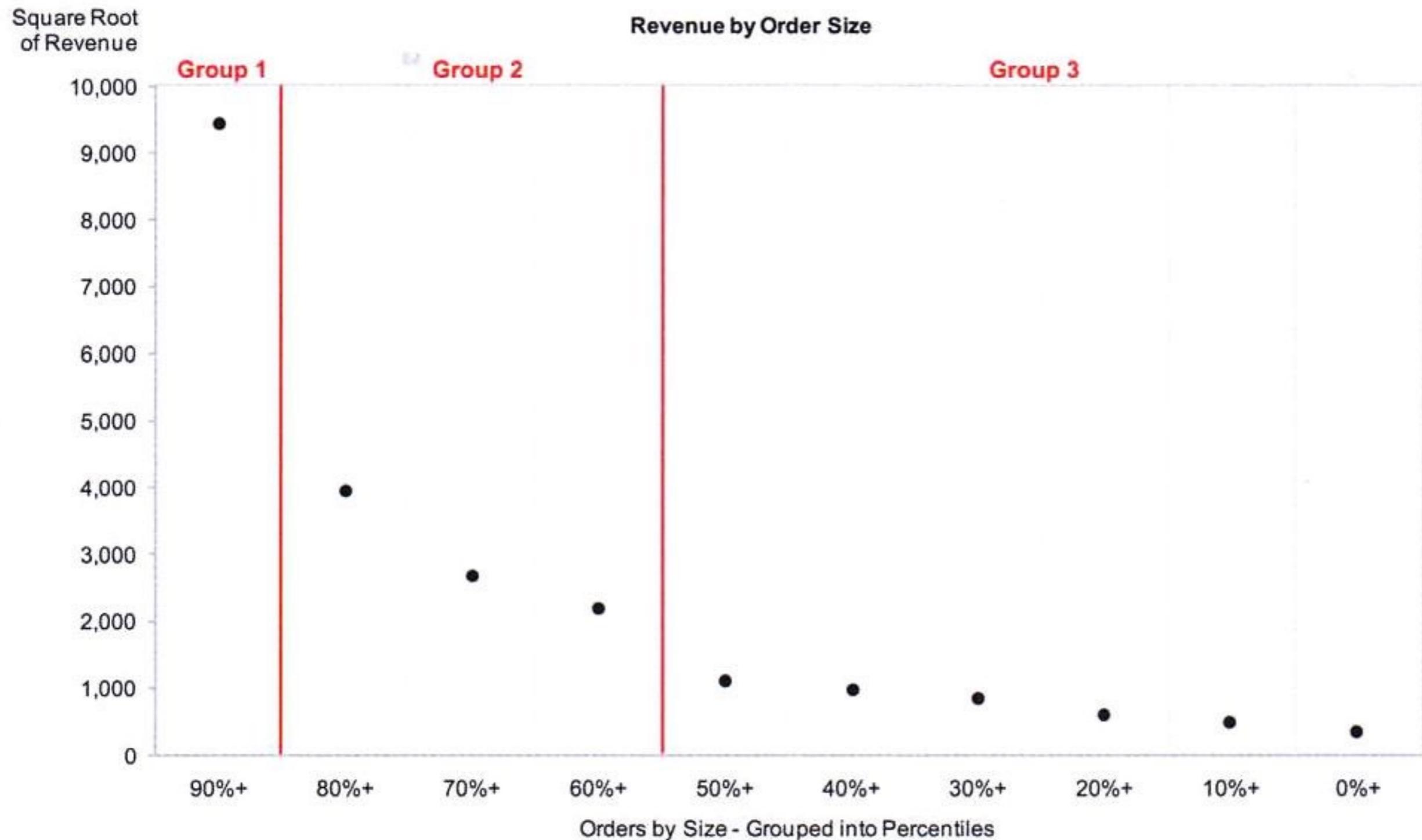


Exiba as barras com tamanho muito diferentes em gráficos separados

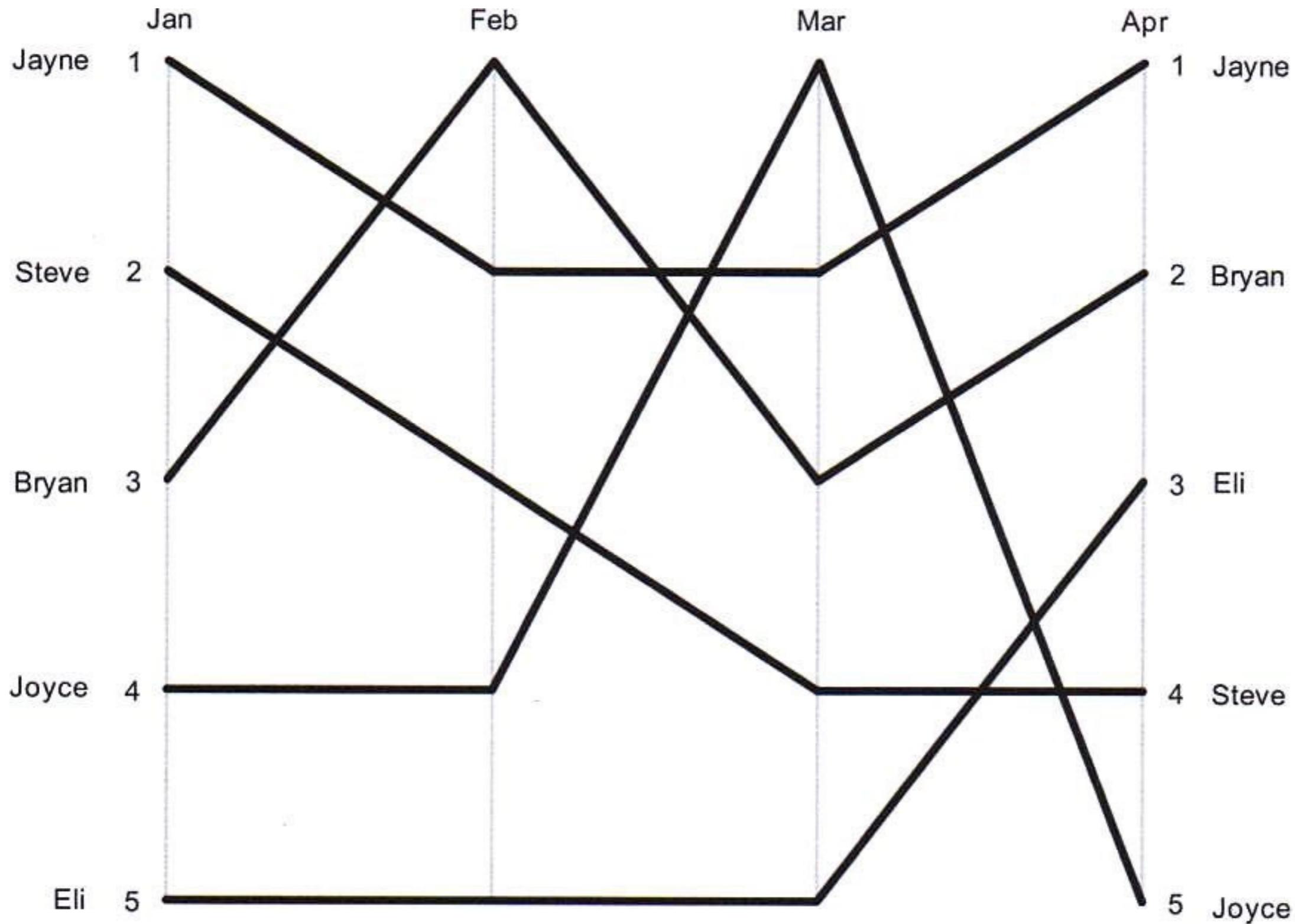
TESTE DIFERENTES ESCALAS - LOGARÍTMICA



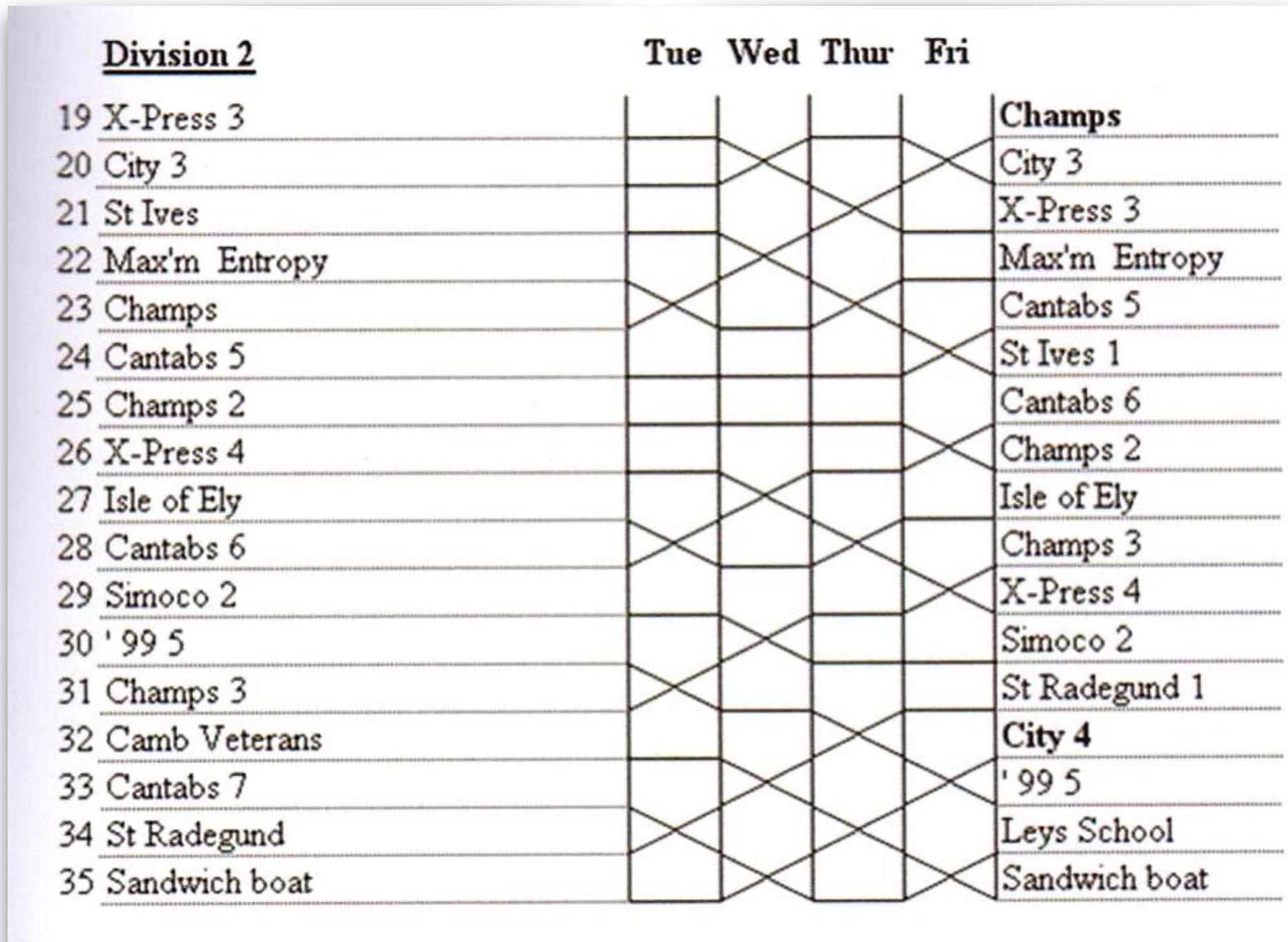
TESTE DIFERENTES ESCALAS - QUADRÁTICA



USE GRÁFICOS DE LINHAS PARA VISUALIZAÇÃO DE MUDANÇAS NOS RANKINGS AO LONGO DO TEMPO



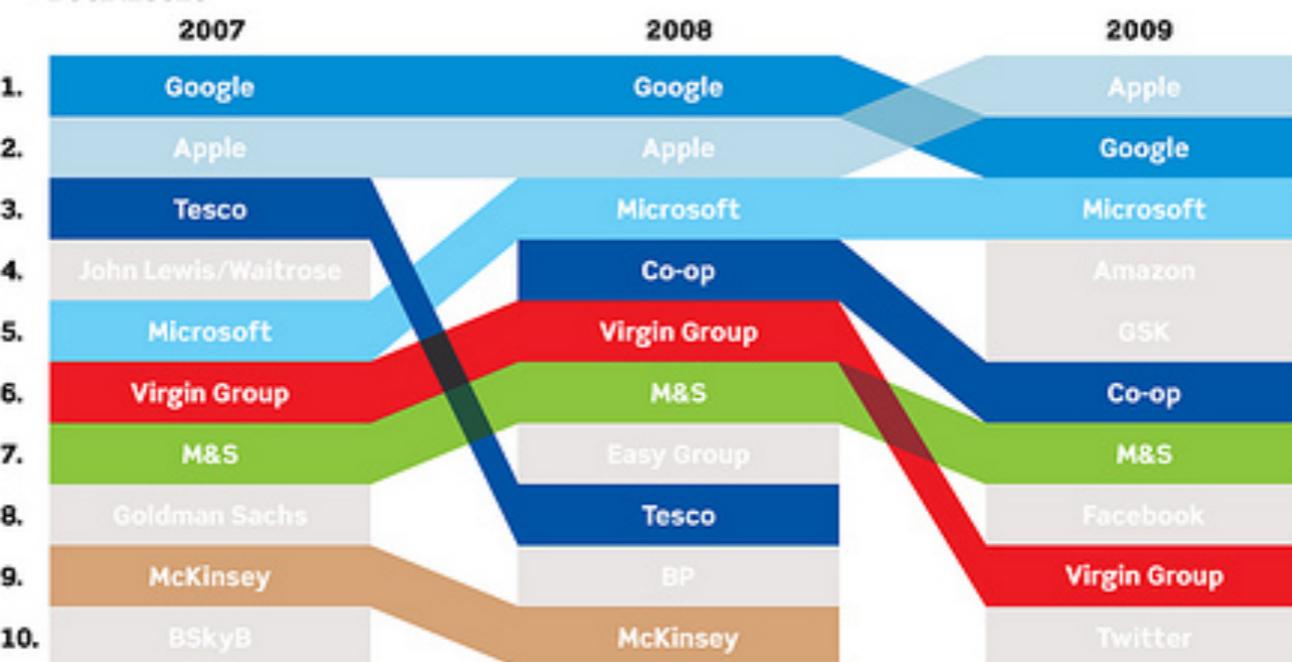
USE GRÁFICOS DE LINHAS PARA VISUALIZAÇÃO DE MUDANÇAS NOS RANKINGS AO LONGO DO TEMPO



USE GRÁFICOS DE LINHAS PARA VISUALIZAÇÃO DE MUDANÇAS NOS RANKINGS AO LONGO DO TEMPO

MOST HIGHLY-REGARDED BRANDS BY UK'S PROMINENT LEADERS

>BUSINESSES



>NON-PROFIT ORGANISATIONS

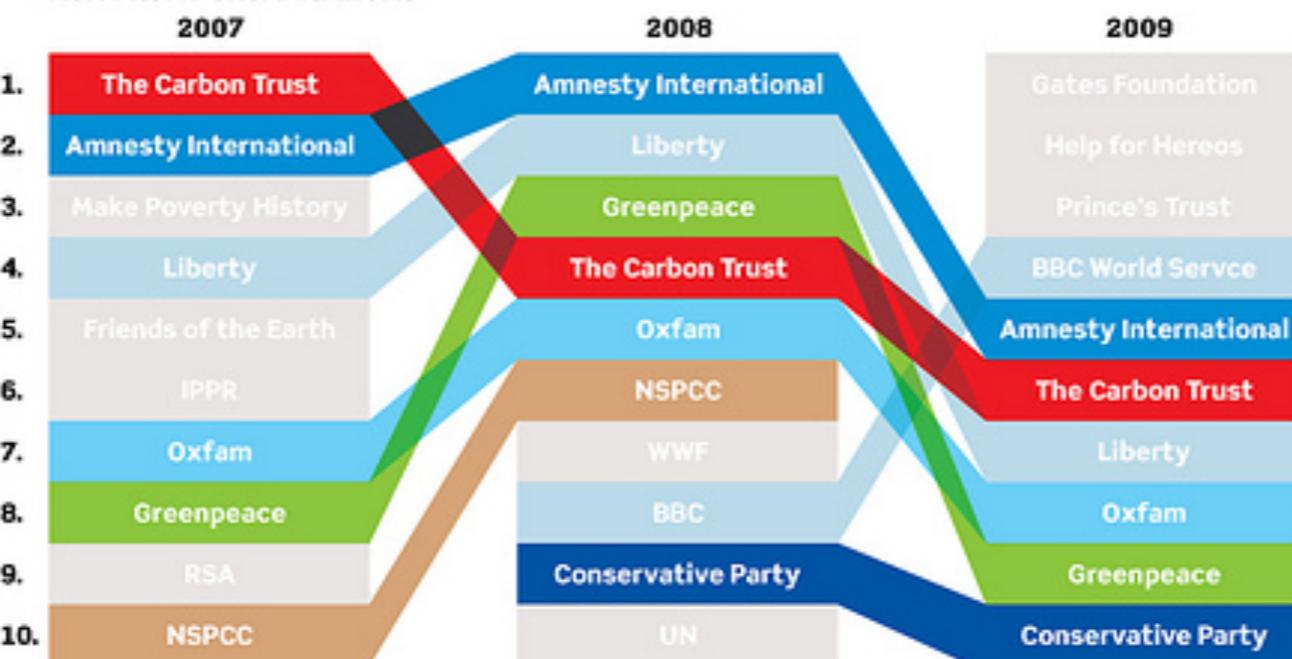
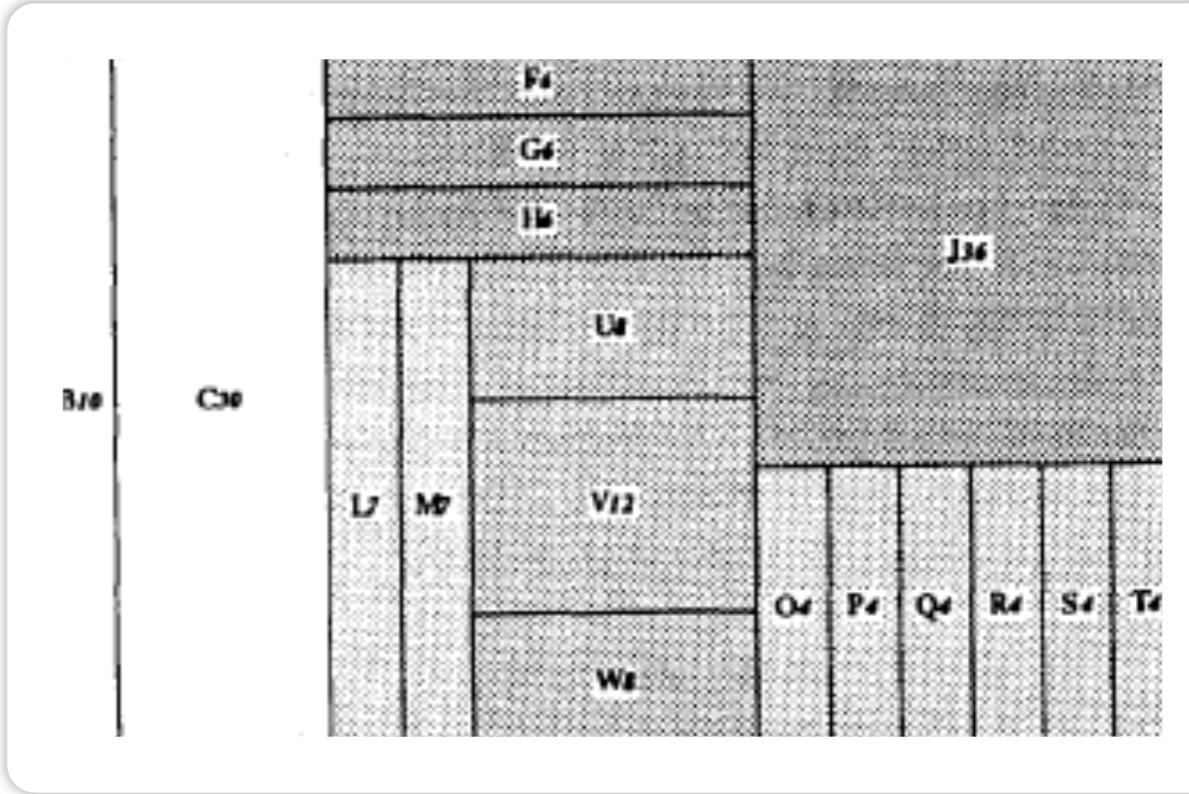


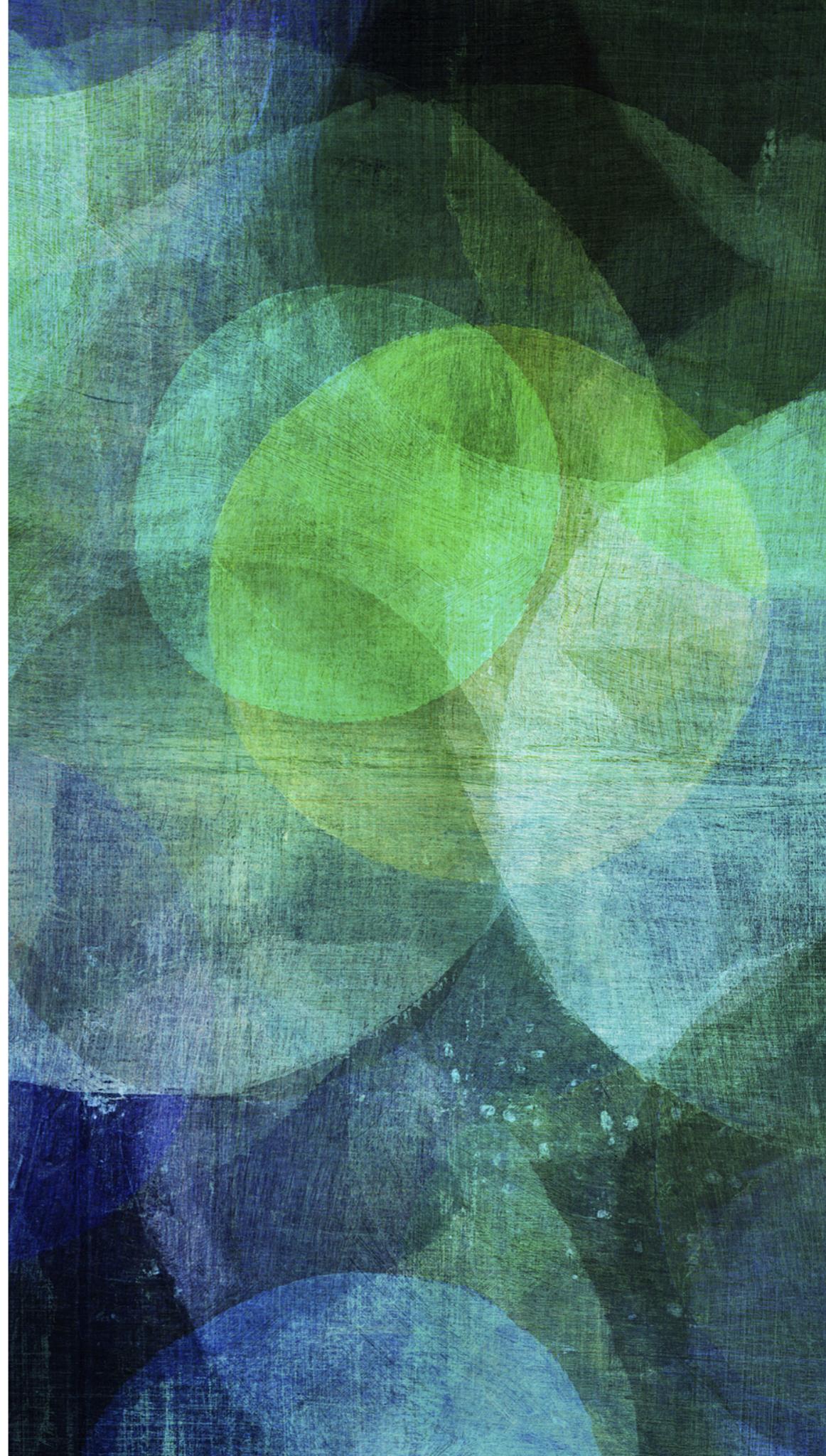
Chart showing the top ten brands' standing over the last three years

TREE-MAPS: A SPACE FILLING APPROACH TO THE VISUALIZATION OF HIERARCHICAL INFORMATION STRUCTURES

B. Johnson e B. Schneiderman
Proceedings of the 2nd Conference on Visualization
1991



ALGORITMOS



TREEMAPS

- Motivação
 - Visualizar estruturas de diretórios e seus tamanhos
- Objetivos
 - Utilização eficiente do espaço
 - Interatividade
 - Compreensão
 - Estética

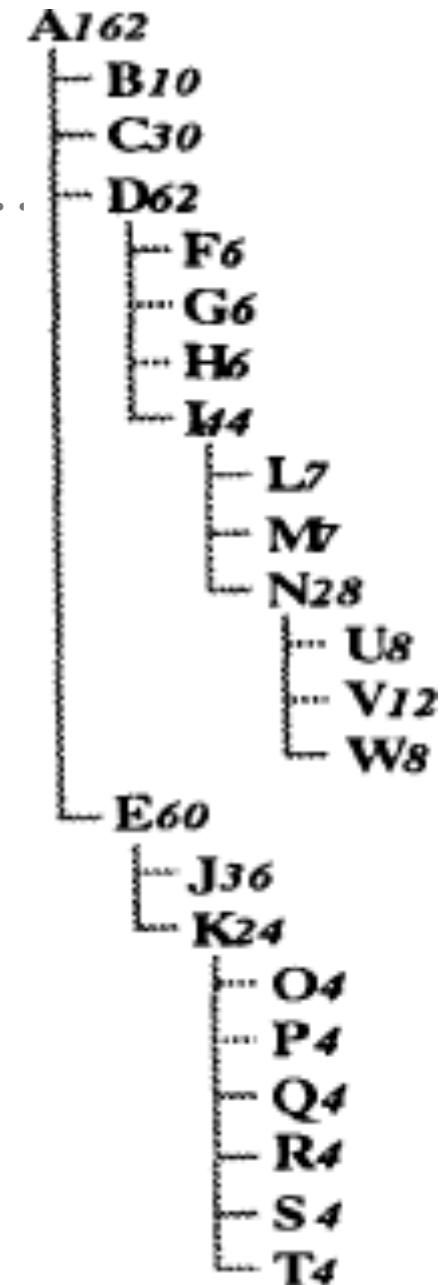


Figure 1. Outline

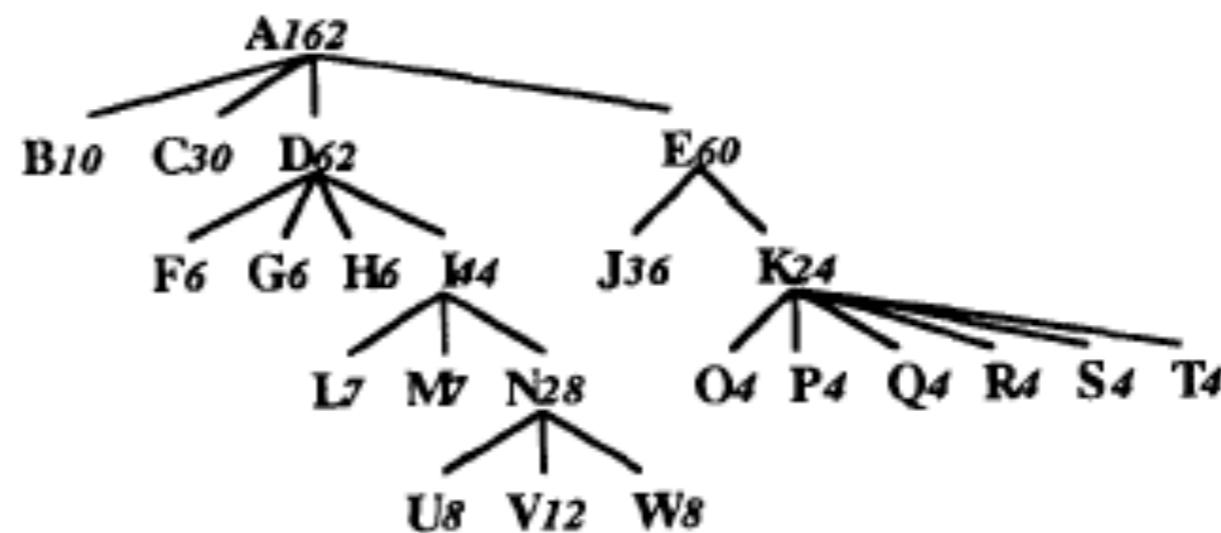


Figure 2. Tree Diagram

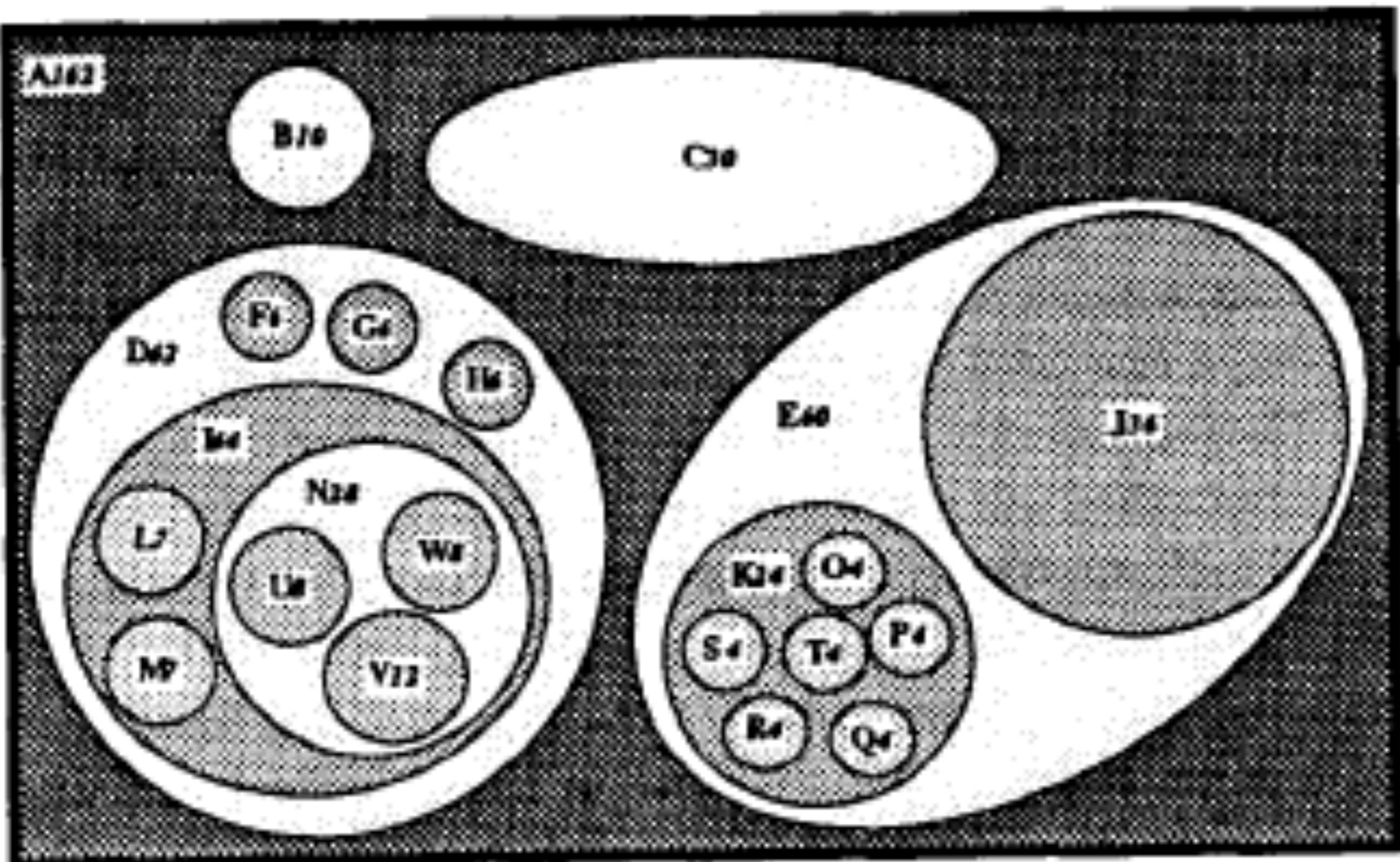


Figure 3. Venn Diagram

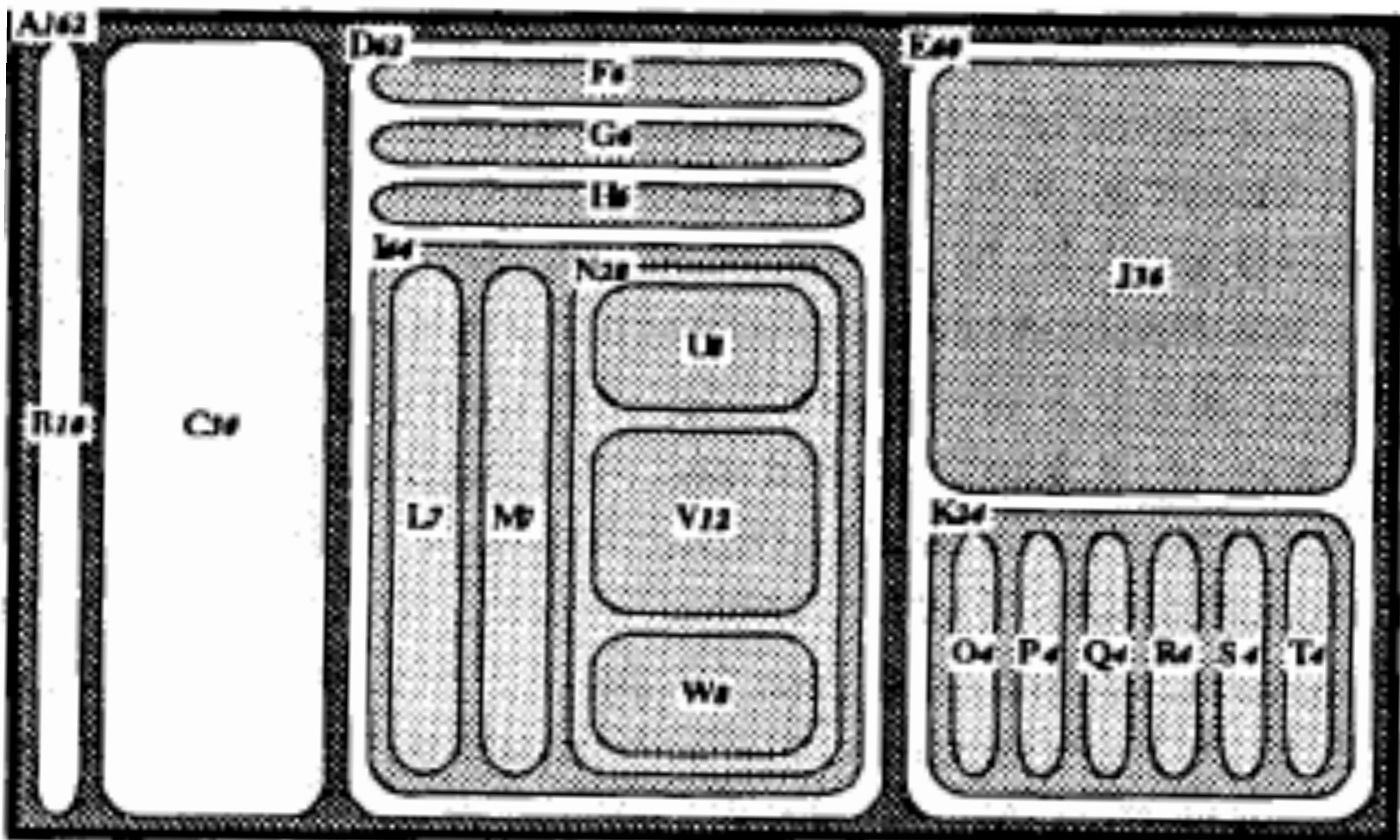


Figure 4. Nested Tree-Map

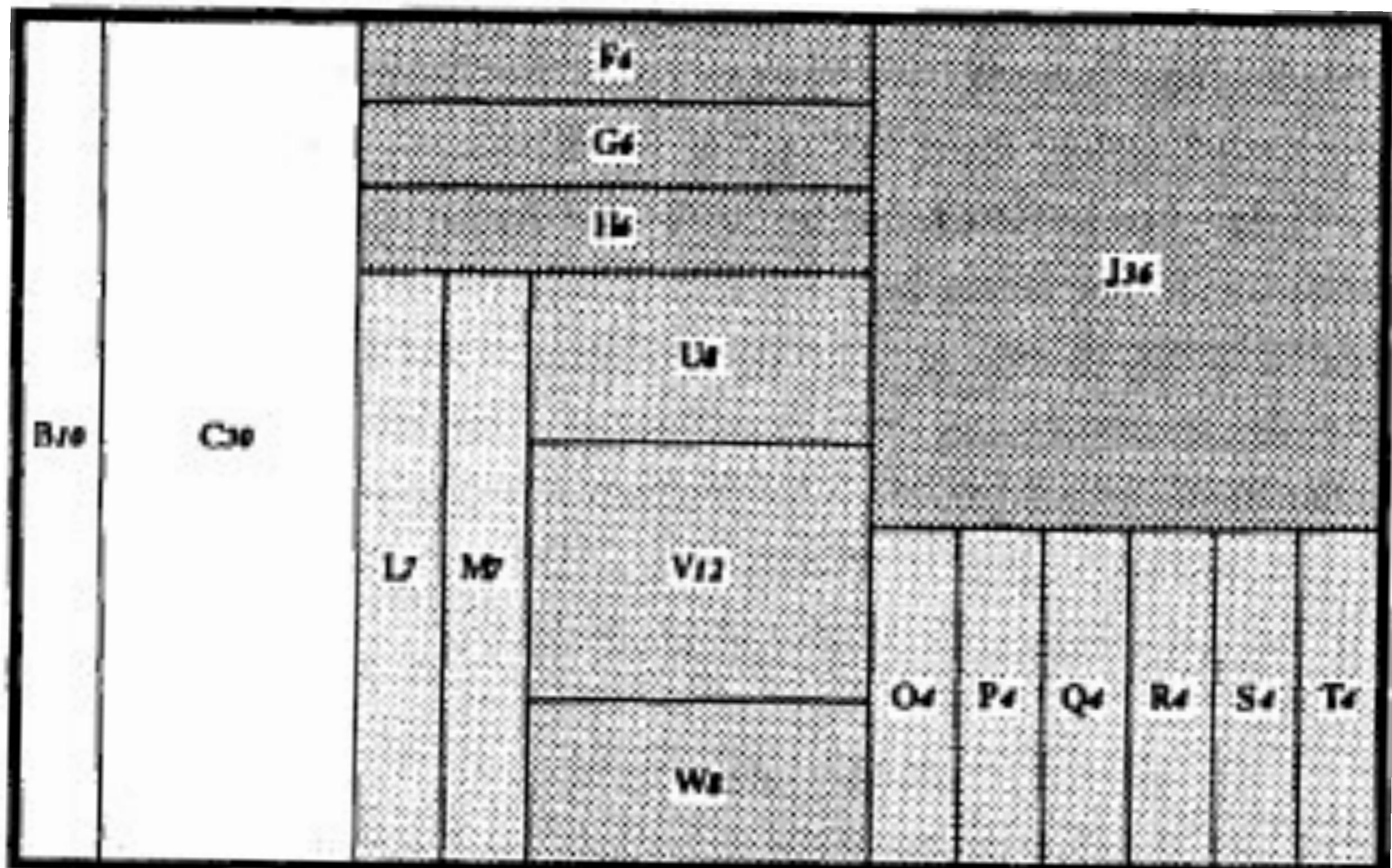


Figure 5. Tree-Map

REPRESENTAÇÃO VISUAL

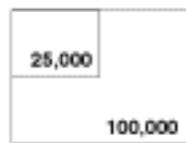
- Cada nó folha é representado por um **retângulo**
 - A área de cada retângulo é proporcional ao peso do nó que representa
 - Se o nó I é ancestral do nó II, então o retângulo que representa o nó I contém área de nó II
 - Os retângulos de dois nós possuem interseção se, e somente se, um é ancestral do outro
 - O peso de um nó tem valor igual à soma de seus filhos

Truck Sales Slip, Tripping Up Chrysler

Over the past few years, Chrysler executives said they were following the lead of Toyota and Honda, focusing on vehicles that met the needs of their customers. But as American consumers turned away from large trucks and S.U.V.'s in 2006, Chrysler continued to churn out big vehicles, which are now sitting unsold at dealerships across the country.

READING THE CHART

Boxes are scaled proportionally according to number of cars sold in 2006



SALES CHANGE
'05 TO '06

Chrysler Group **-7.0%**

Trucks/vans/S.U.V.'s 1.6 million

Cars 0.5 million

Pickups, minivans and S.U.V.'s made up 76 percent of Chrysler's sales, which left it vulnerable when consumers shifted to cars.

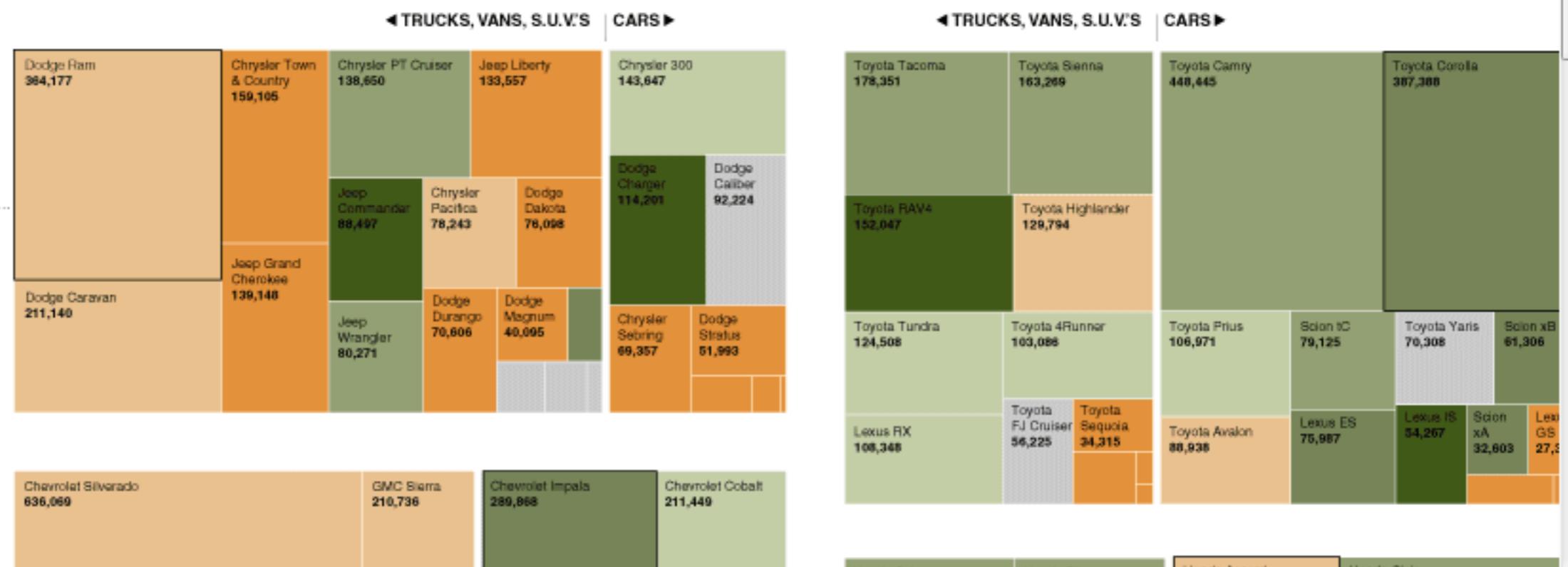
Dodge Ram



General Motors **-8.7%**

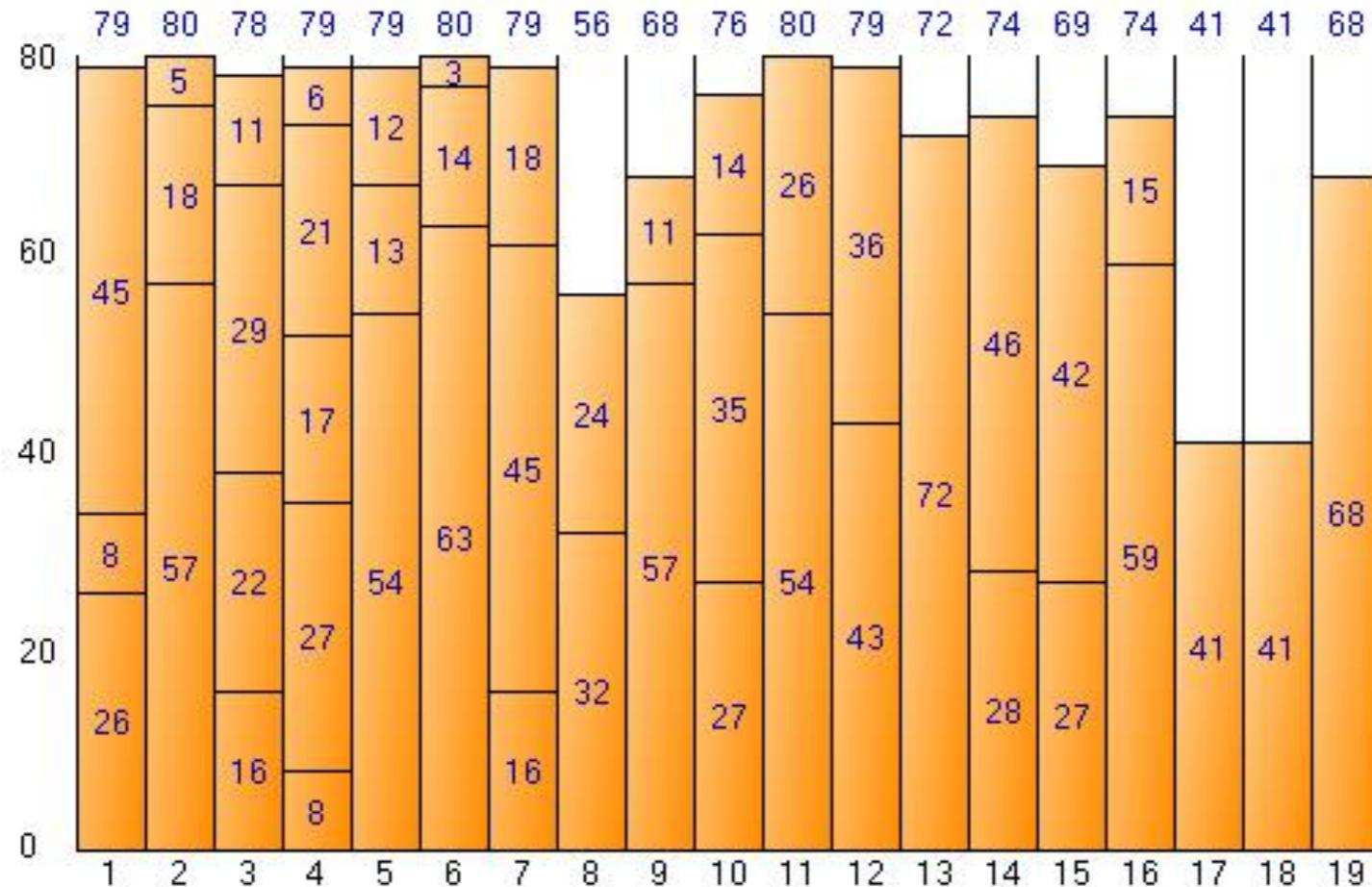
Trucks/vans/S.U.V.'s 2.5 million

Cars 1.6 million



Variação do problema bin packing que é NP-difícil

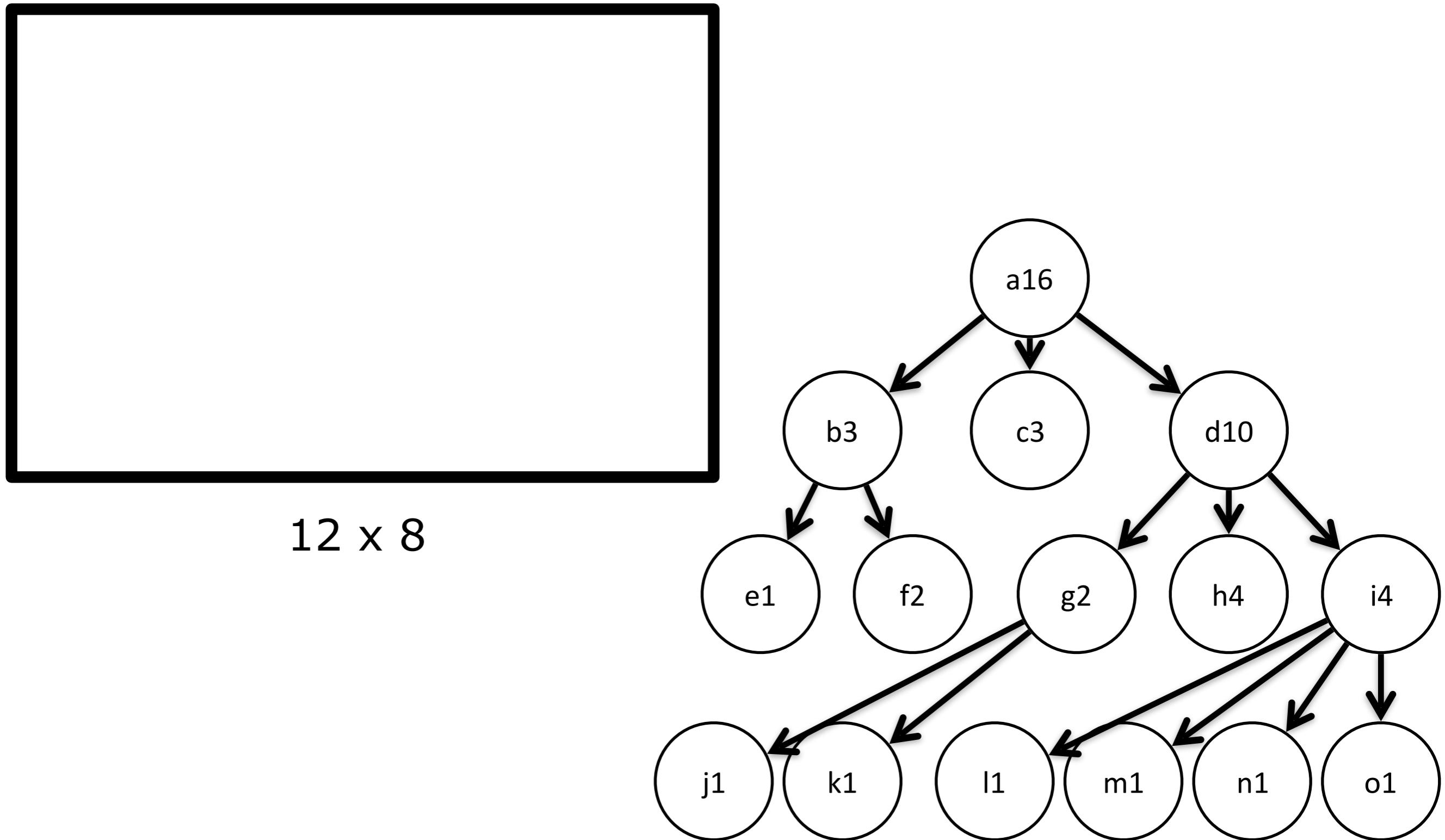
Objetos de diferentes volumes devem ser colocados em um número finito de compartimentos de capacidade V minimizando o número de compartimentos usados



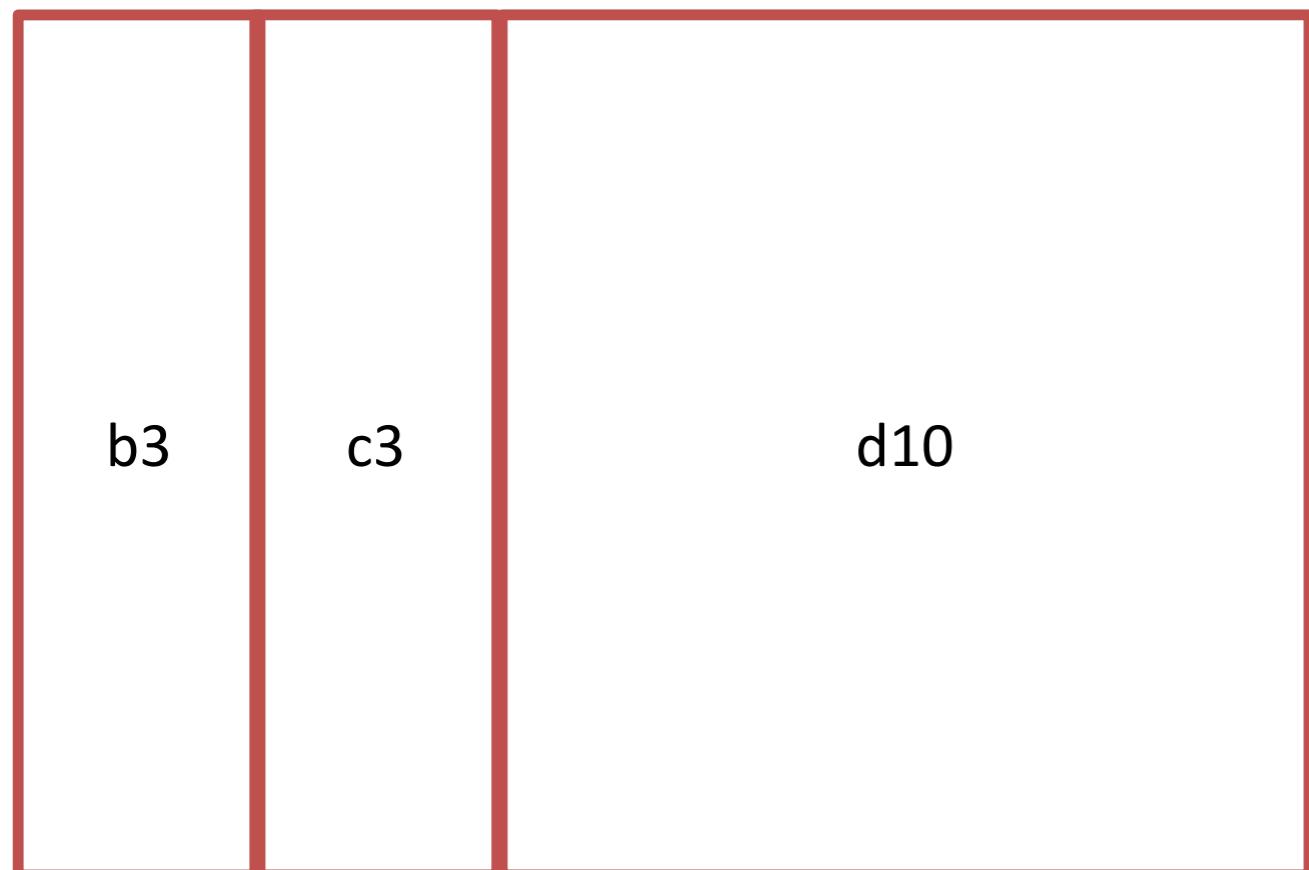
ALGORITMO

- Heurística *slice-and-dice* que pode ser aplicada através do caminhamento em pré-ordem em tempo $O(n)$

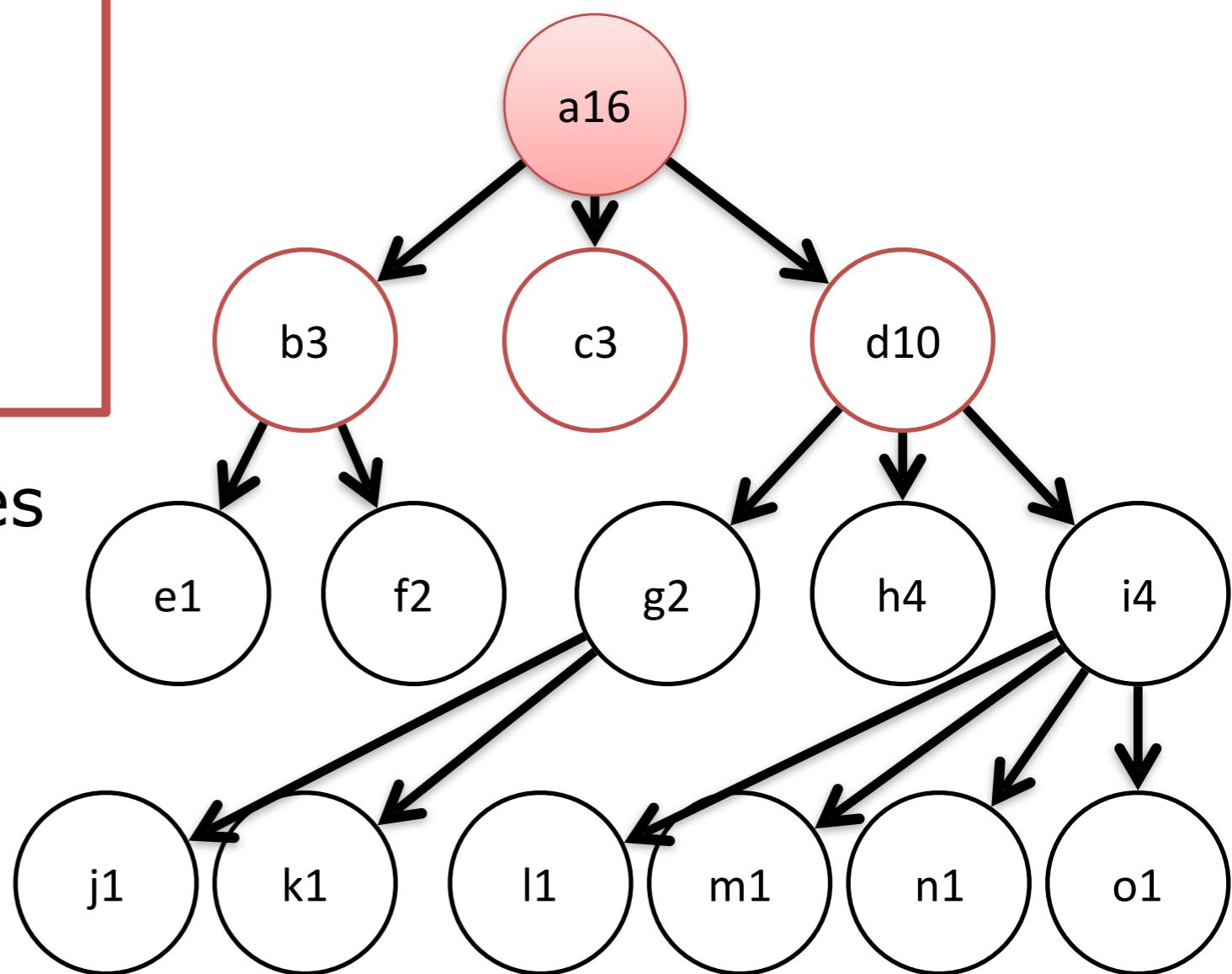
slice-and-dice



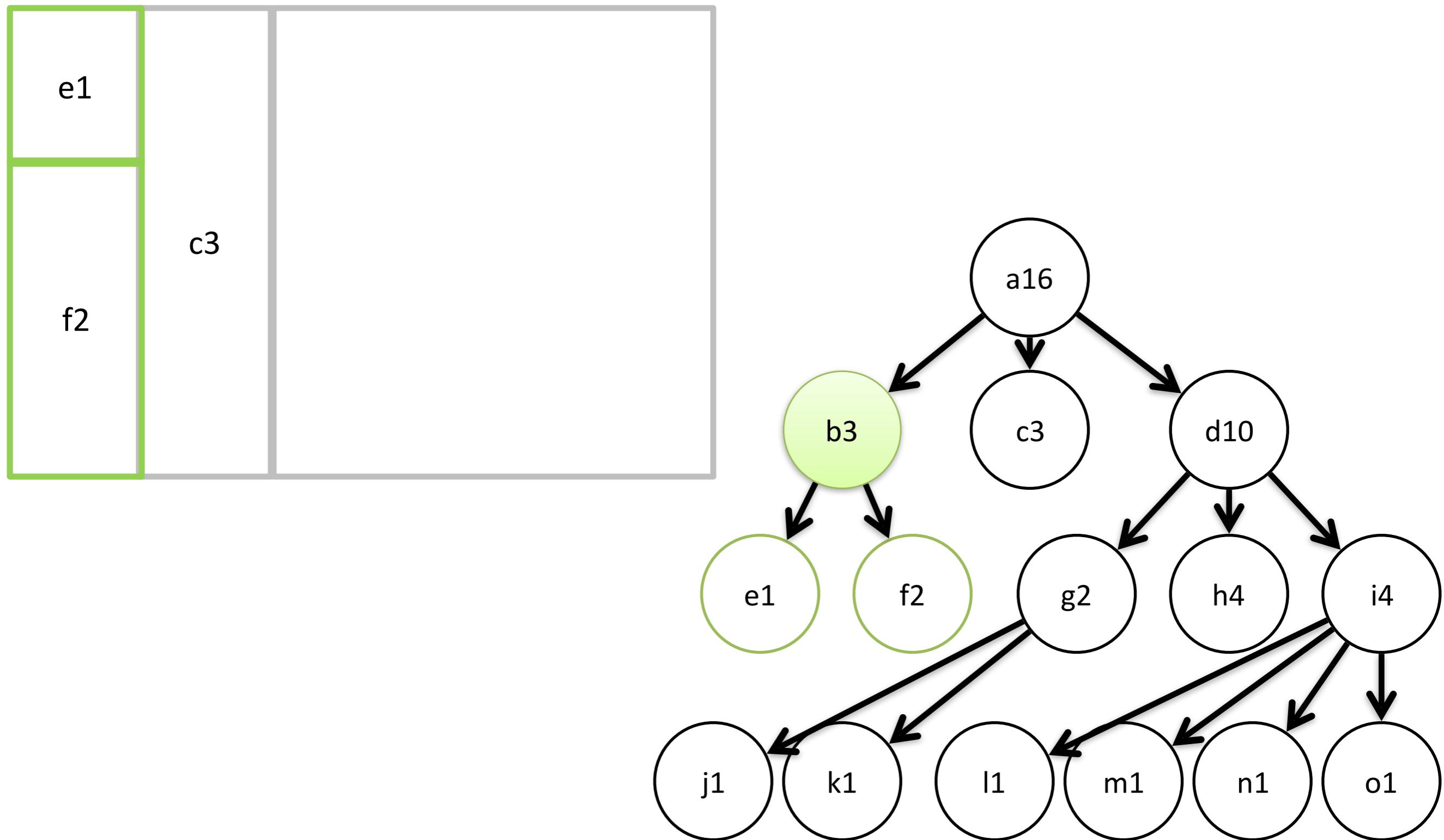
slice-and-dice



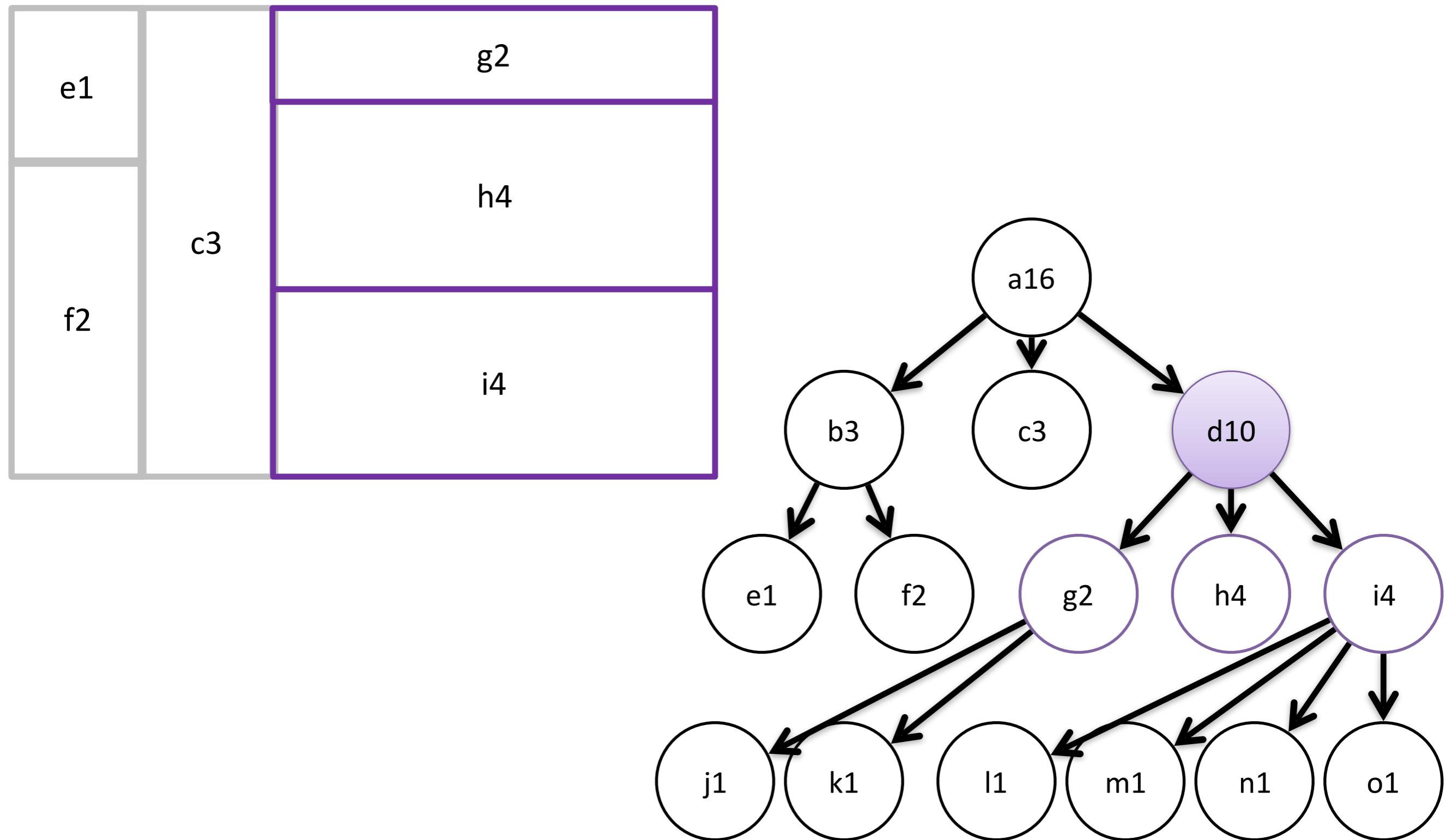
$12 \times 8 = 96$ para 16 unidades



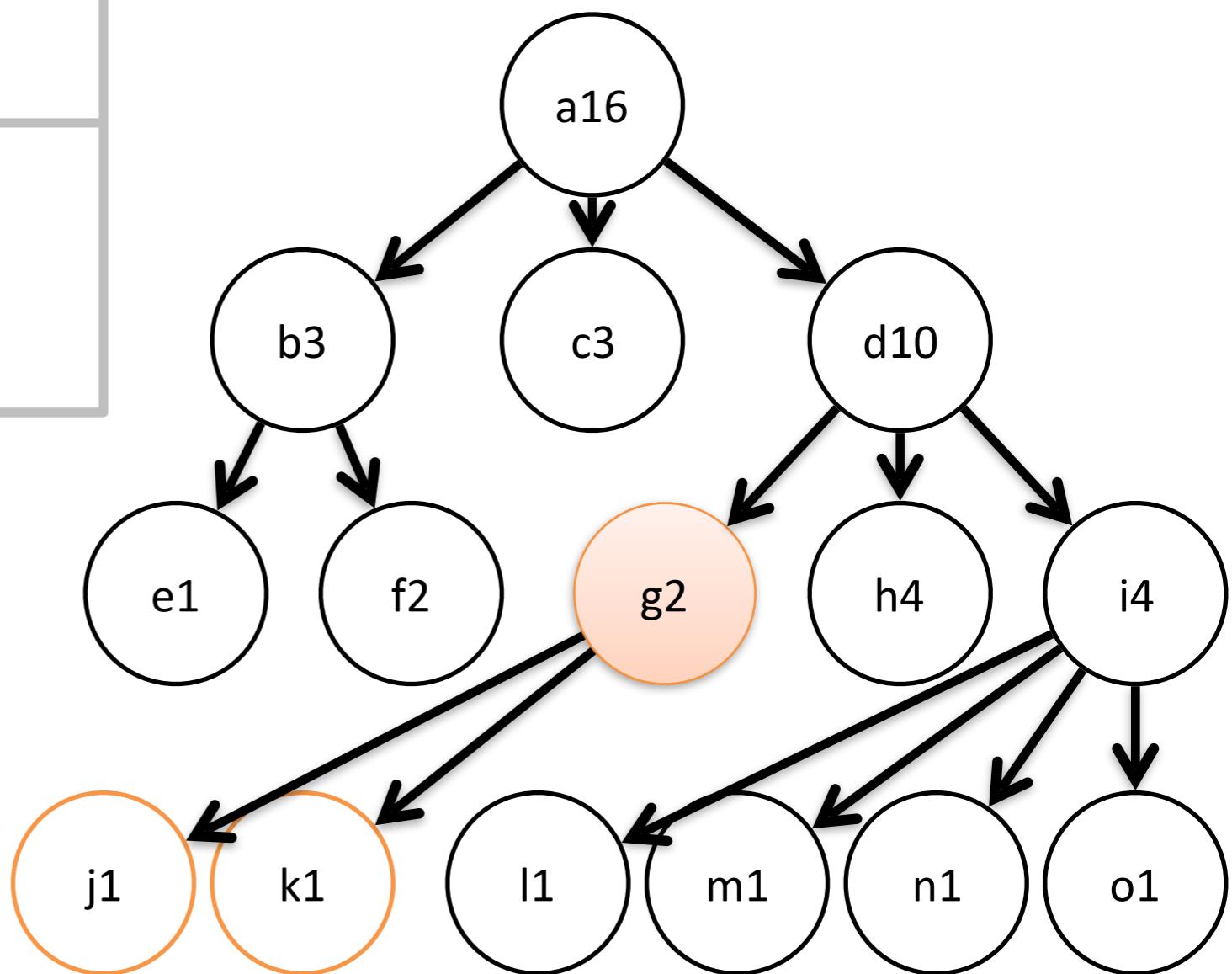
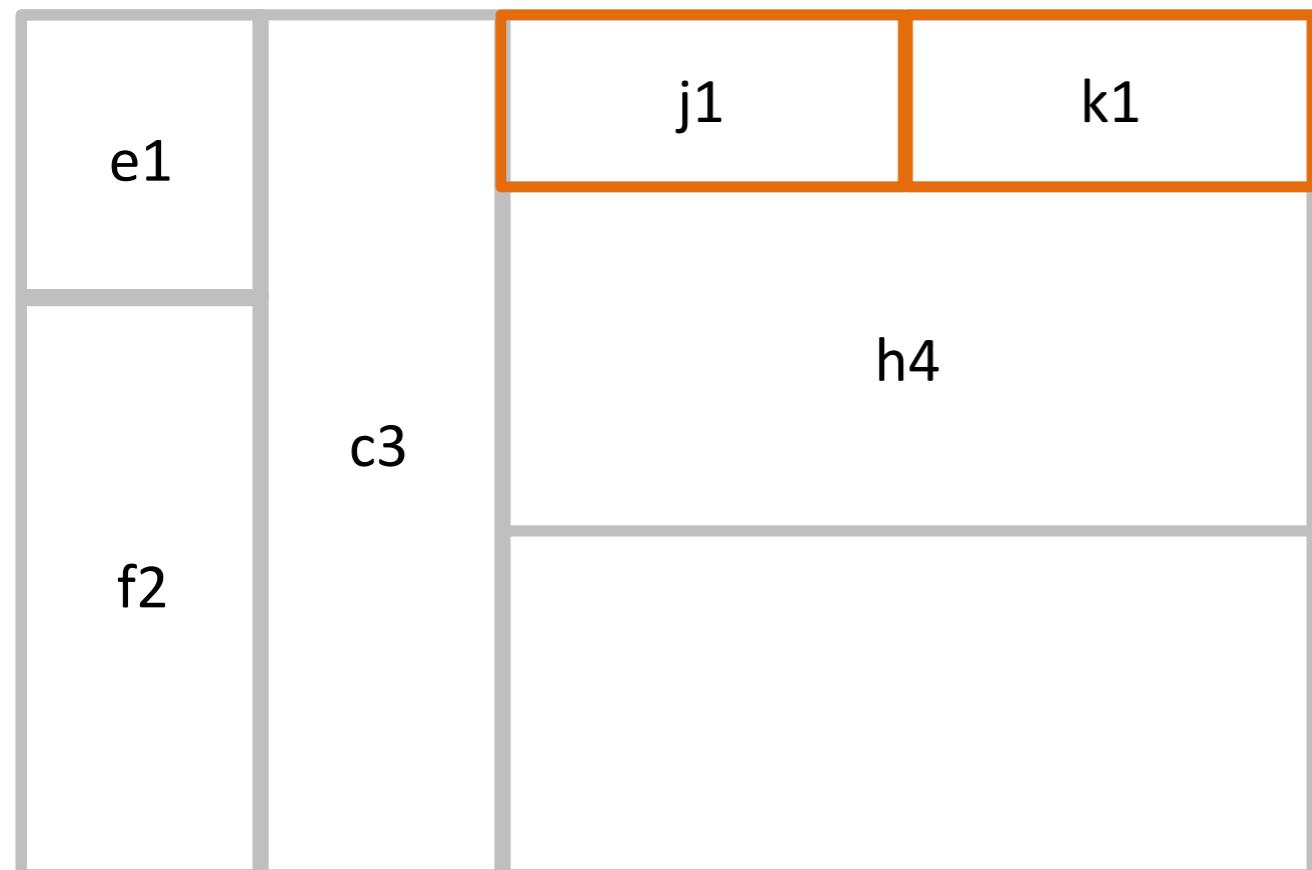
slice-and-dice



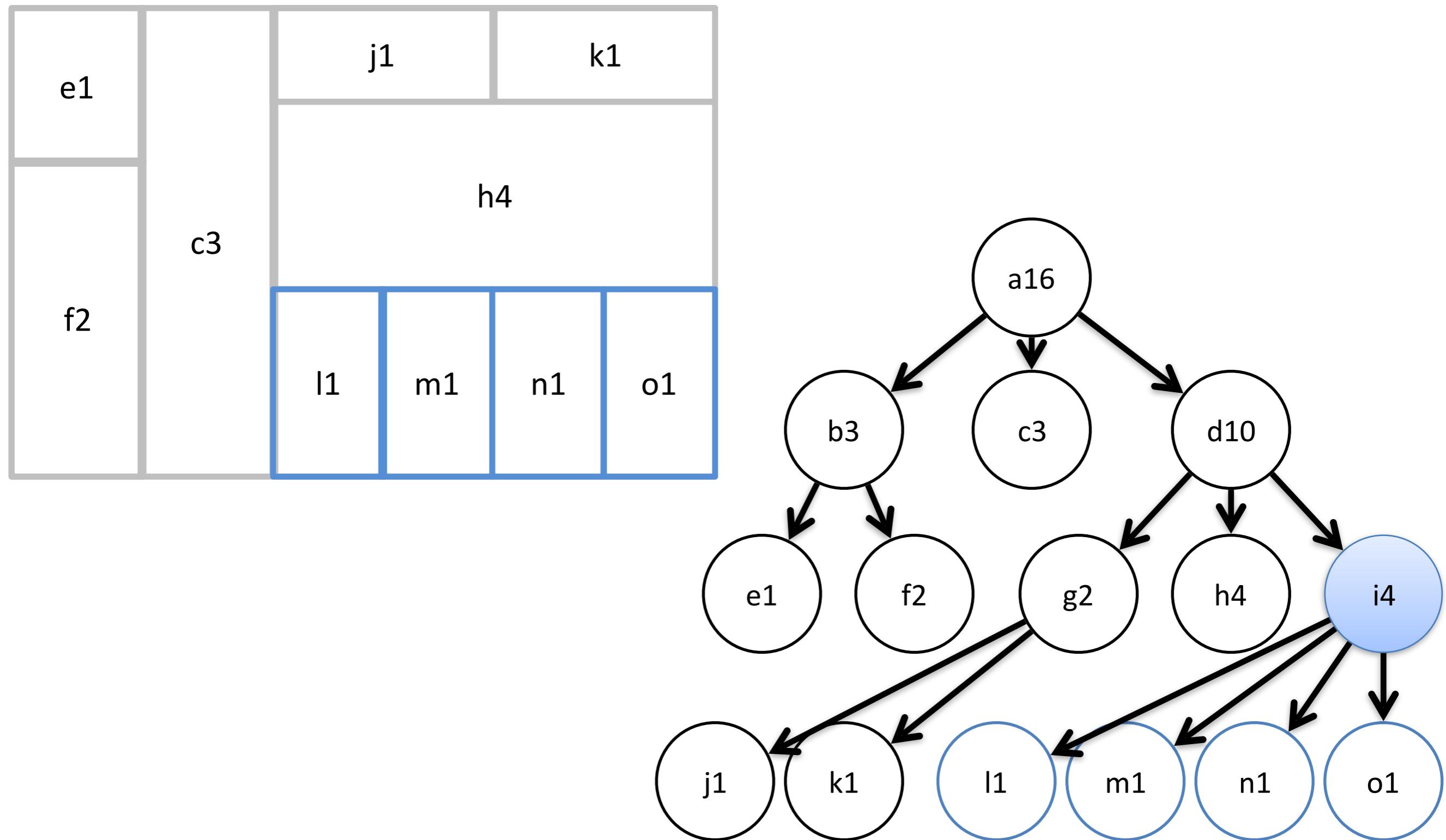
slice-and-dice



slice-and-dice



slice-and-dice



Desvantagens?

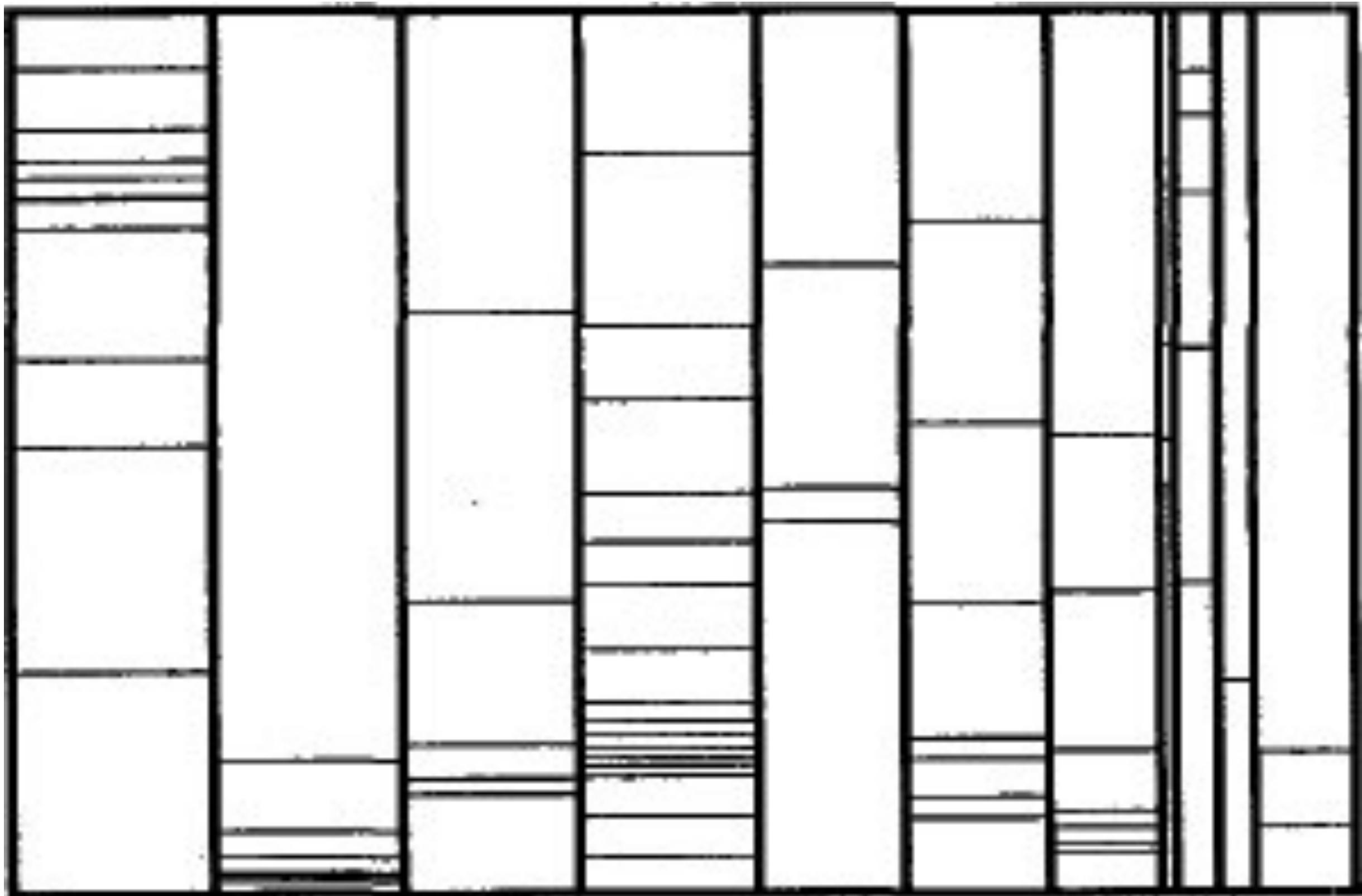
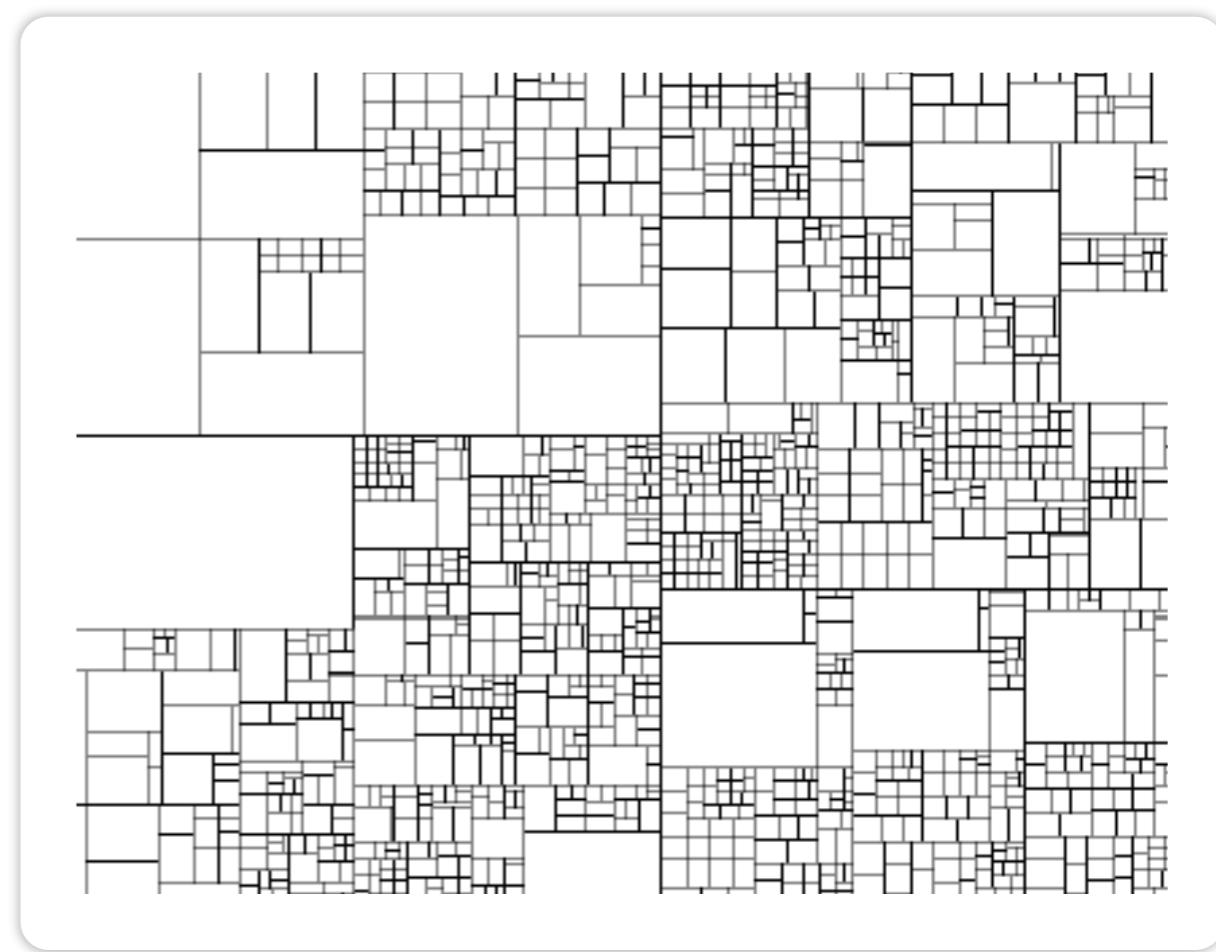


Figure 1: Typical slice-and-dice layout

SQUARIFIED TREEMAPS

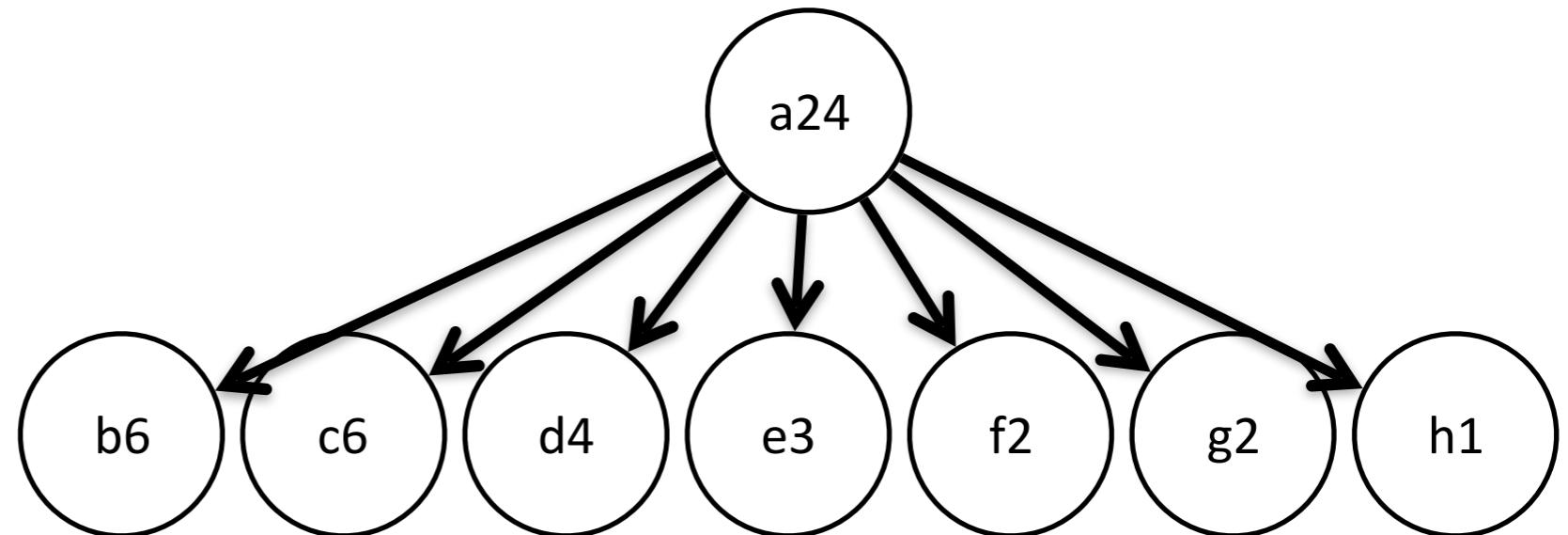
M. Bruls, K. Huizing e J.J. van Wijk
Eurographics / IEEE Transactions on Visualization and
Computer Graphics
2000



ALGORITMO

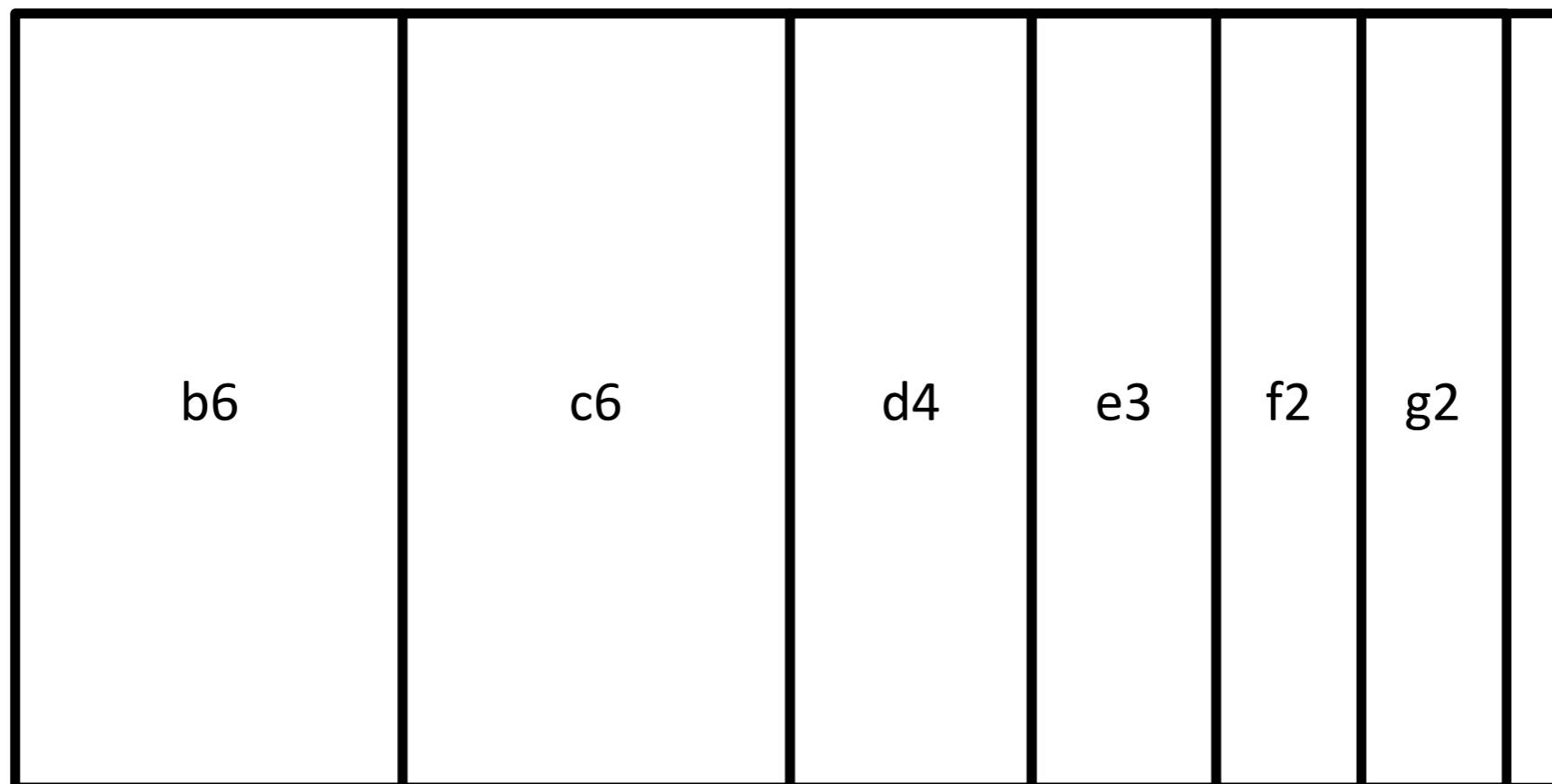
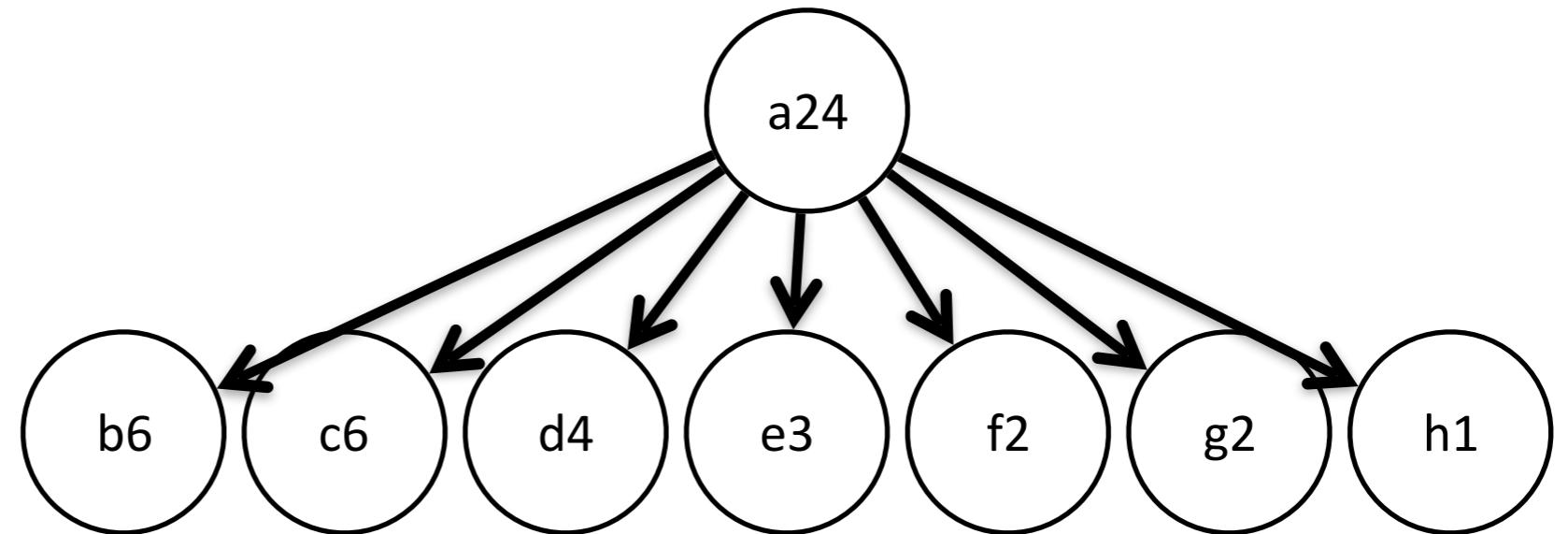
- O objetivo do artigo é produzir *Treemaps* com razão de aspecto próxima de 1
- Mais fácil de se estimar a área de quadrados que de retângulos
- Mais fácil interação uma vez que é mais fácil clicar em quadrados

squarified



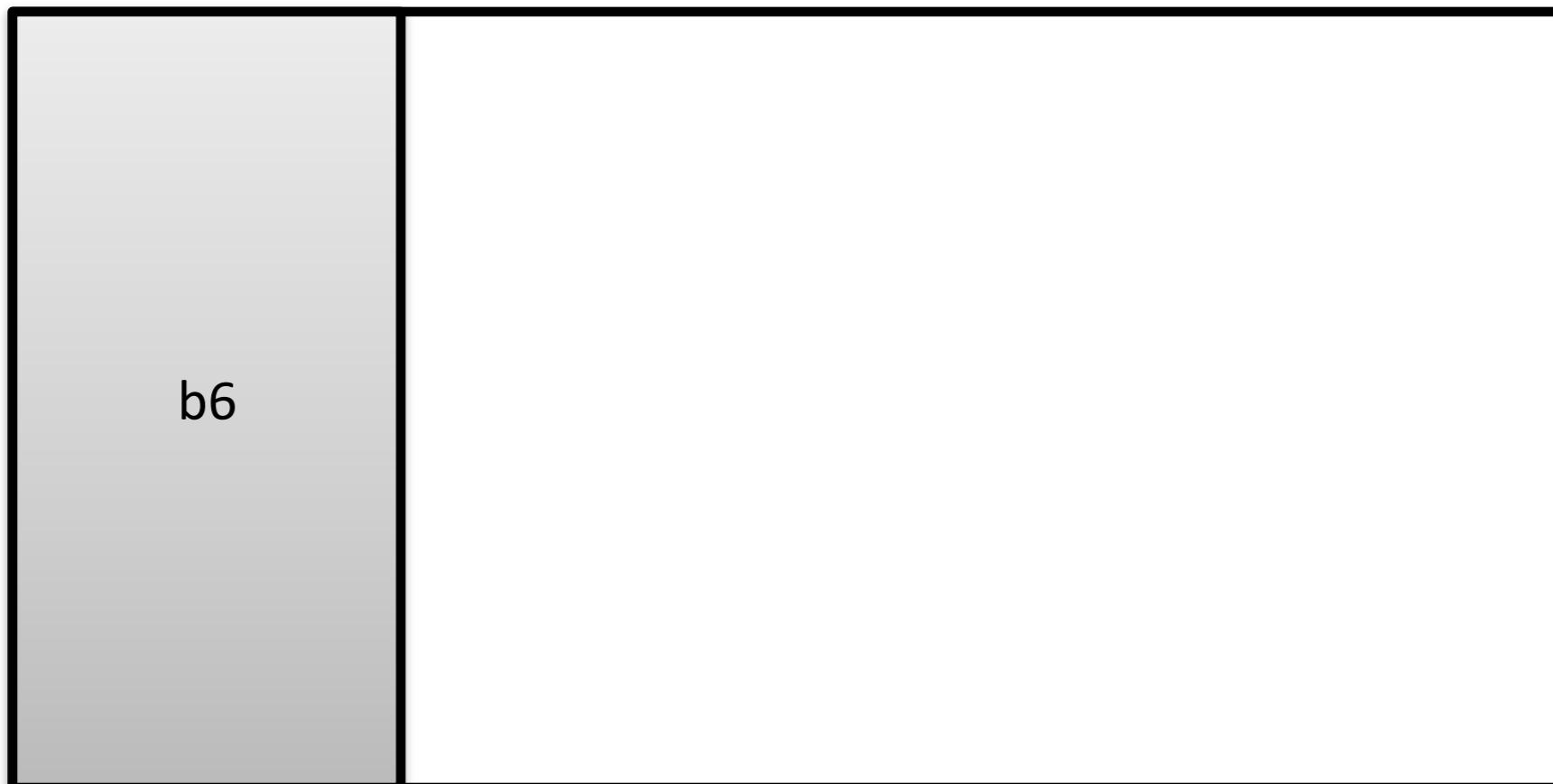
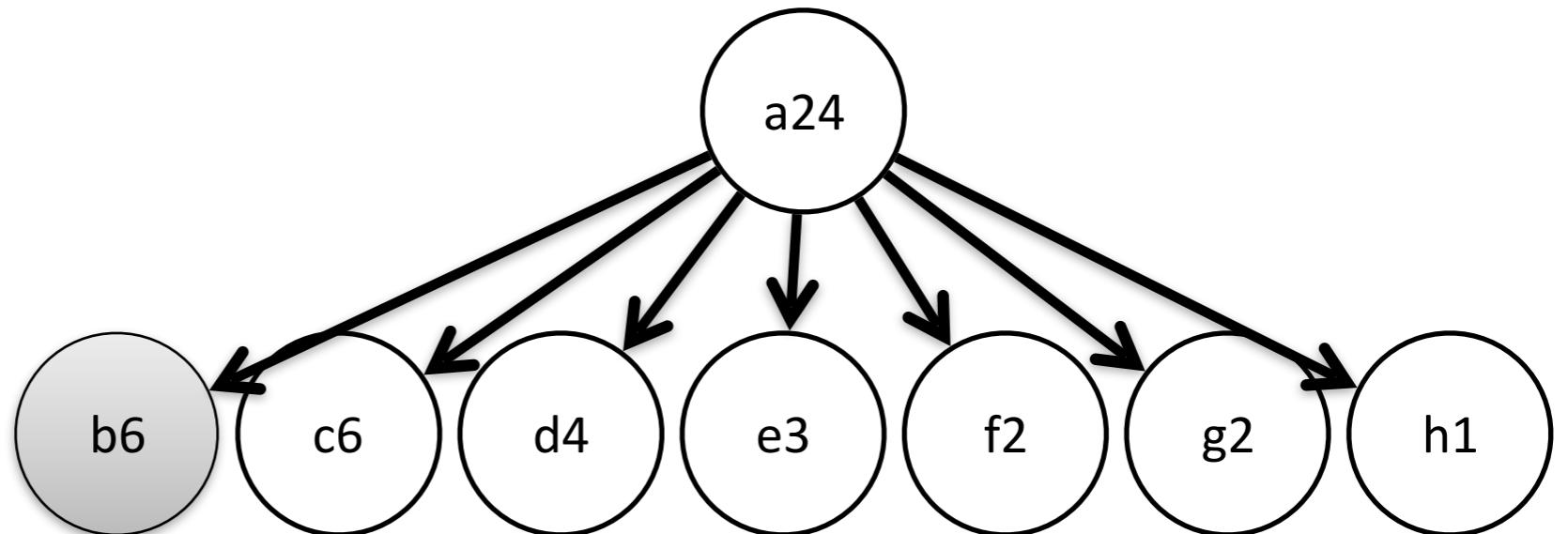
6 x 4

squarified



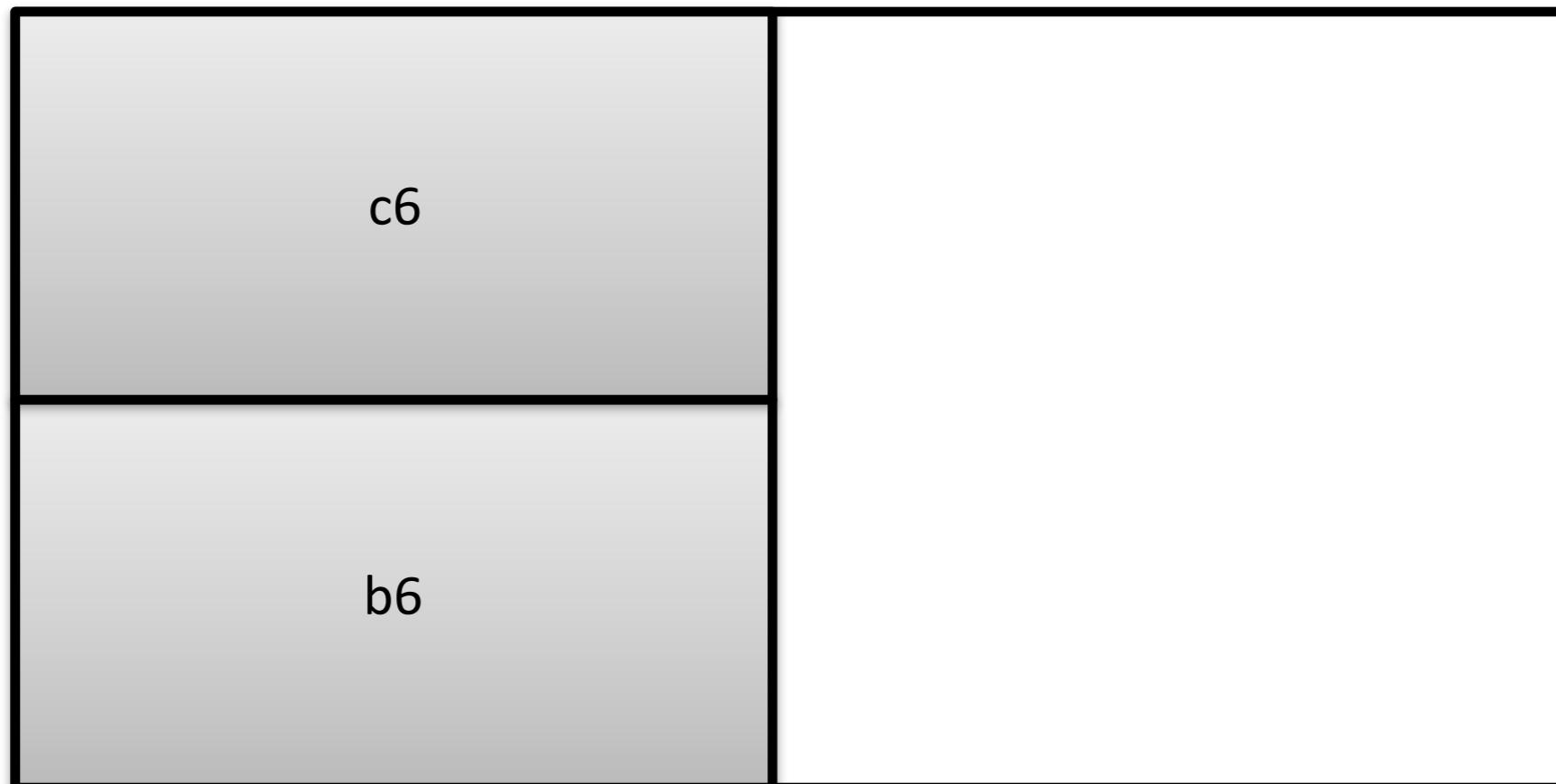
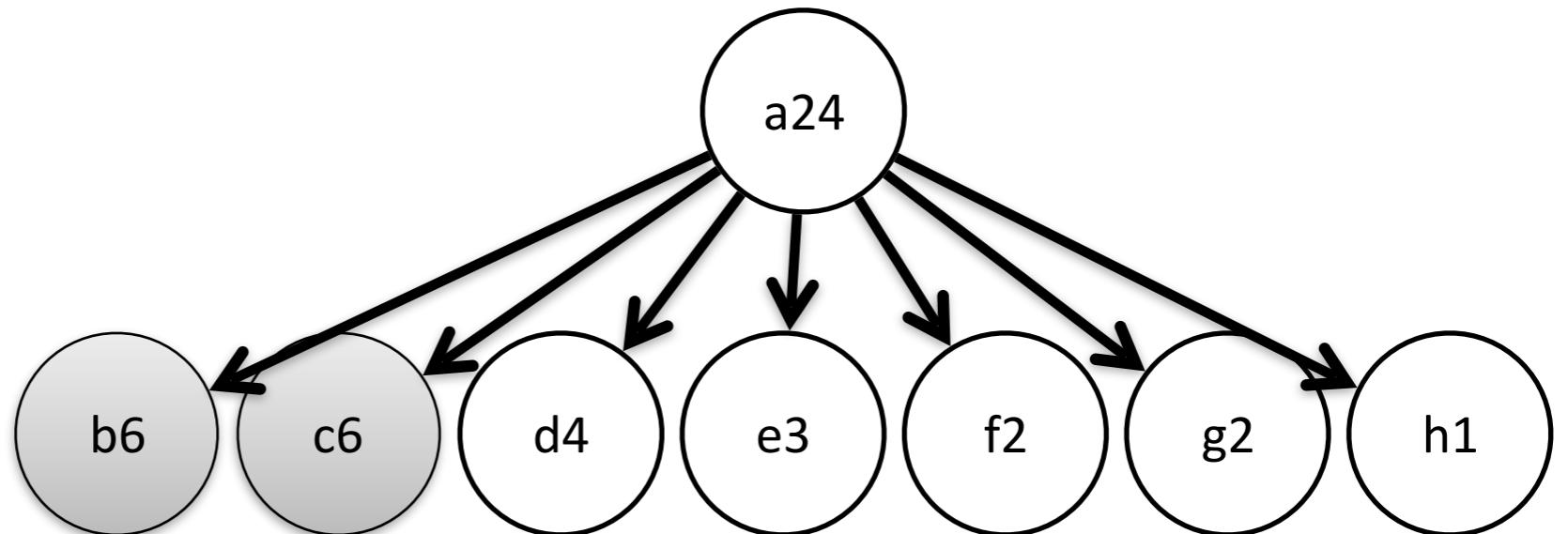
$$\text{Max(aspect ratio)} = \text{Max}(\text{width}/\text{height}, \text{height}/\text{width}) = 16$$

squarified



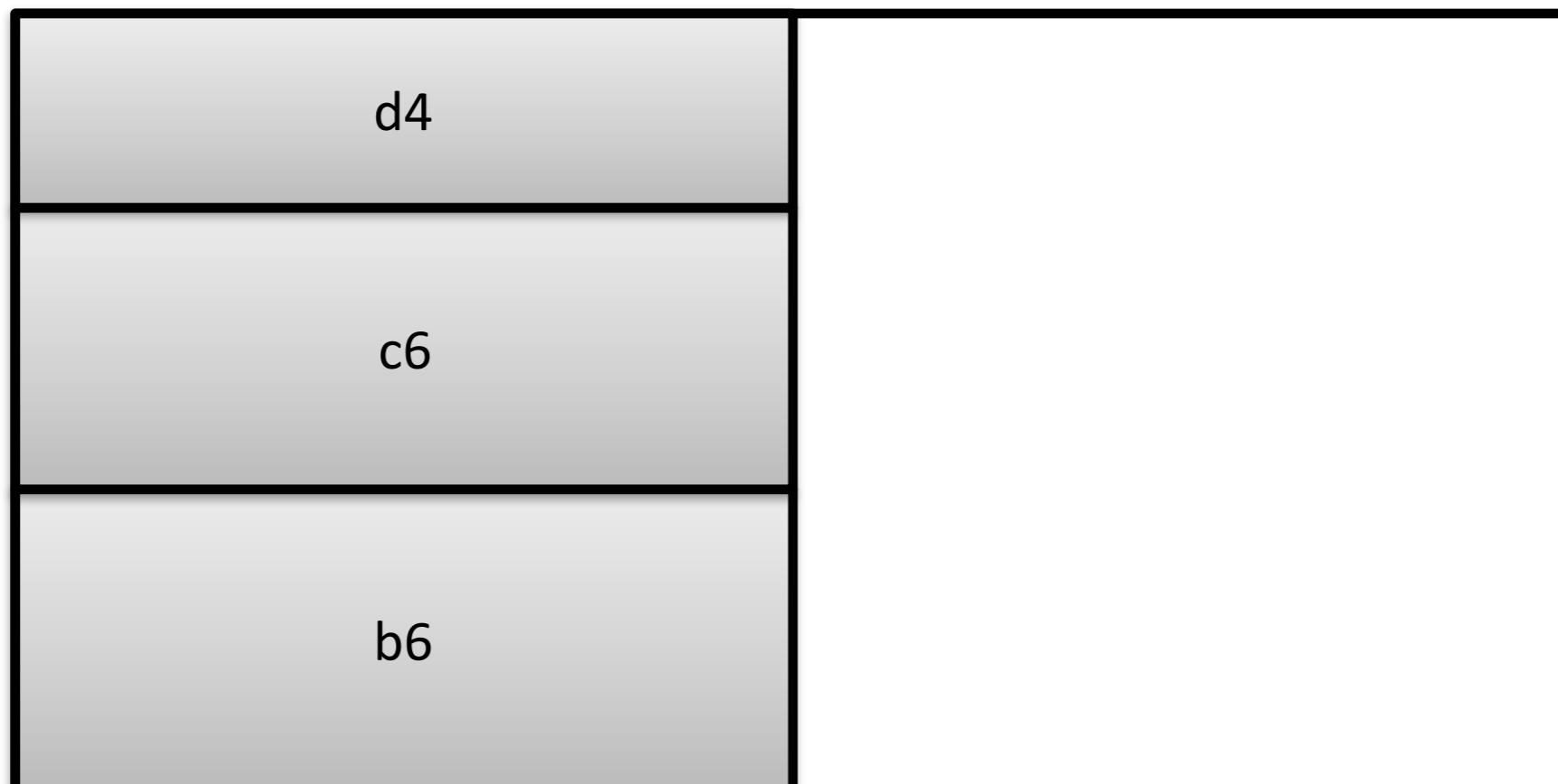
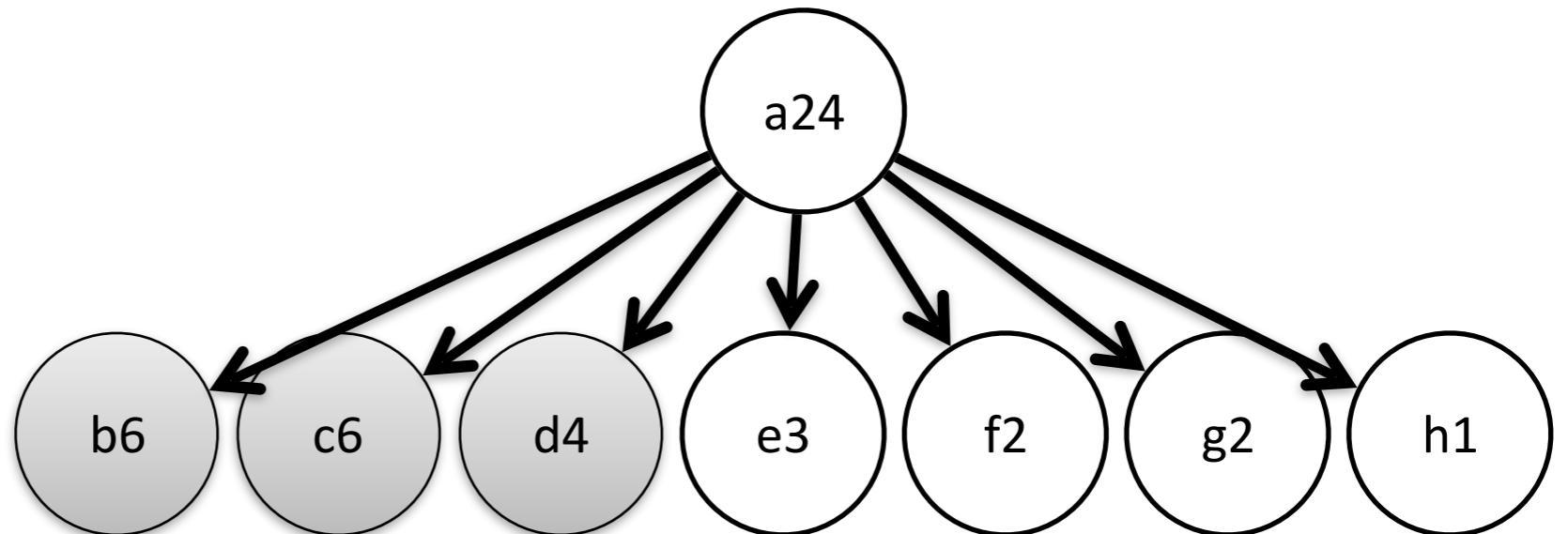
$$\text{Max(aspect ratio)} = 8/3 = 2,66$$

squarified



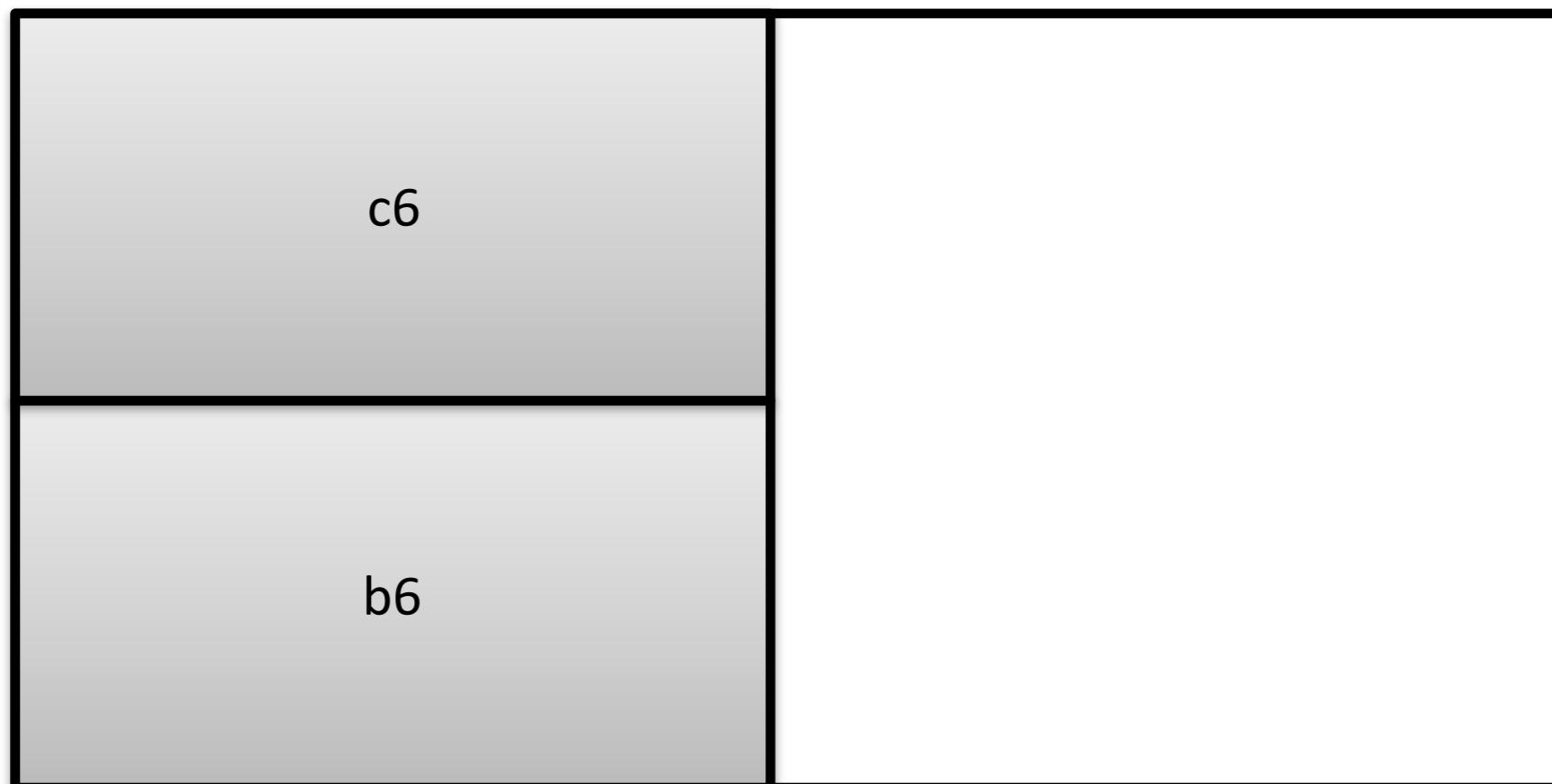
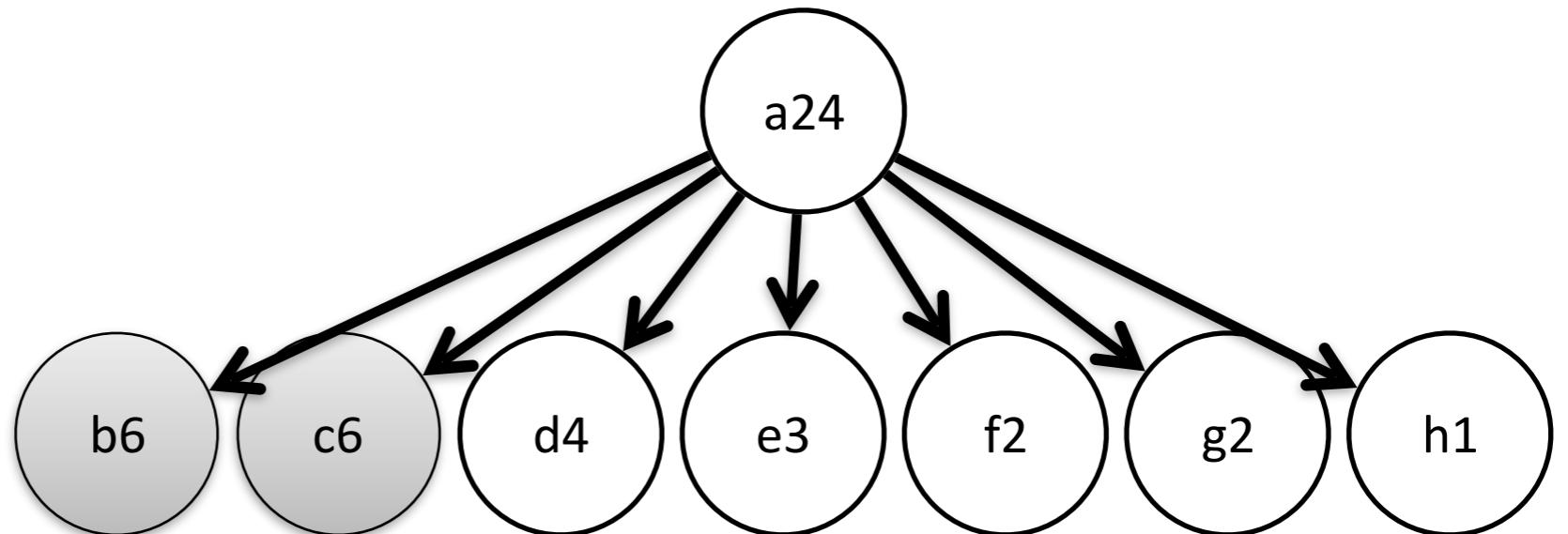
$$\text{Max}(aspect\ ratio) = 3/2 = 1,5$$

squarified



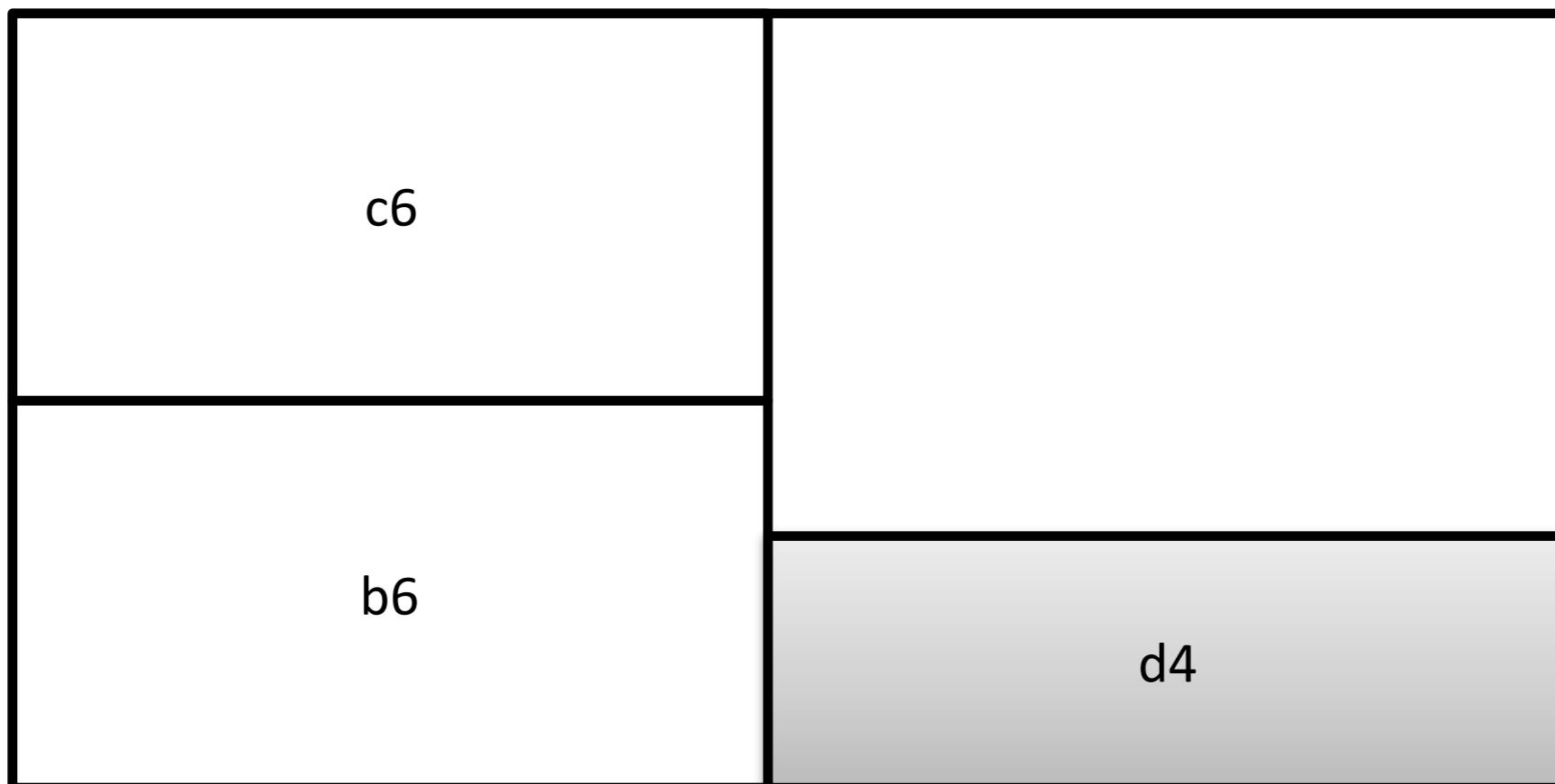
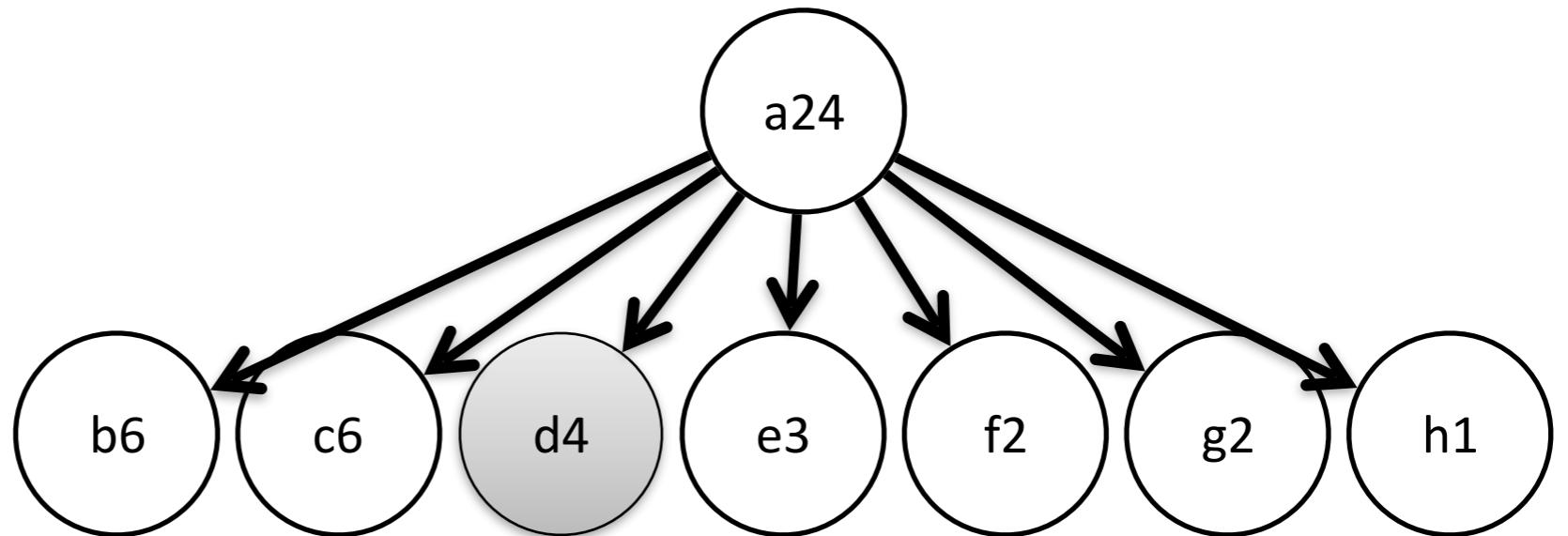
$$\text{Max(aspect ratio)} = 8/2 = 4$$

squarified



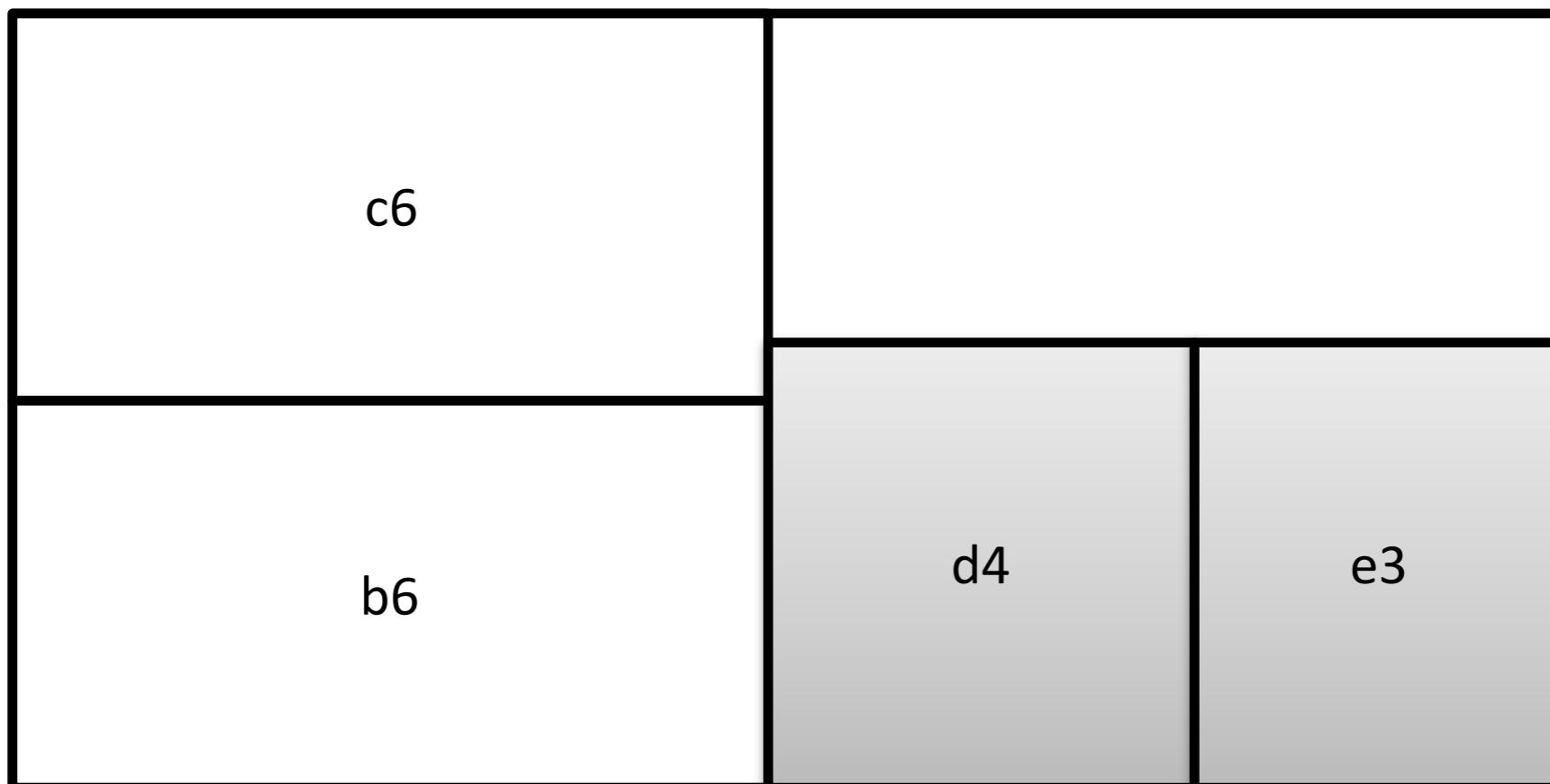
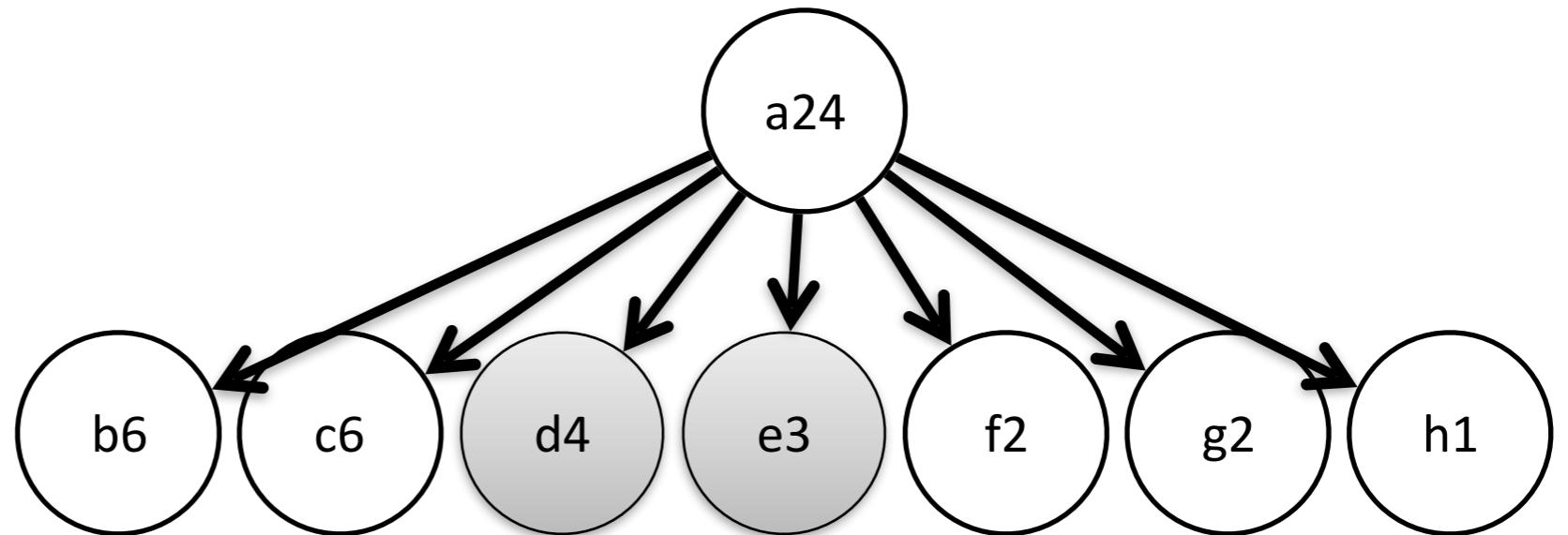
$$\text{Max(aspect ratio)} = 3/2 = 1,5$$

squarified



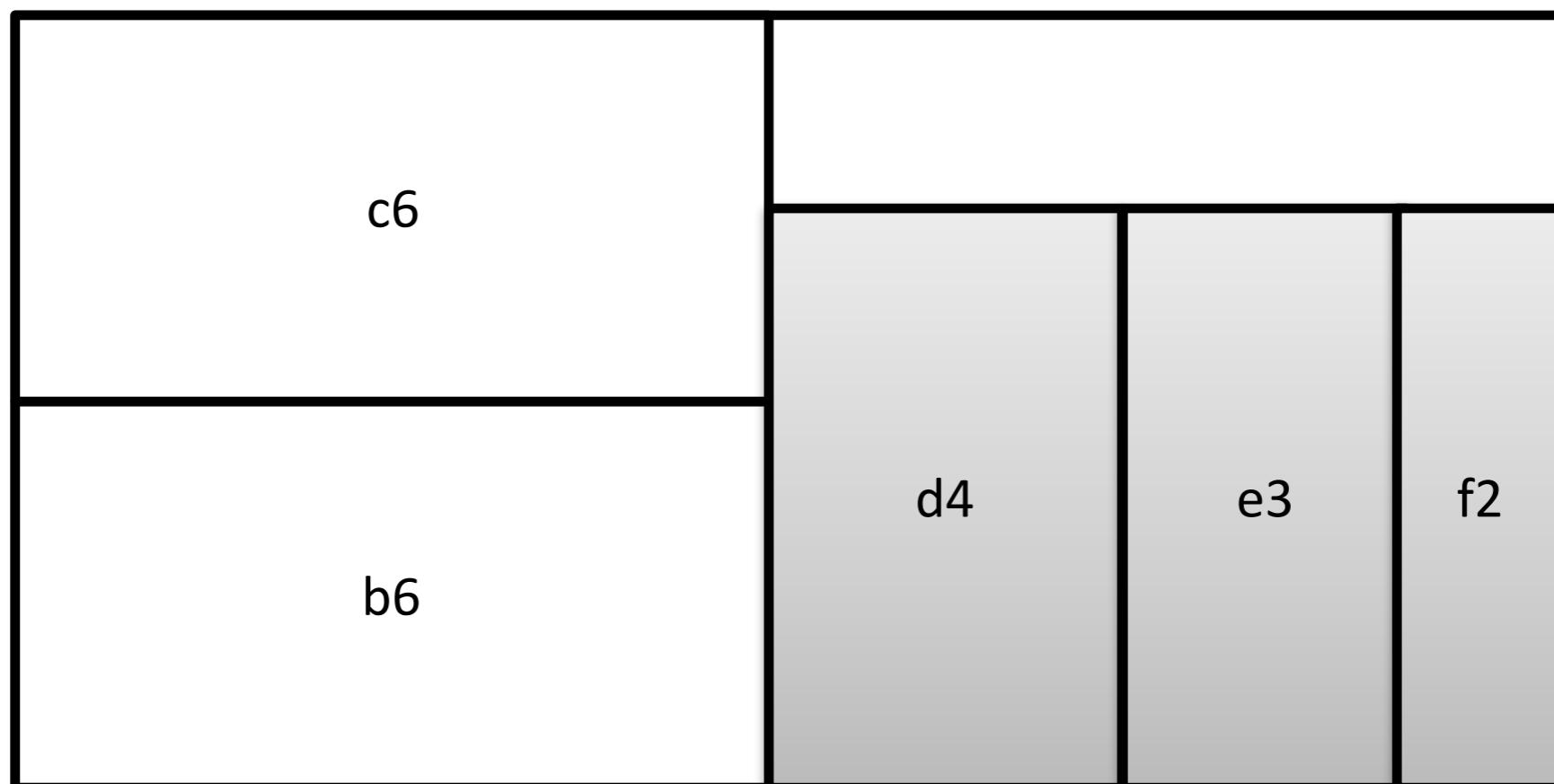
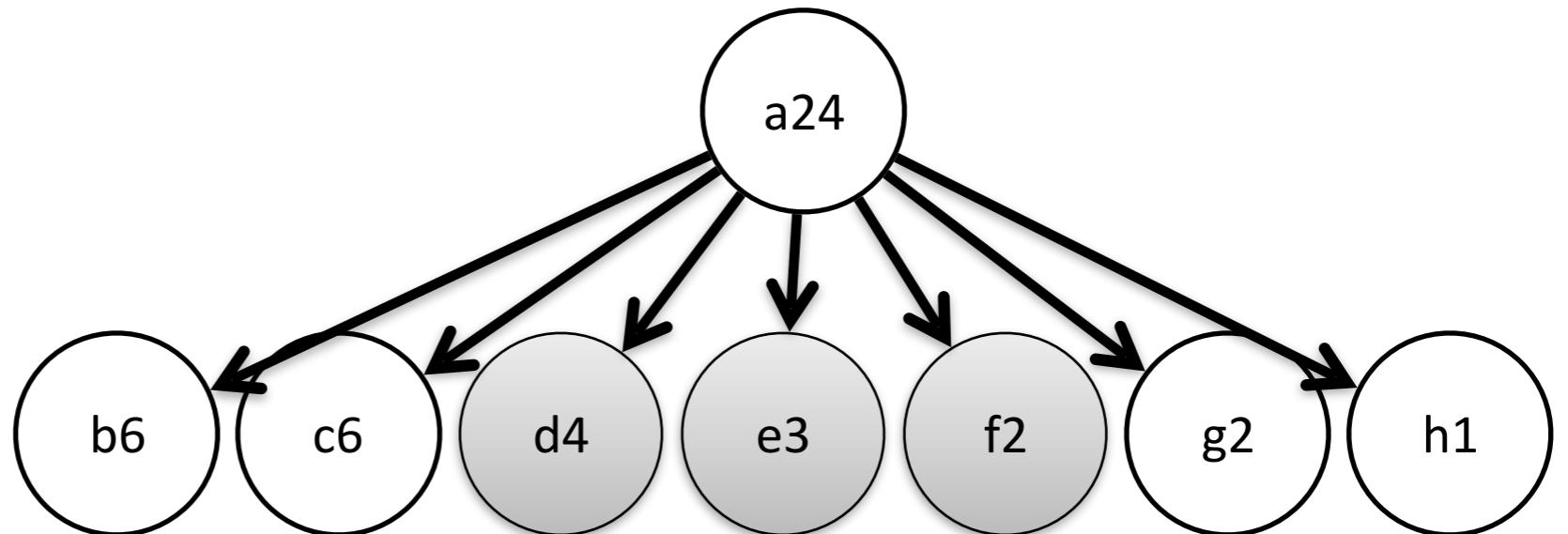
$$\text{Max(aspect ratio)} = 9/4 = 2,25$$

squarified



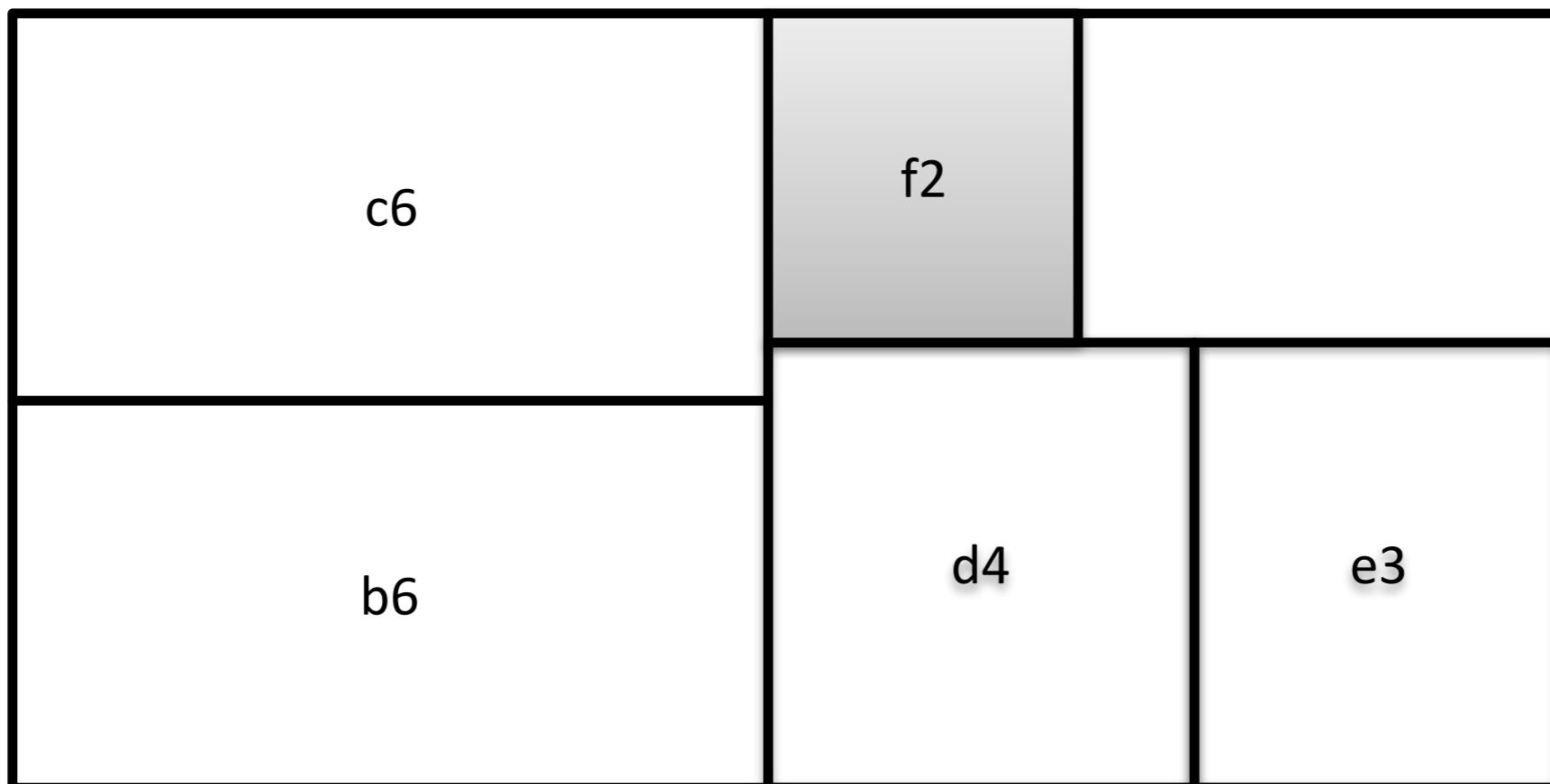
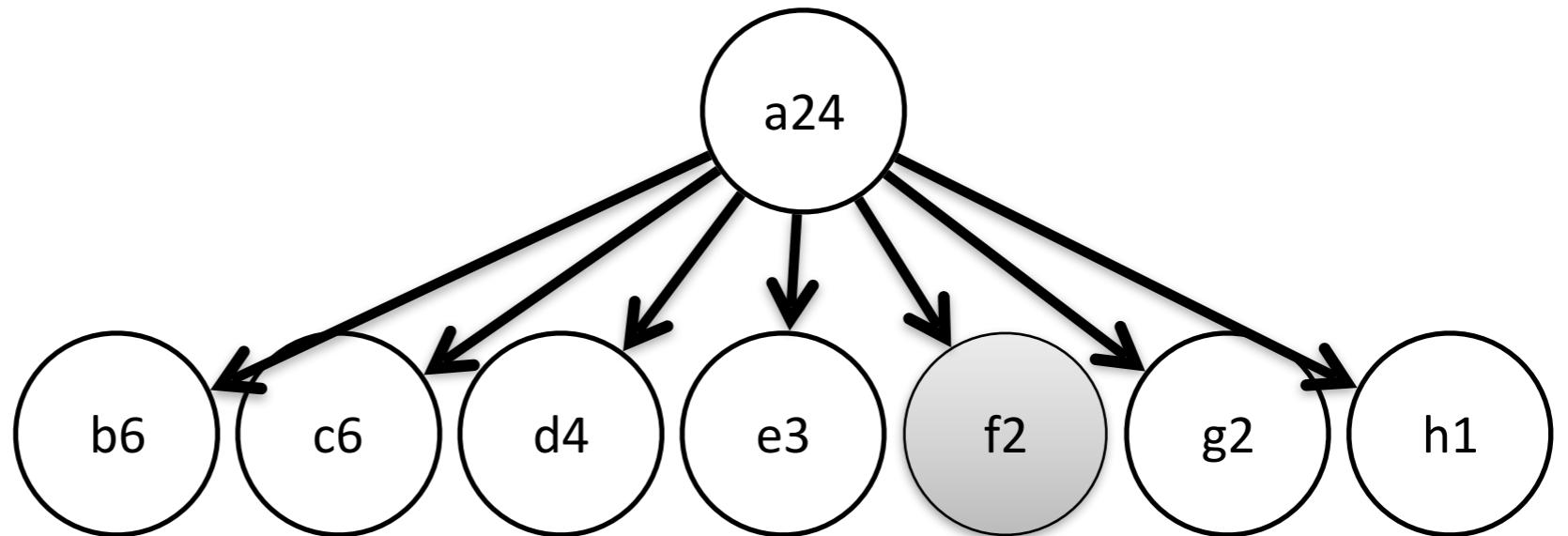
$$\text{Max(aspect ratio)} = 49/27 = 1,81$$

squarified



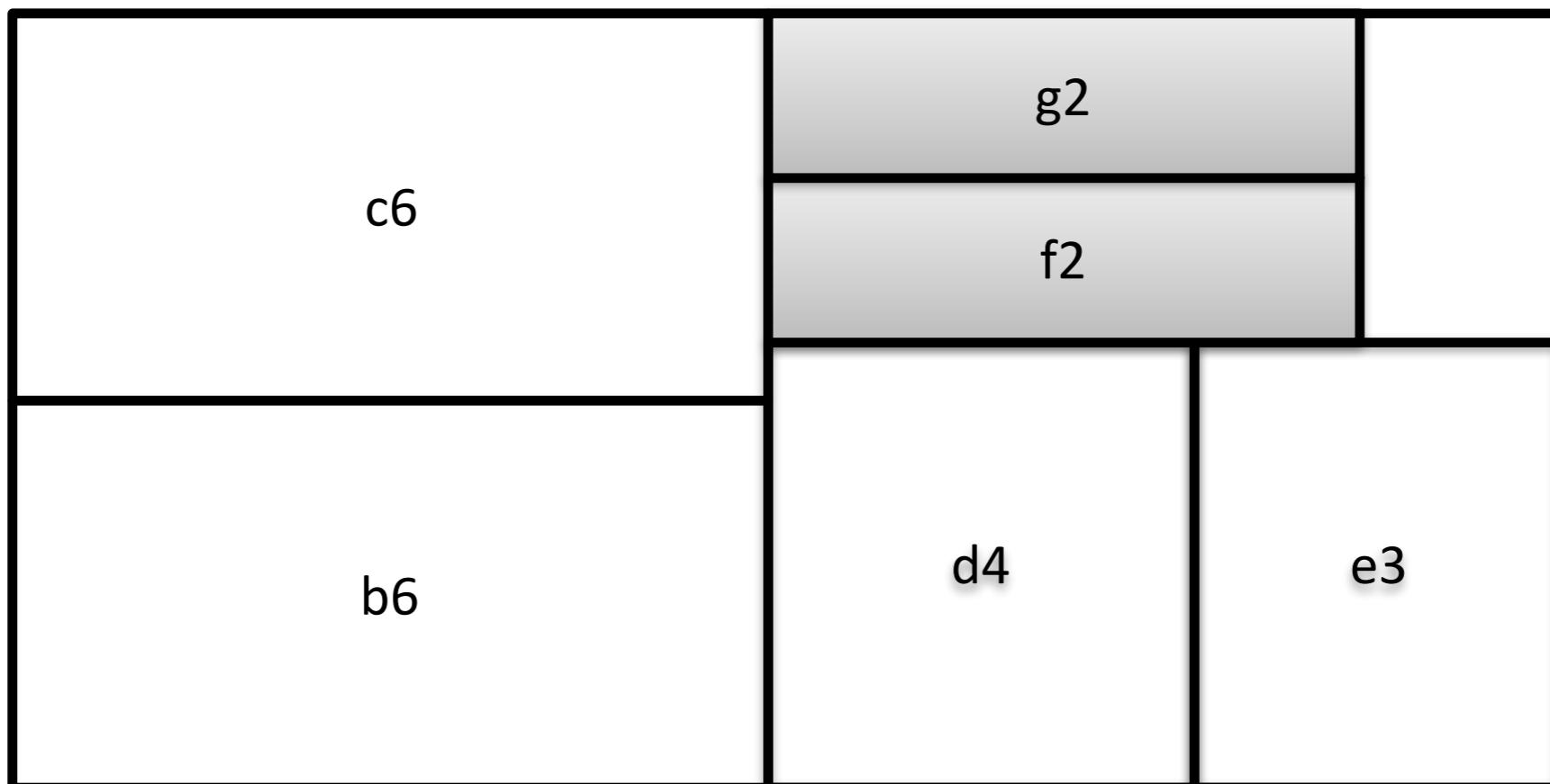
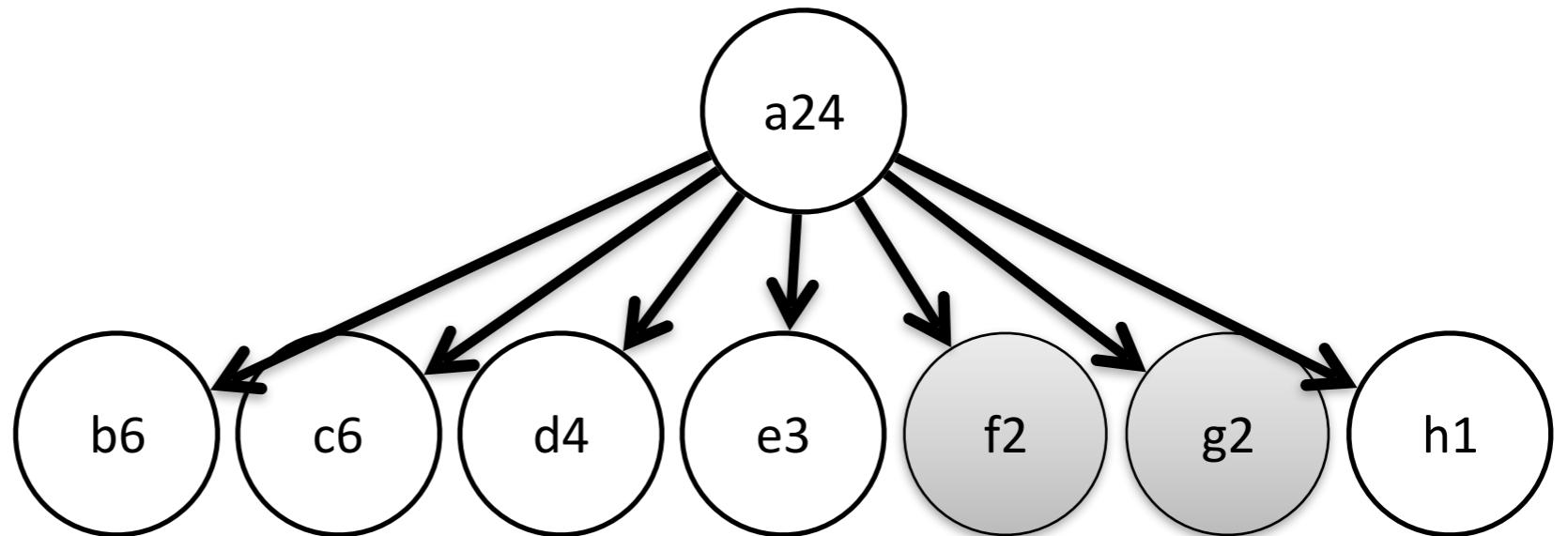
$$\text{Max(aspect ratio)} = 9/2 = 4,5$$

squarified



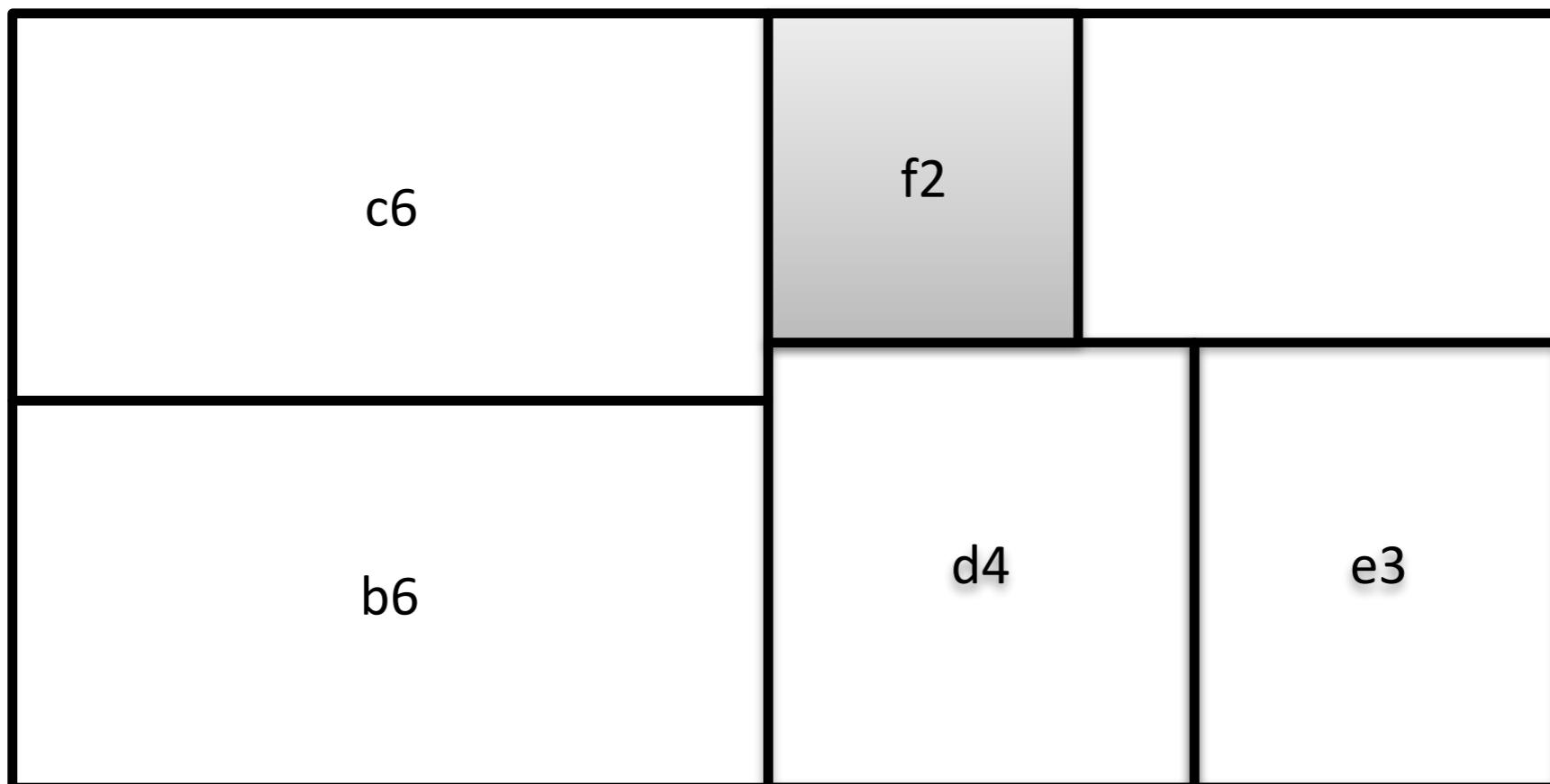
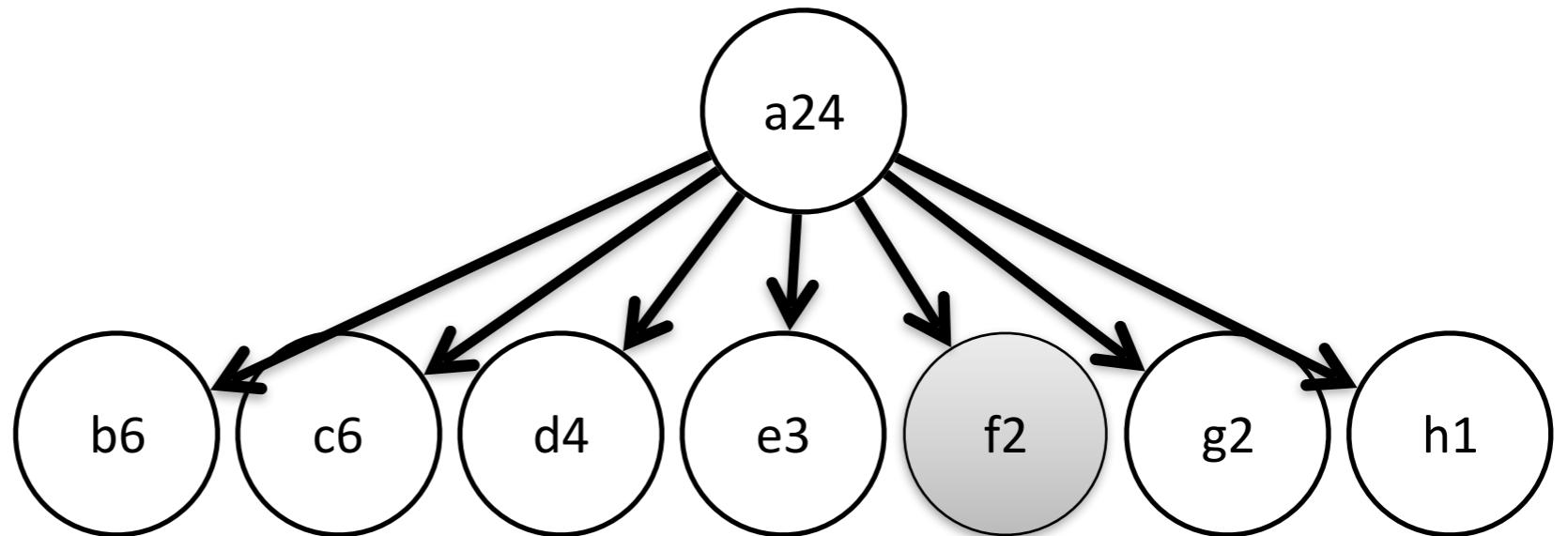
$$\text{Max(aspect ratio)} = 25/18 = 1,39$$

squarified



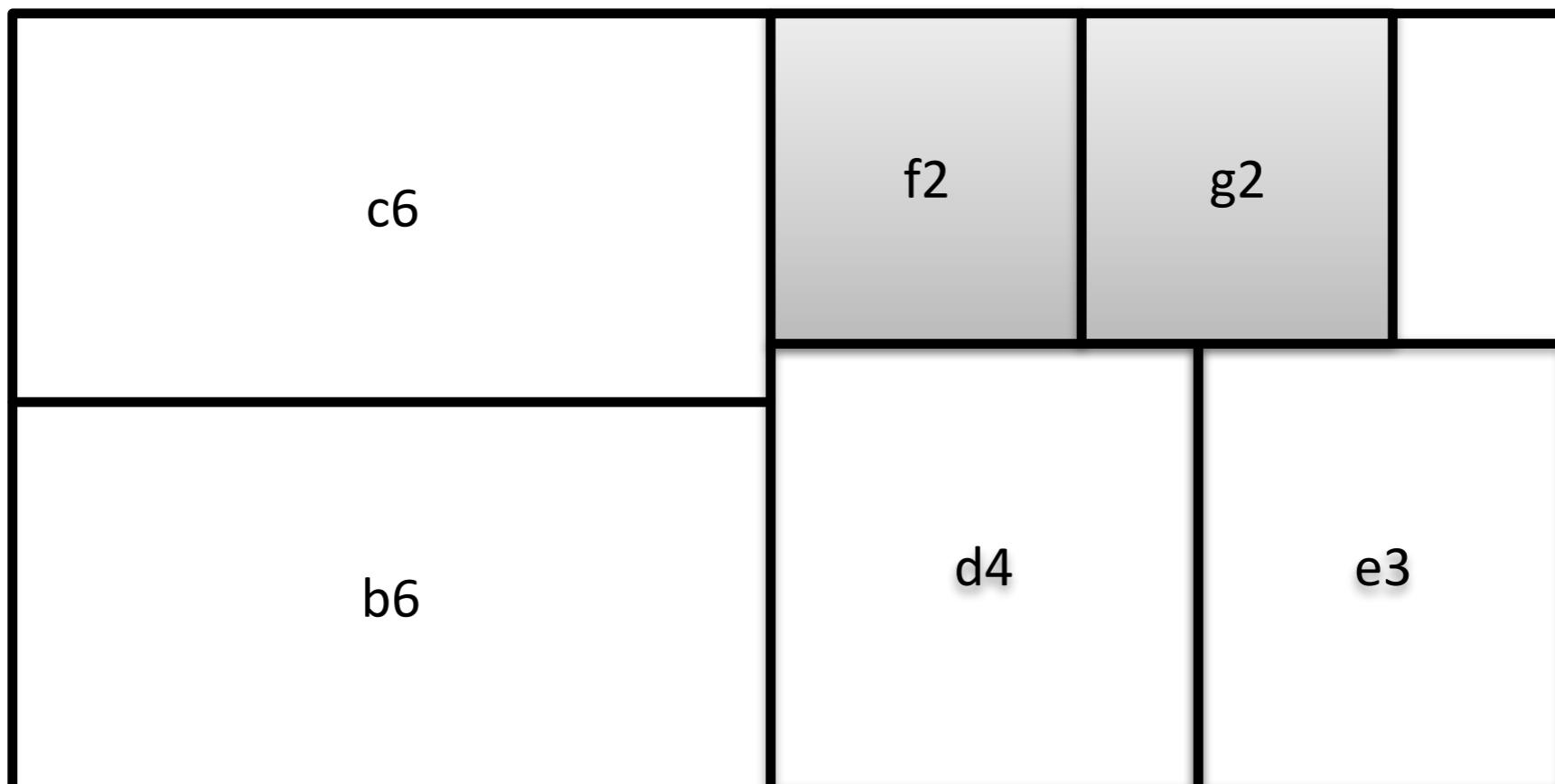
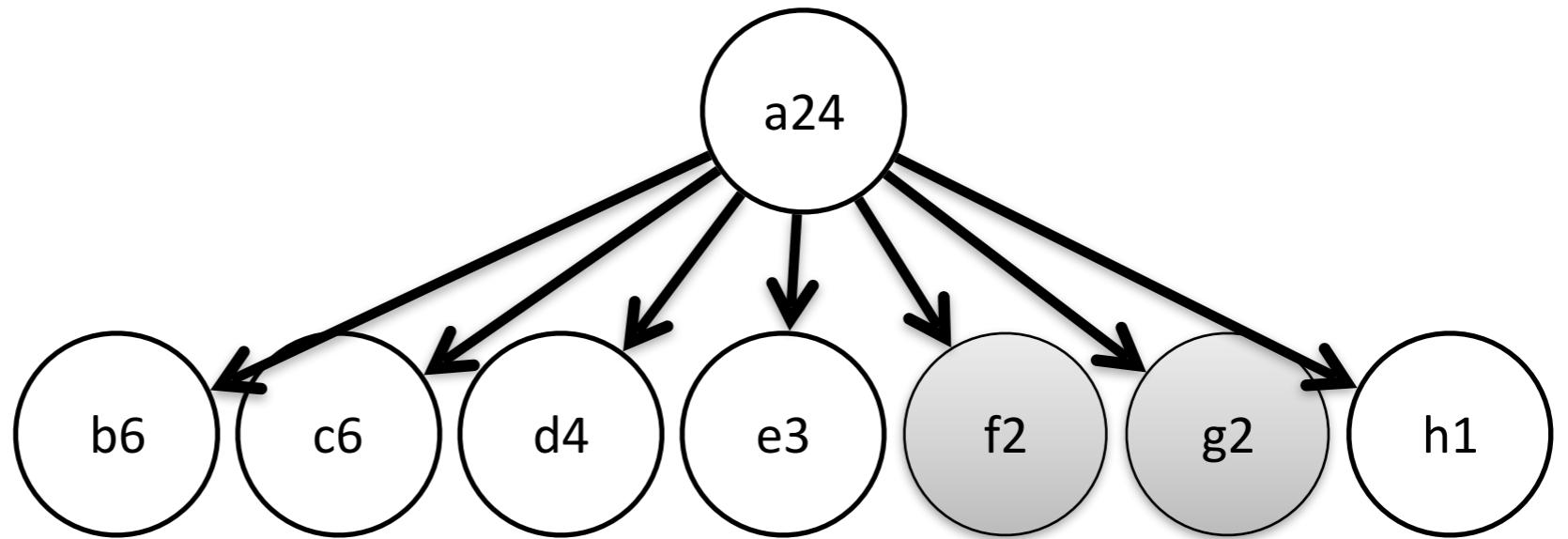
$$\text{Max(aspect ratio)} = 144/50 = 2,88$$

squarified



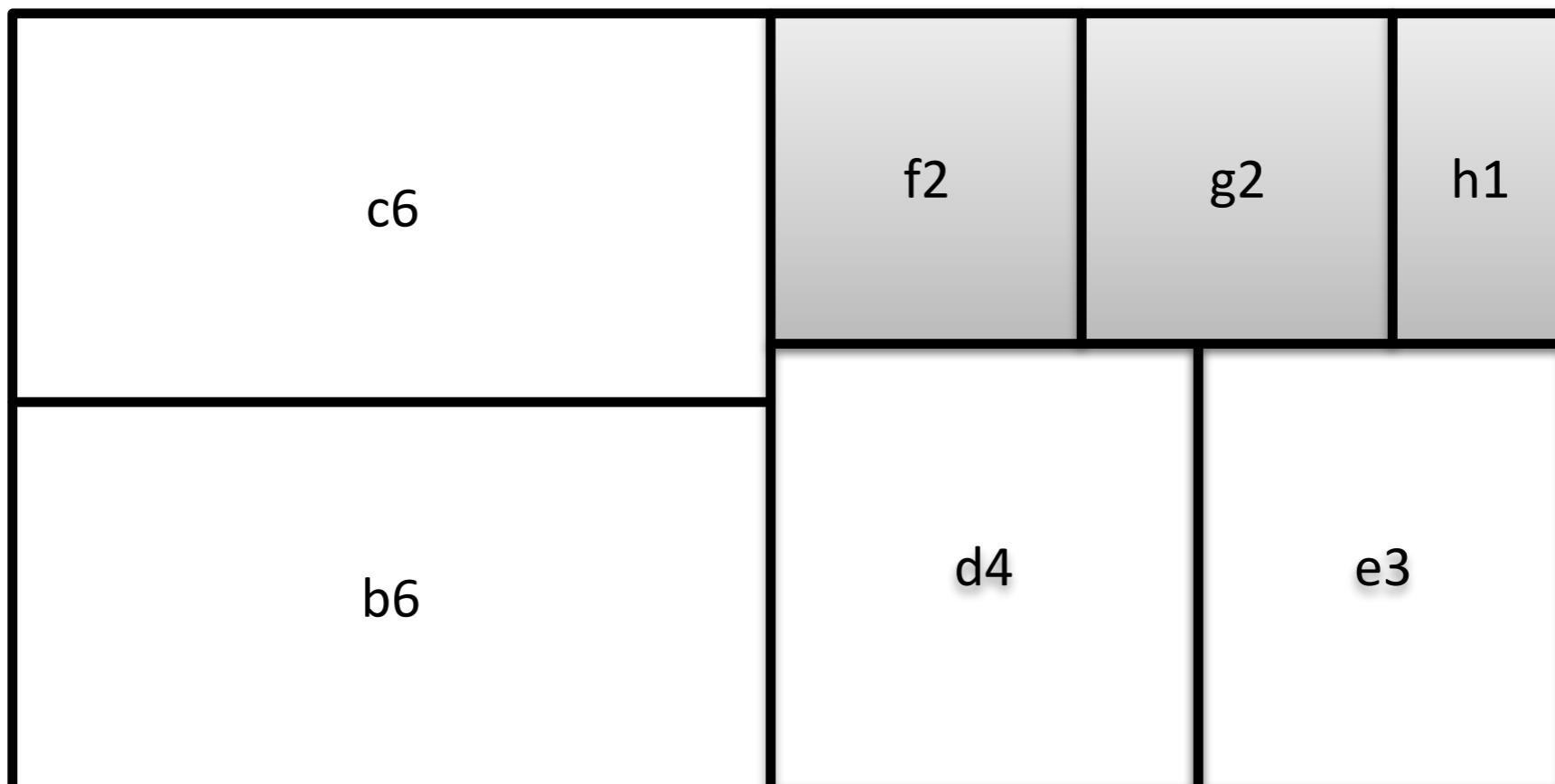
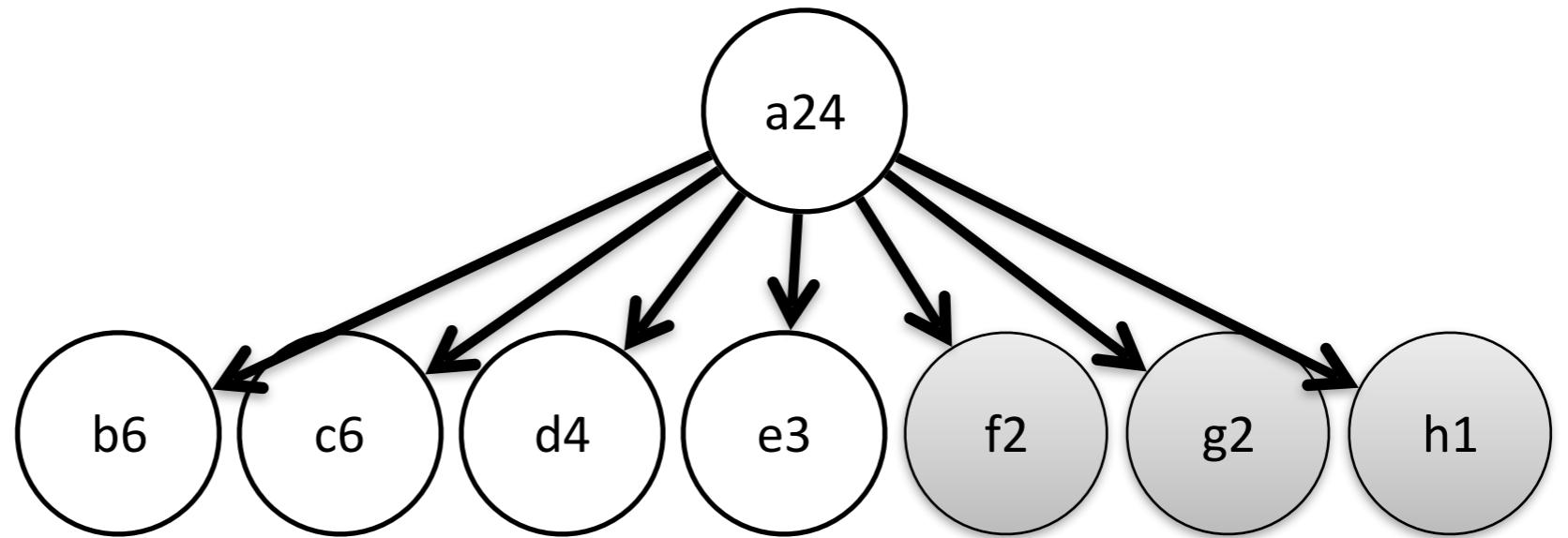
$$\text{Max(aspect ratio)} = 25/18 = 1,39$$

squarified



$$\text{Max(aspect ratio)} = 25/18 = 1,39$$

squarified



$$\text{Max(aspect ratio)} = 25/9 = 2,78$$

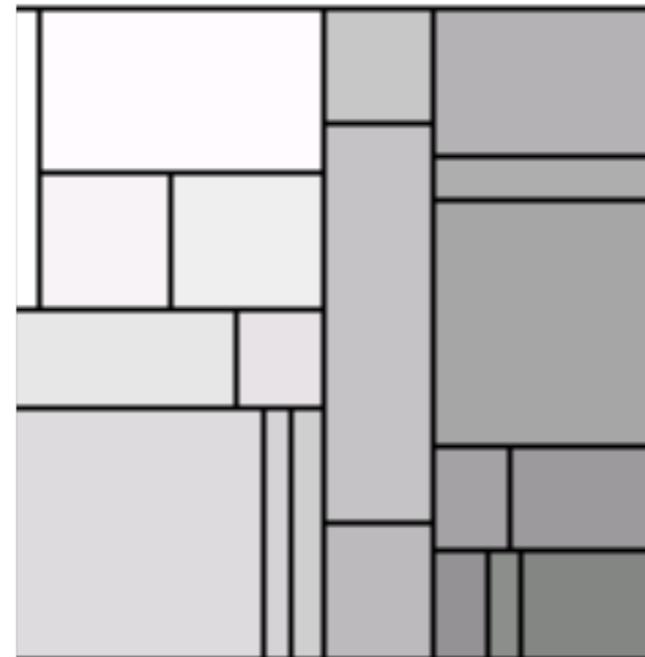
Desvantagens?

Pequenas mudanças nos dados podem provocar **mudanças radicais no desenho**

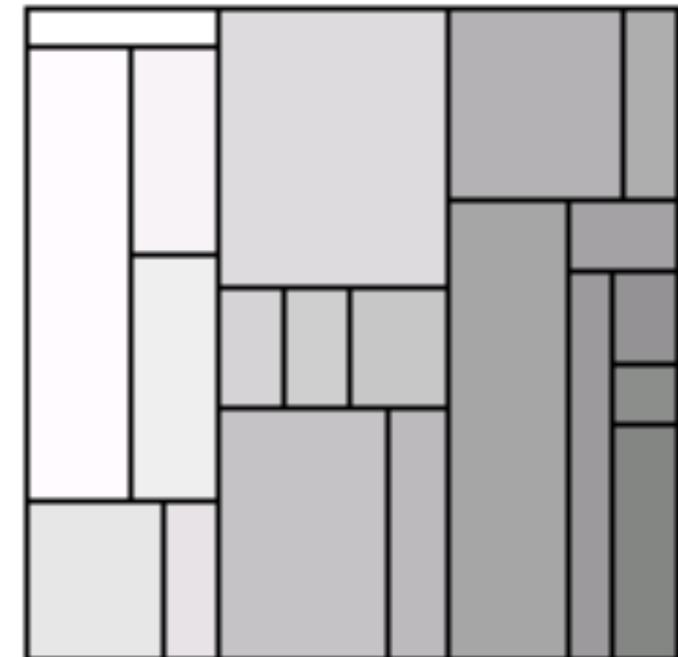
Perde a ordem da estrutura da árvore

ORDERED TREEMAP LAYOUTS

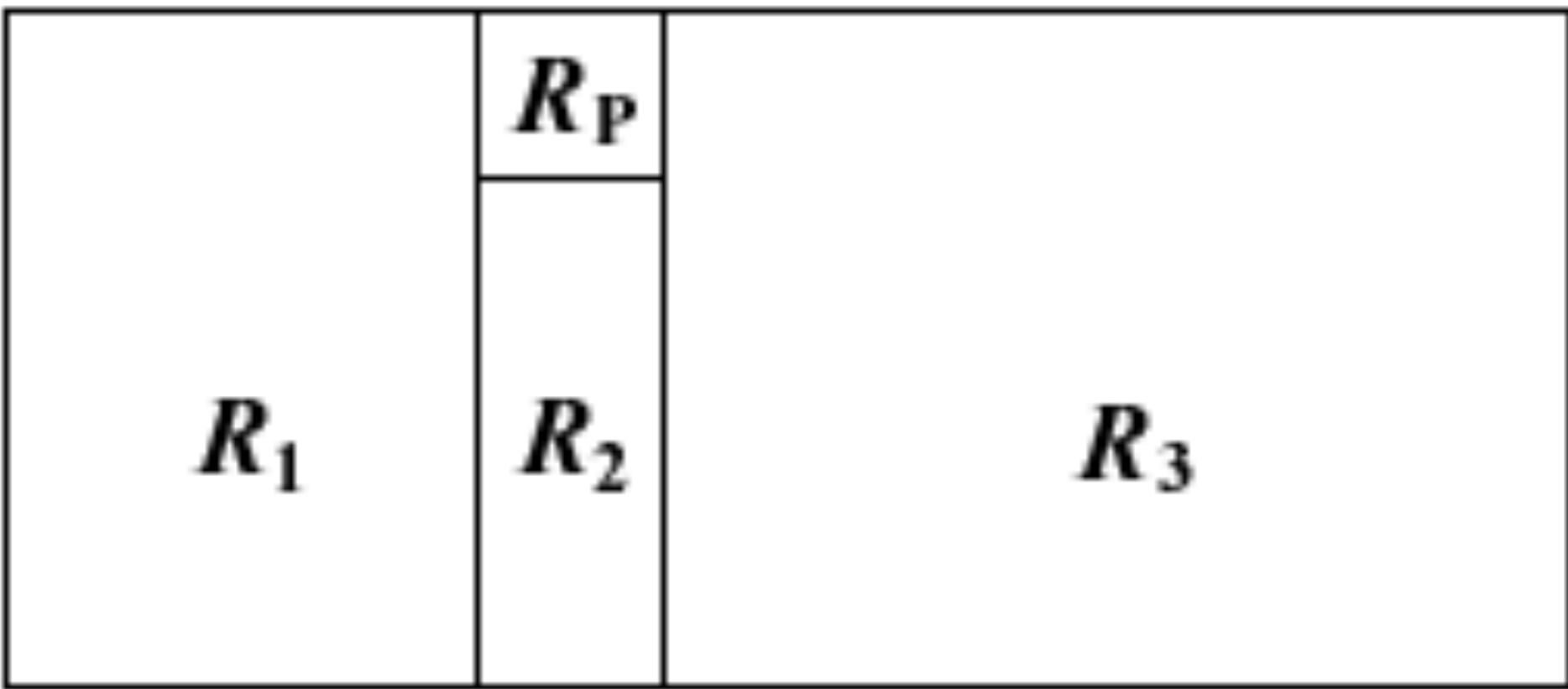
Pivot-by-middle



Pivot-by-size

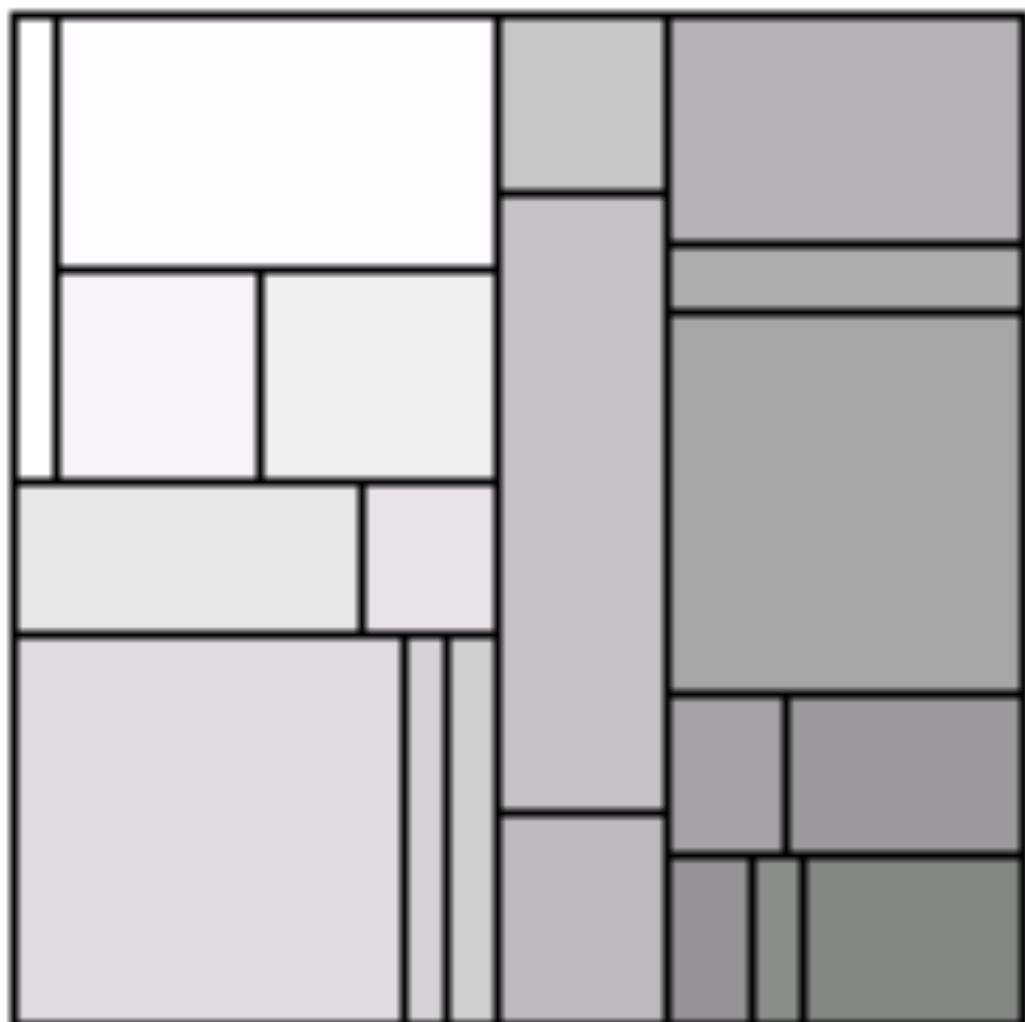


.....
*B. Schneiderman e M. Wattenberg
IEEE Information Visualization
2001*

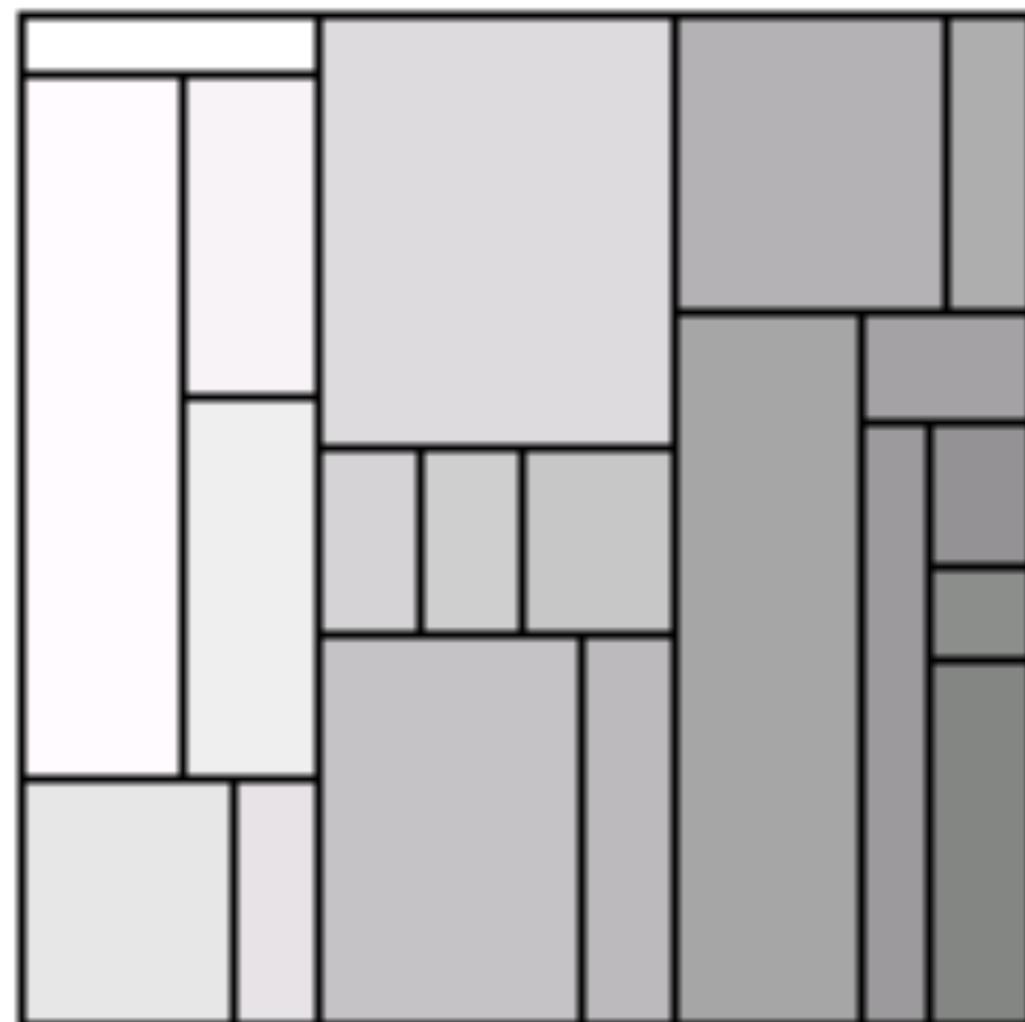


1. Escolha um pivot (maior área, valor intermediário, etc)
2. Posicione o pivot na maior base, criando os retângulos R_1 , R_2 e R_3
3. Divida os itens em listas L_1 , L_2 e L_3 a serem colocadas em R_1 , R_2 e R_3 . L_1 contém os itens anteriores ao pivot e L_2 e L_3 , os posteriores. L_1 e L_3 podem ser vazias.
4. Posicione L_1 , L_2 e L_3 recursivamente com o mesmo algoritmo

Pivot-by-middle

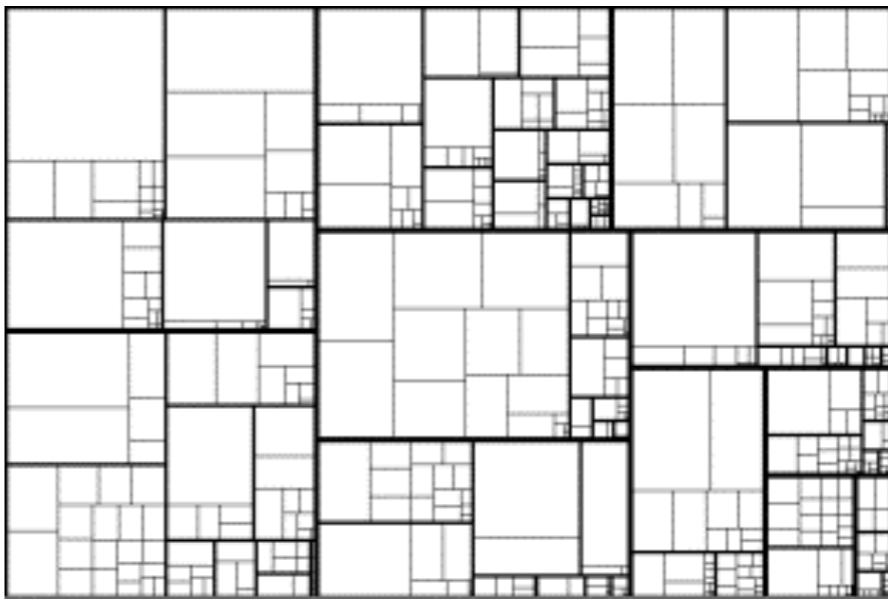


Pivot-by-size

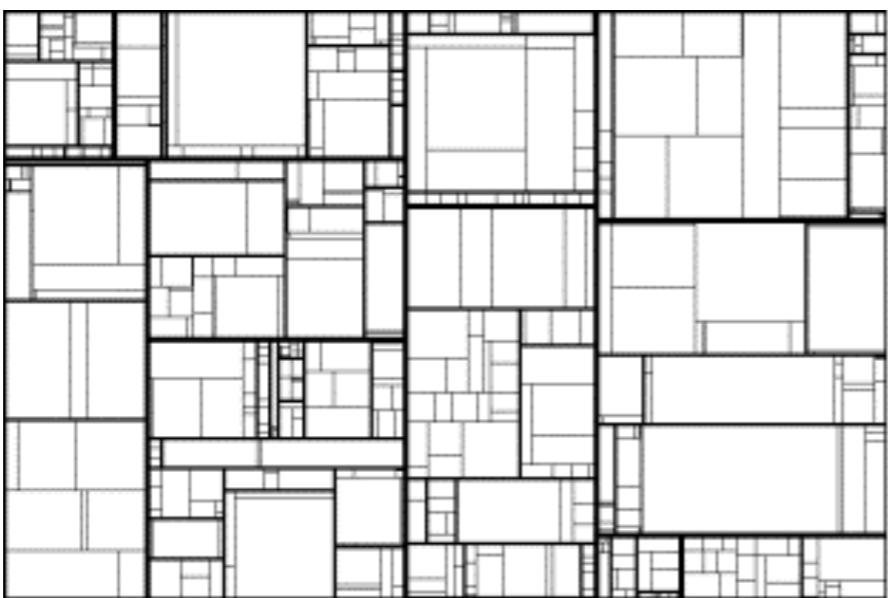




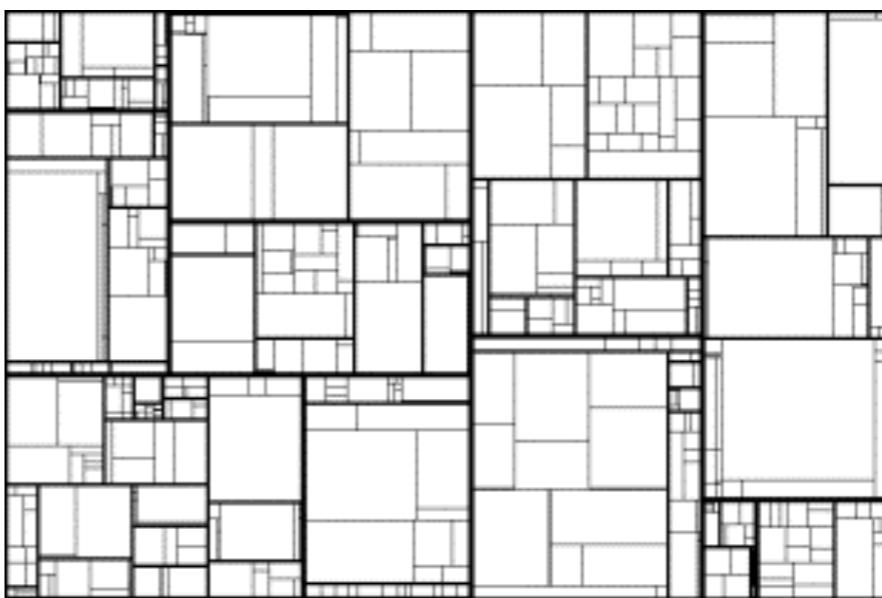
slide-and-dice



squarified



pivot by middle



pivot by size

Dynamic treemap layout comparison

- Martin Wattenberg, w@bewitched.com
- Ben Bederson, (University of Maryland, [Human-Computer Interaction Lab](#))

[Continue](#)

[Start over](#)

Type of change:

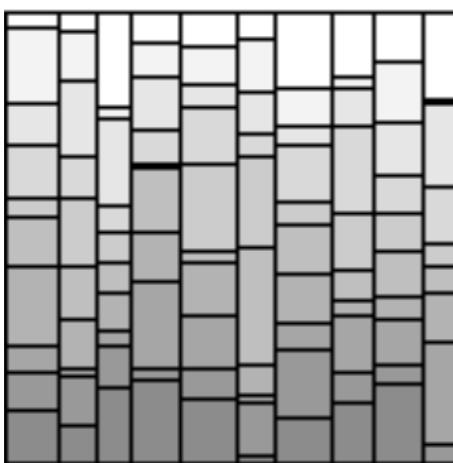
Color by order

10 x 10 ▾

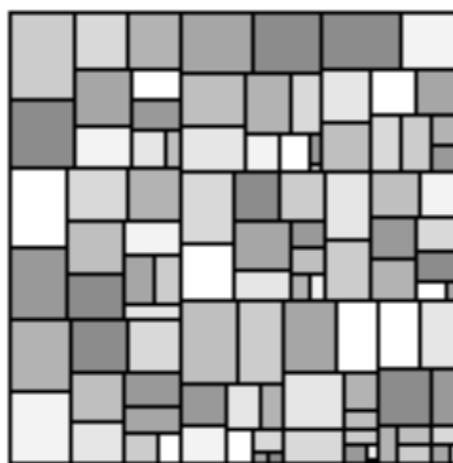
Random walk

Sine waves

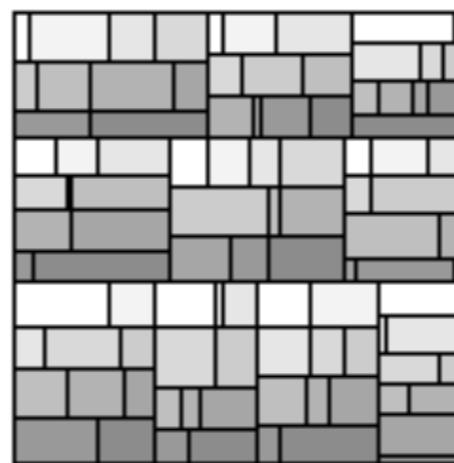
Slice-and-dice



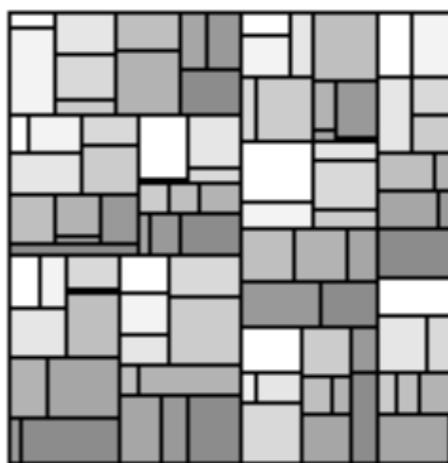
Squarified



StripTreemap



Pivot by Split Size



Avg. Aspect = 2.39

Avg. Aspect = 1.57

Avg. Aspect = 2.06

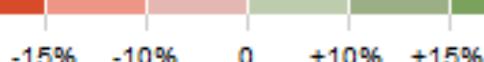
Avg. Aspect = 2.3

Obama's 2012 Budget Proposal: How \$3.7 Trillion is Spent

Explore every nook and cranny of President Obama's budget proposal.

RELATED ARTICLE
[Obama Budget Pivots From Stimulus to Deficit Cuts](#)

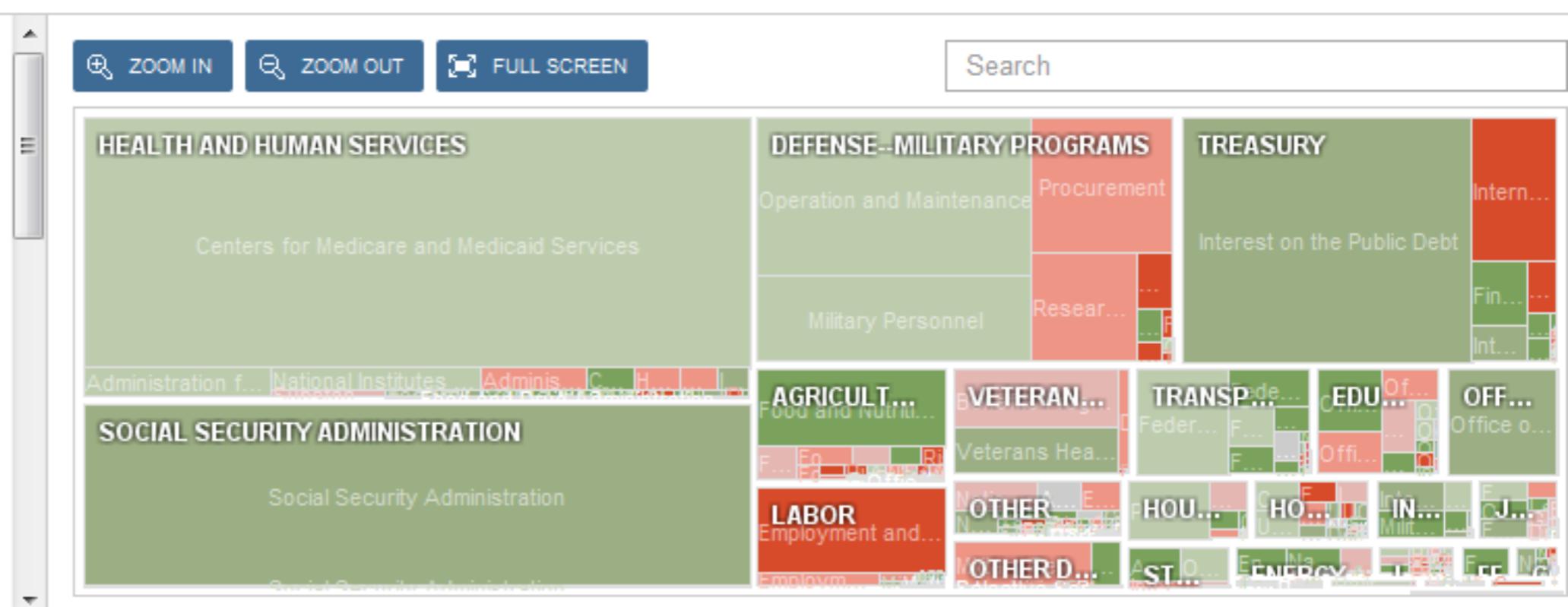
Rectangles are sized according to the proposed spending. Color shows severity of cut or increase from 2010.



The president has proposed a five-year freeze of discretionary spending, excluding national security spending. This type of spending accounts for about one fifth of all spending.

[Isolate discretionary spending.](#)

Mandatory spending, which includes entitlement programs like Medicare and Social Security, is expected to continue to

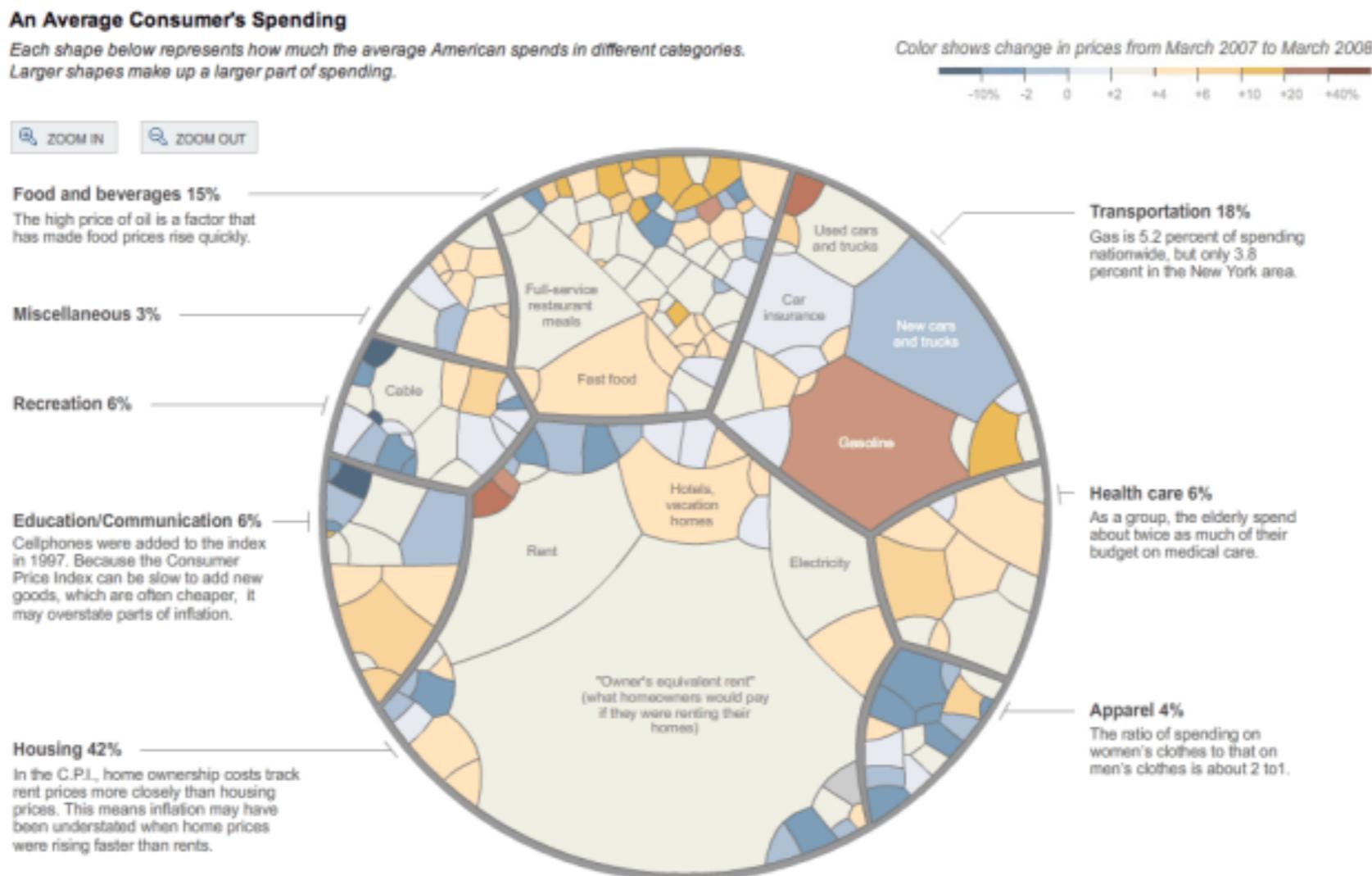


Published: February 14, 2011 | By SHAN CARTER and AMANDA COX | Source: Office of Management and Budget

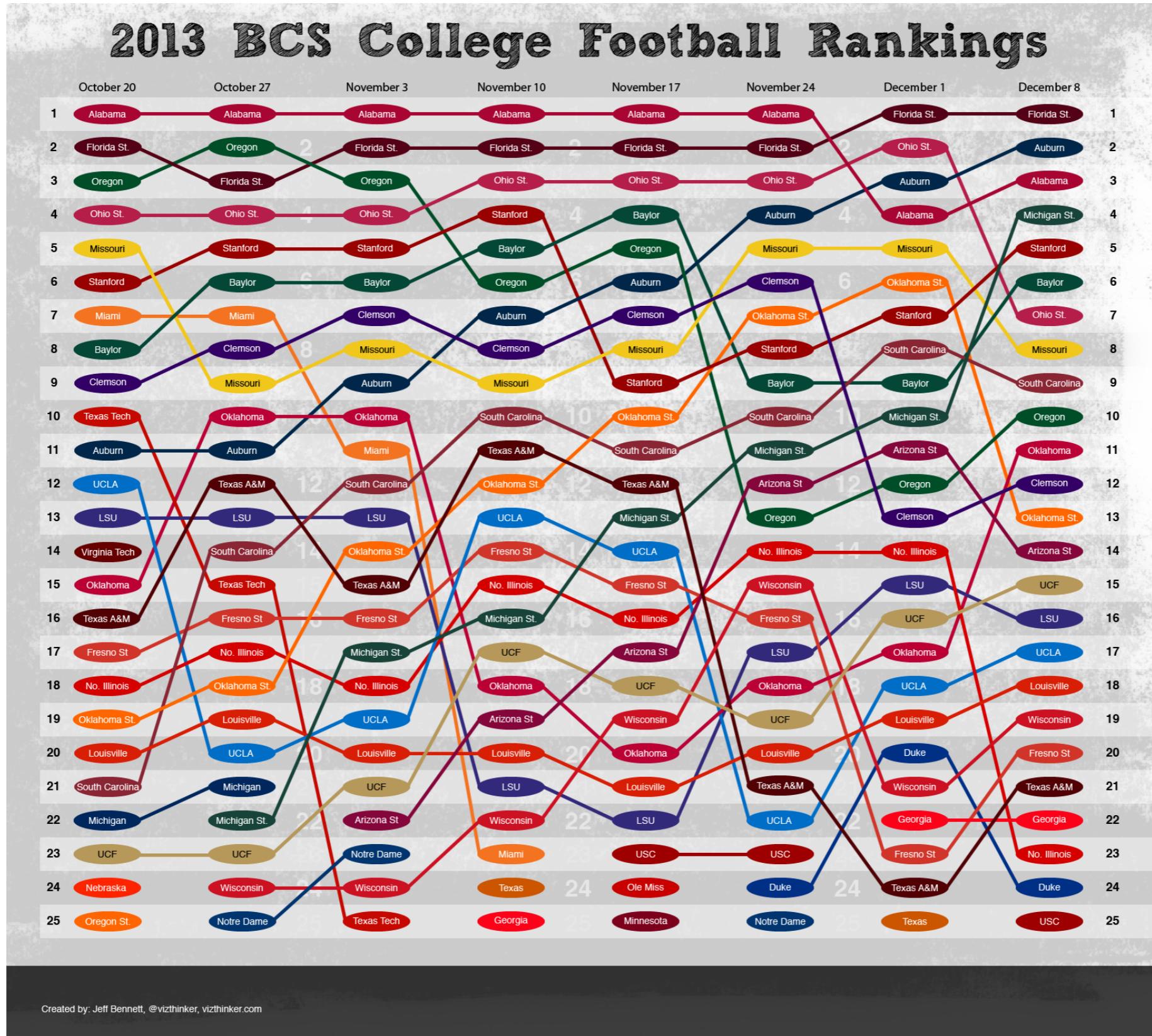
[TWITTER](#) | [FACEBOOK](#)

Cuidado com variações perigosas

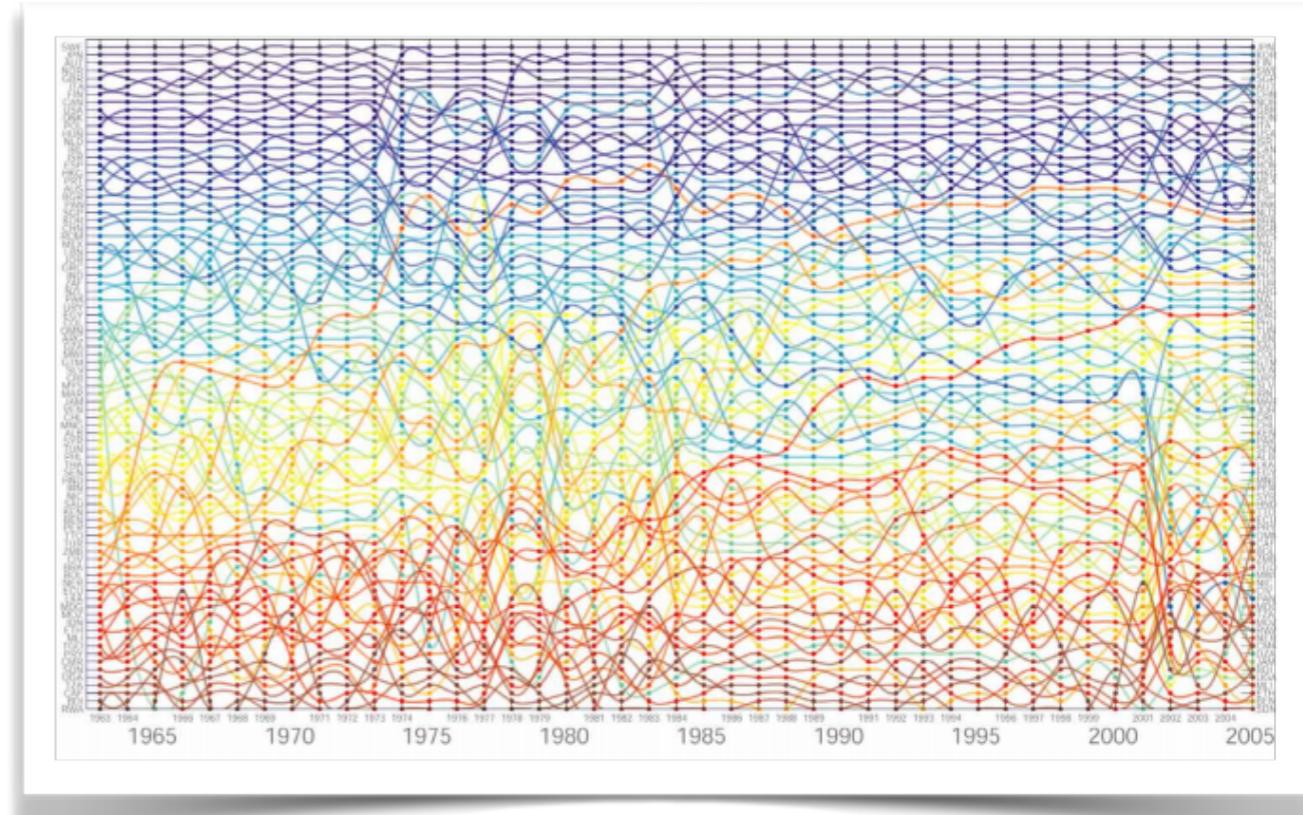
Qual a vantagem de se usar células de Voronoi?



BUMPCHART



THE BUILDING BLOCKS OF ECONOMY COMPLEXITY



C.A. Hidalgo e R. Hausman
Proceedings of the National Academy of Sciences
2009

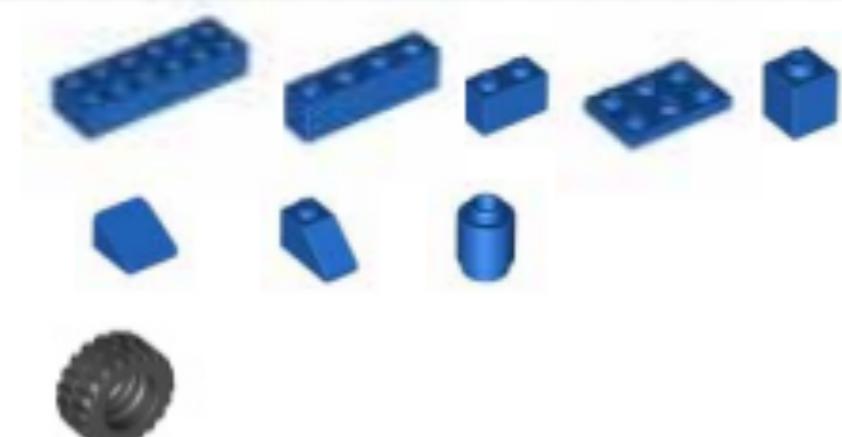
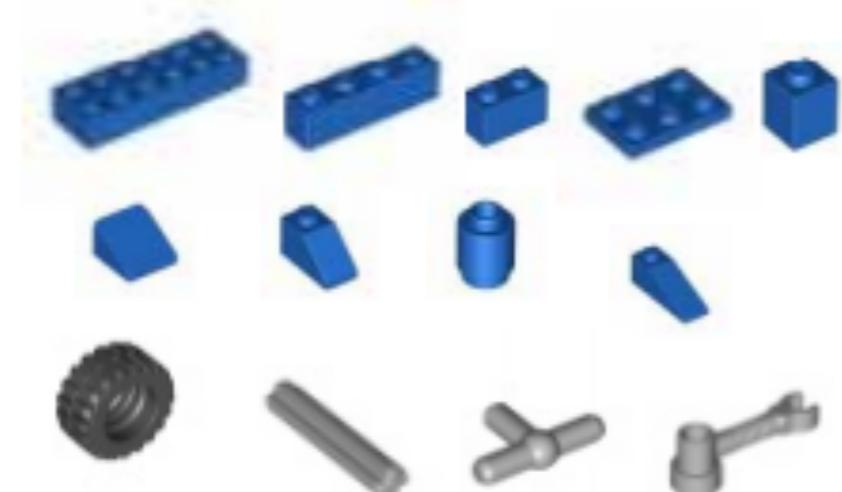
“

“Assim, o mercador ou comerciante, movido apenas pelo seu próprio interesse egoísta, é levado por uma mão invisível a promover algo que nunca fez parte do interesse dele: o bem-estar da sociedade”

-Adam Smith

Teórico do liberalismo econômico e estudioso da causa da riqueza das nações

Segundo Adam Smith, a riqueza das nações está associada à divisão de trabalho e a especialização e a complexidade que emergem da economia

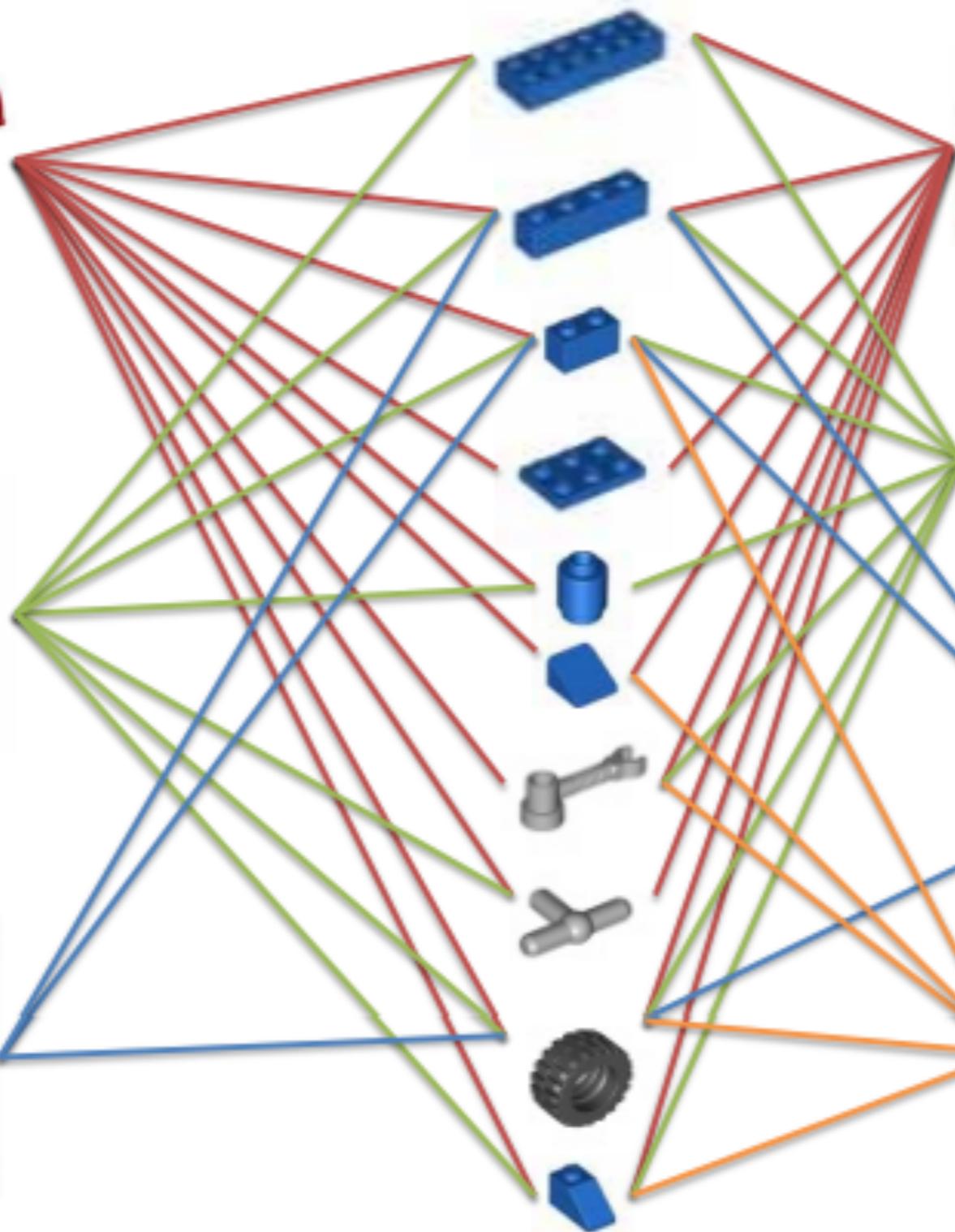




Countries



Capabilities



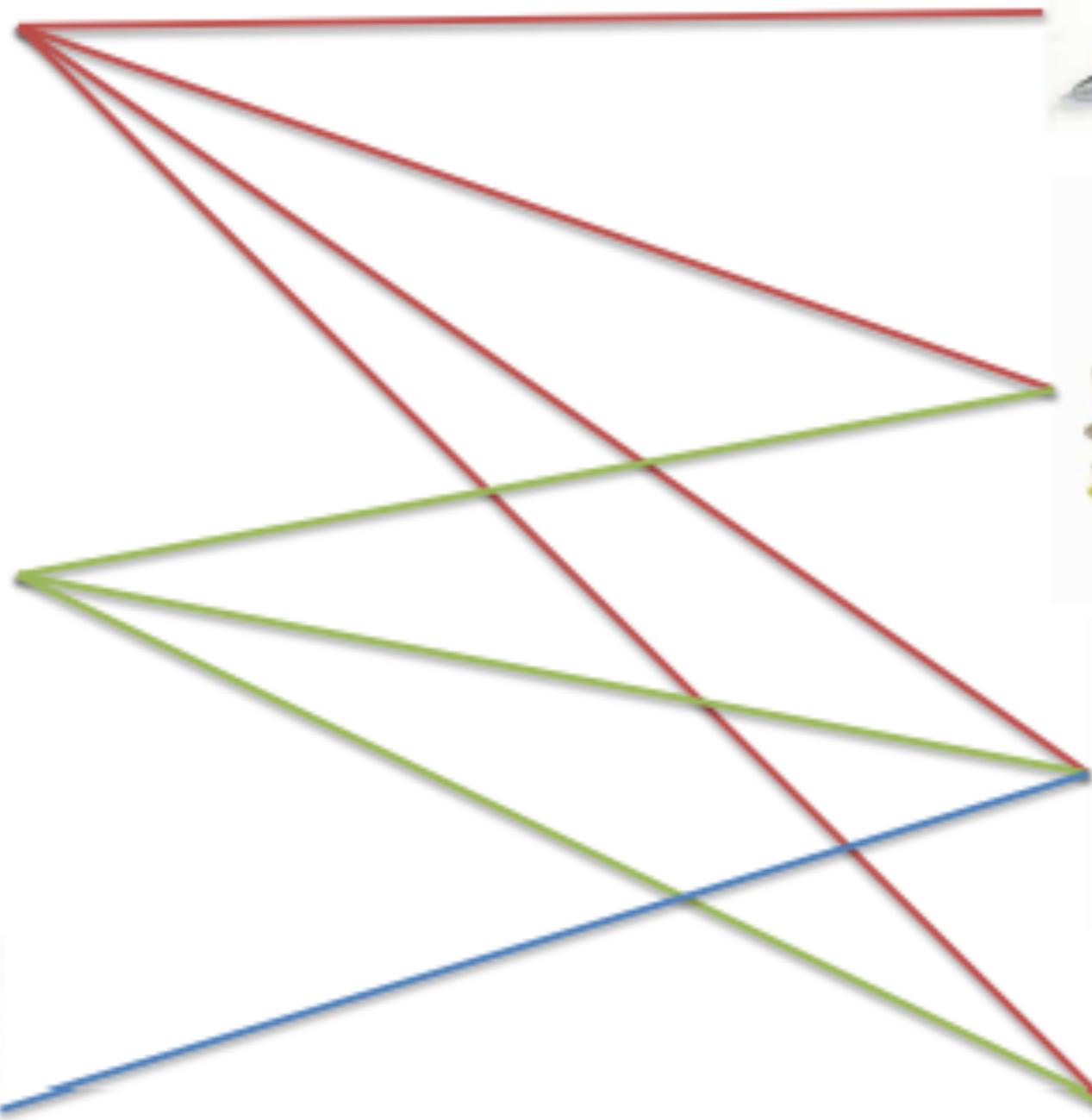
Products



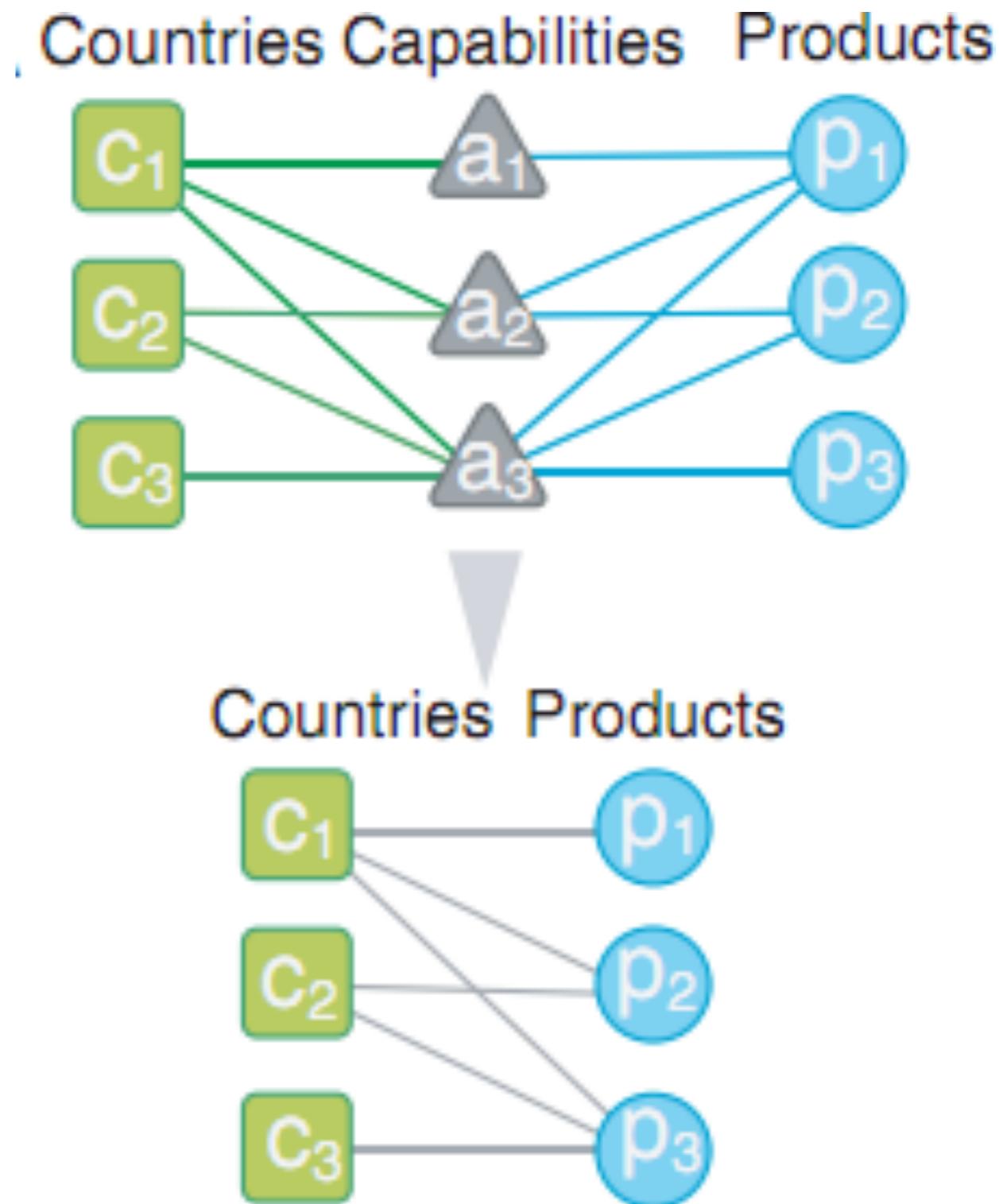
Countries



Products



Um grafo bipartido é um grafo cujos nós podem ser separados em dois conjuntos, ou partições, sendo que todas as arestas conectam nós em partições diferentes



1.- A Country



2.- with a great diversity of Legos (capabilities)



3.- Can make many products





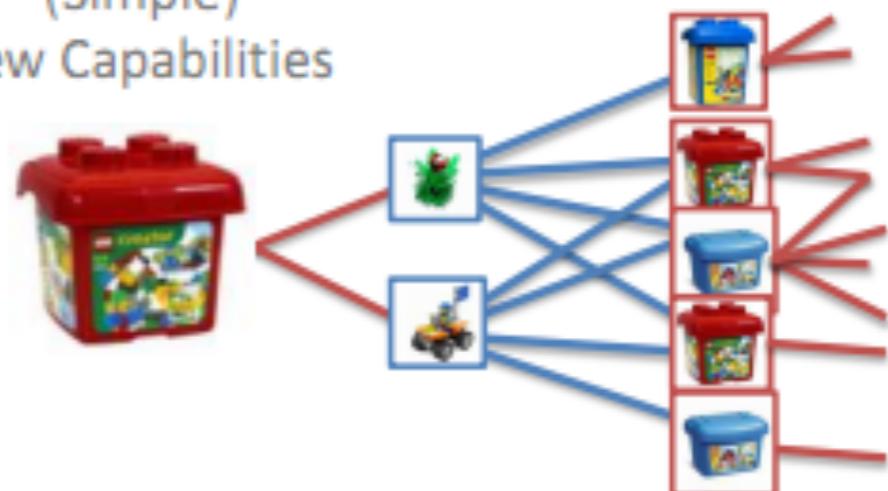
In Lego Language



In Network Language

$$k_{c,0} = \sum_p M_{cp} \quad , \quad k_{p,0} = \sum_c M_{cp}$$
$$k_{c,n} = \frac{1}{k_{c,0}} \sum_p M_{cp} k_{p,n-1} \quad , \quad k_{p,n} = \frac{1}{k_{p,0}} \sum_c M_{cp} k_{c,n-1}$$

(Simple)
Few Capabilities



(Complex)
Diverse Set
of Capabilities



$$k_{c,0} = \sum_p M_{cp} \quad , \quad k_{p,0} = \sum_c M_{cp}$$

$$k_{c,n} = \frac{1}{k_{c,0}} \sum_p M_{cp} k_{p,n-1} \quad , \quad k_{p,n} = \frac{1}{k_{p,0}} \sum_c M_{cp} k_{c,n-1}$$

Reflexão	Tipo	Descrição
K _{c,0}	Diversificação	Número de produtos exportados por c
K _{p,0}	Ubiquidade	Números de países exportadores de p
K _{c,1}	Ubiquidade	Ubiquidade média dos produtos exportados por c
K _{p,1}	Diversificação	Diversificação média dos países exportadores de p
K _{c,2}	Diversificação	Diversificação média dos países com cestas de exportação
K _{p,2}	Ubiquidade	Ubiquidade média dos produtos exportados pelos países exportadores de p

(Year 2000)

Data by Feenstra 129 countries 772 products (SITC-4)

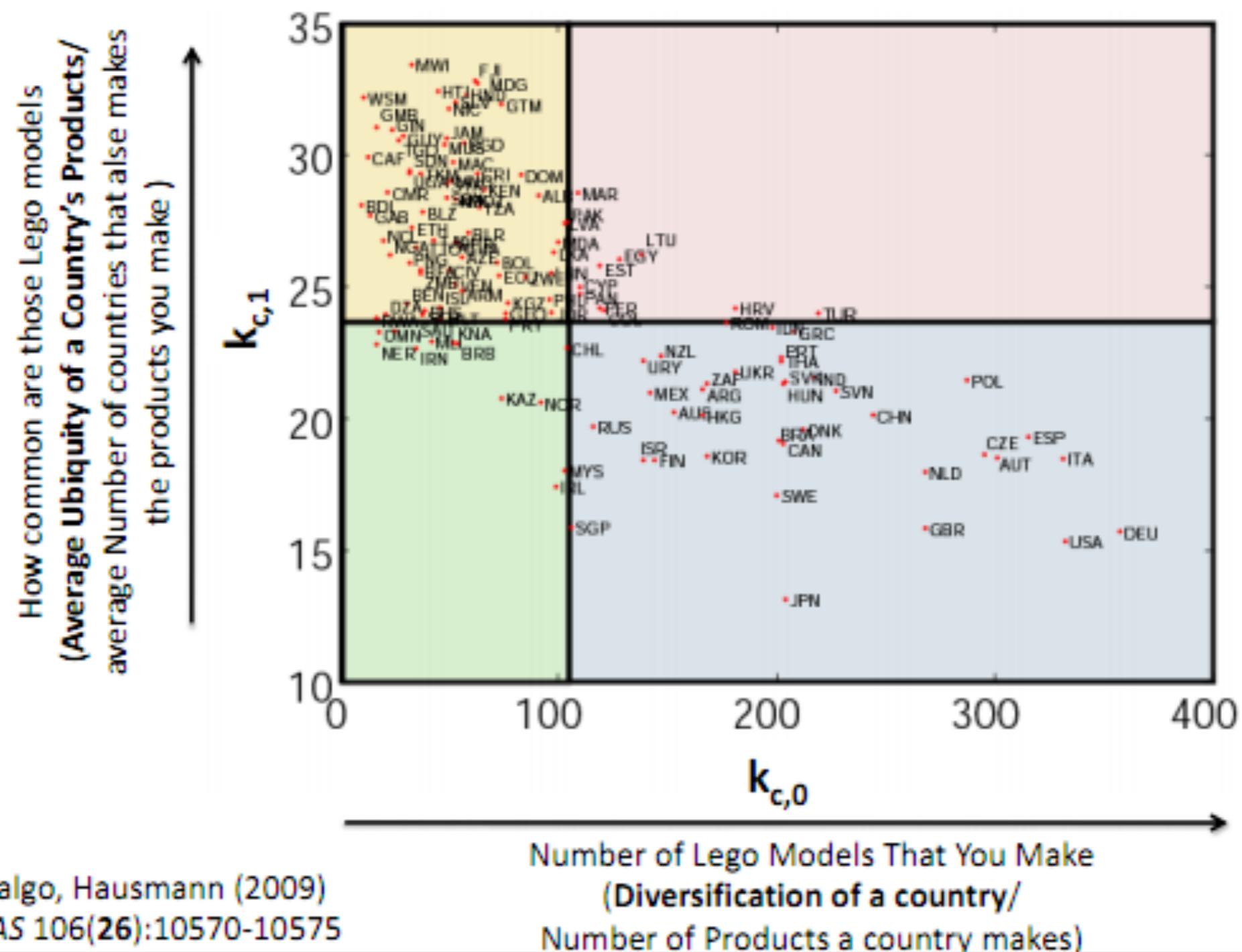


FIGURE 4.1:

► Evolution of the ranking of countries based on ECI between 1964 and 2008. Please see pages 352-353 for a larger version.

