

Vision, Perception and Cognition (contd.)

ID 413: Information Graphics and Data Visualization
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<http://info-design-lab.github.io/ID413-DataViz/>

Perception Principles

V.S. Ramachandran & William Hirstein

1. The Artful Brain
2. The Science of Art – A Neurological Theory of Aesthetic Experience



Neurological basis of visual perception

- Visual perception is a well studied and understood topic
- Gestalt psychologists around the turn of the century proposed a theory of brain's sense making ability
- The principle of "grouping"
- Its evolutionary rationale and the neural mechanism



5 key principles

1. Peak shift
2. Isolation
3. Contrast
4. Viewpoint
5. Metaphor

1. Peak shift principle

- Peak shift effect in animal learning and evocativeness in visual representation
- Caricature: capturing the essential features while discarding redundant information
- Take the average of all faces, subtract the average from Federer's face and then amplify the differences



1. Peak shift principle

Caricature



1. Peak shift principle

- Essentially a caricature of the female form
- not only captures the essence of feminine sensuality, grace, poise, dignity and charm, but also amplifies, exaggerates
- the concept of “*rasa*” or “the very essence”, in order to evoke a specific mood or emotion in the viewer’s brain



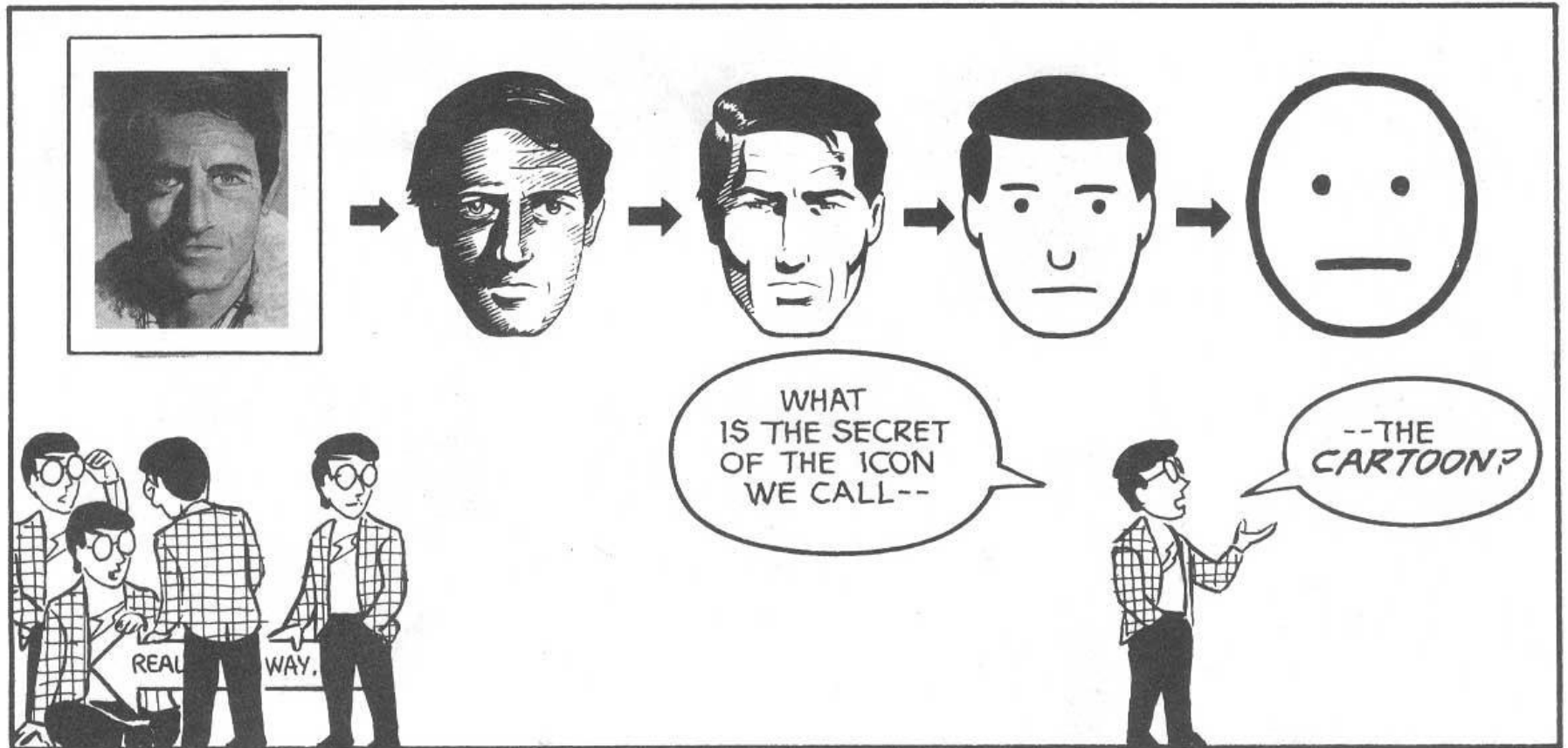
1. Peak shift principle

Prehistoric art



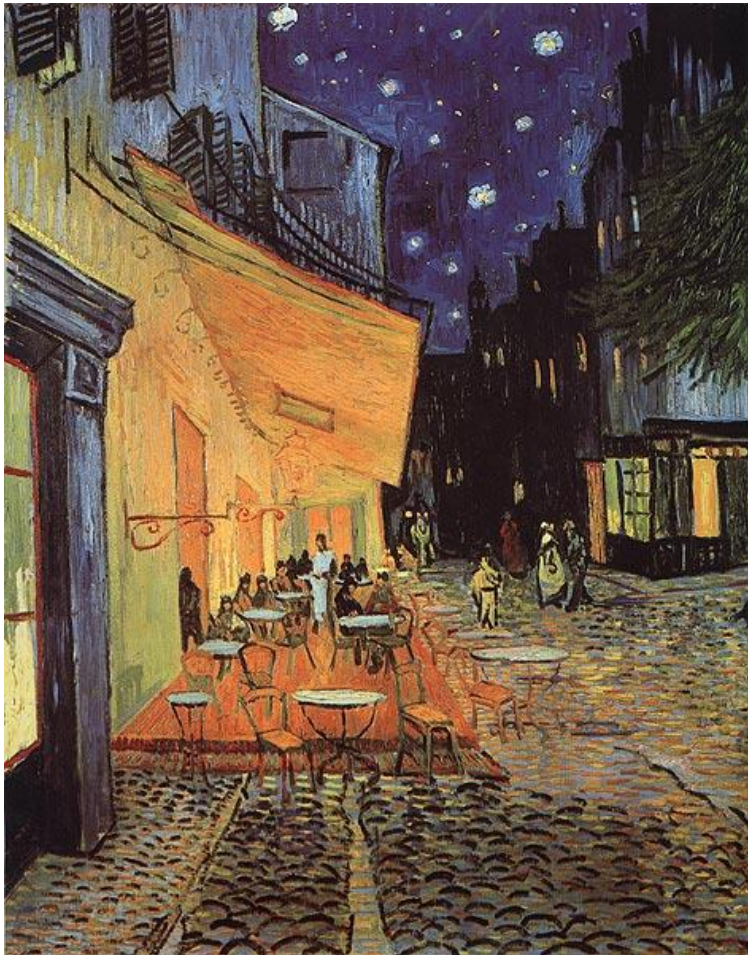
1. Peak shift principle

Comics



1. Peak shift principle

Van Gogh's paintings – peak shift in colour space



1. Peak shift principle

Movement, shading, highlights, illumination, texture...

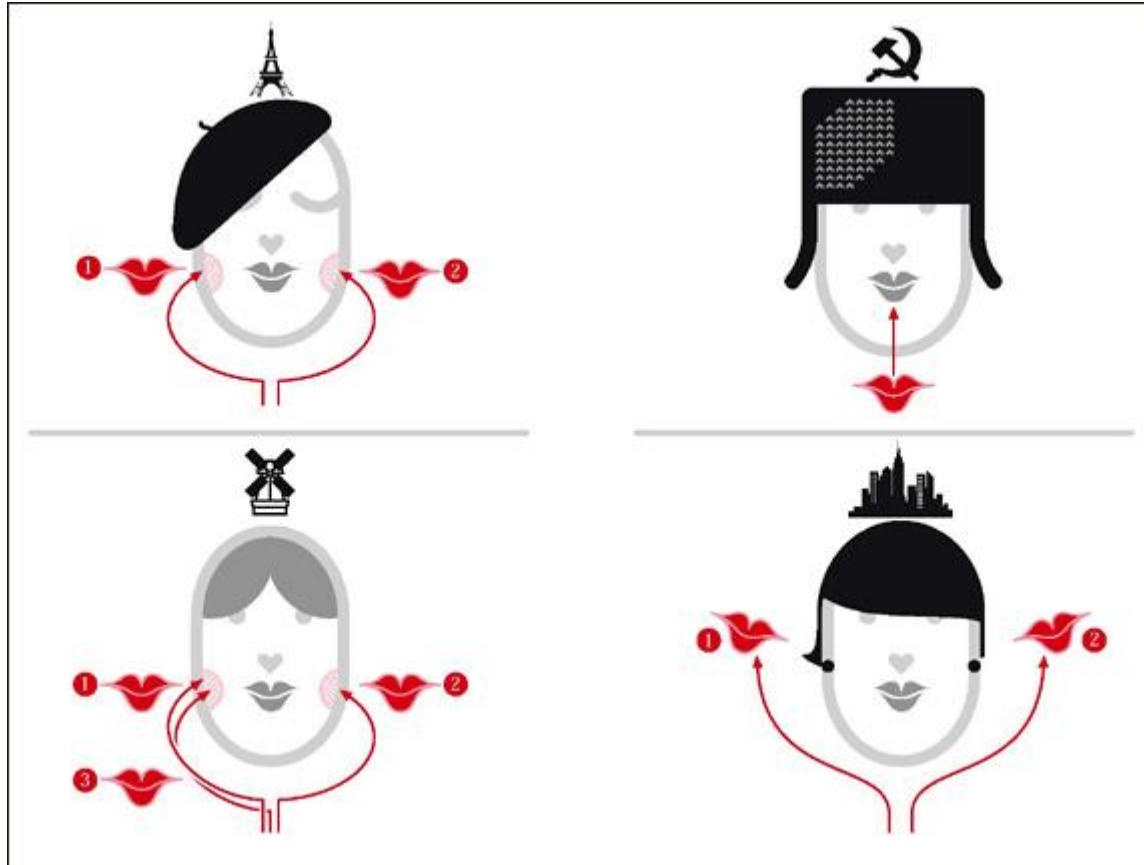


1. Peak shift principle

- How is this related to the rest of visual representation?
- Seagull behaviour – a caricature in ‘beak space’



1. Peak shift principle



1. Peak shift principle



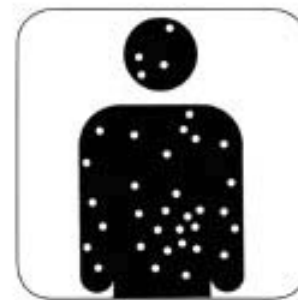
Orthopedic



X - Ray/Screening



Dressing



Dermatology



Cardiology



Respiratory



Urology



Gastrology



Pregnancy



Medical examination



Operation theatre

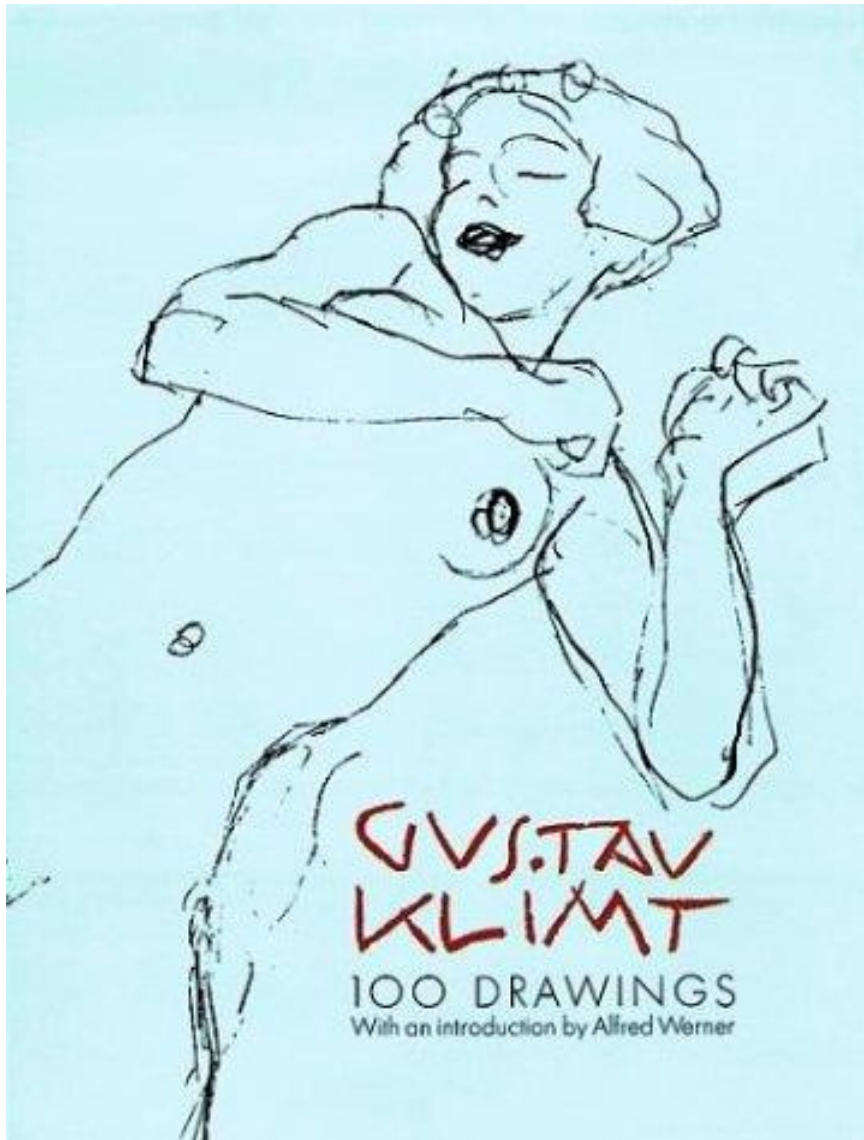


Emergency

2. Isolation principle



2. Isolation principle



2. Isolation principle

- Also referred to as the principle of understatement
- A wealth of information leads to poverty of attention
- Isolating a single visual cue helps to focus attention
- Johansson effect
- Comedic impressions

2. Isolation principle



IDENTIFICATION

HEIGHT

m cm



AGE



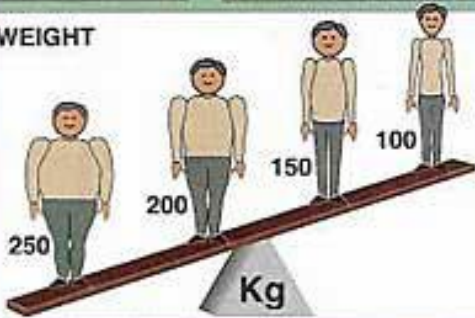
10 20 30 40 50 60 70 80



SEX



WEIGHT

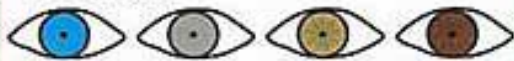


Kg

CLOTHING TYPES



EYE COLOR



SKIN COLOR



HAIR COLOR



FACIAL HAIR



HAIR STYLE



AMBUSH



TARGET TYPE



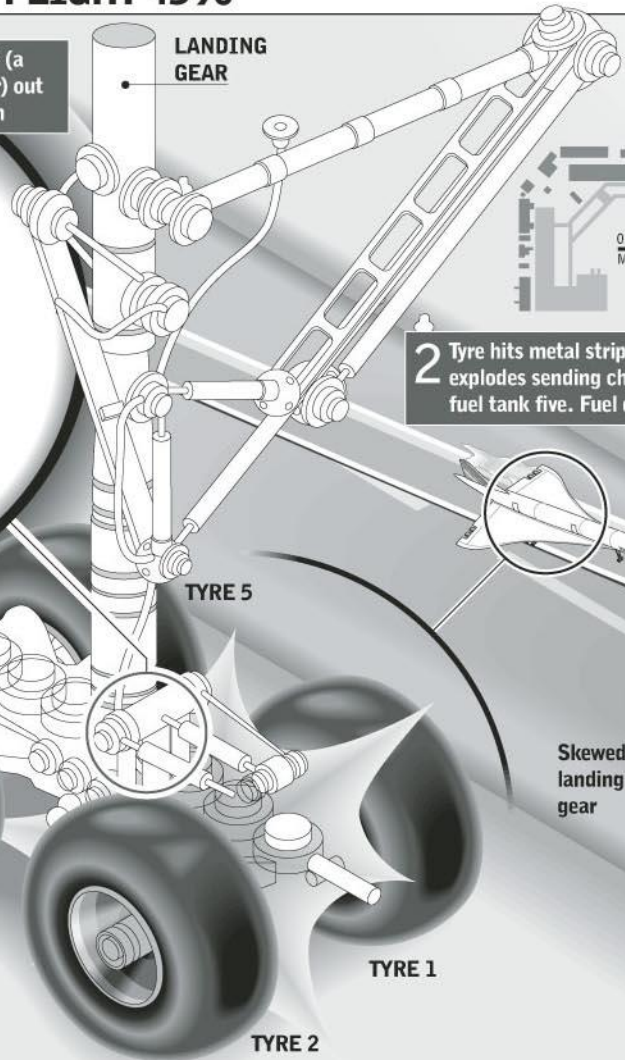
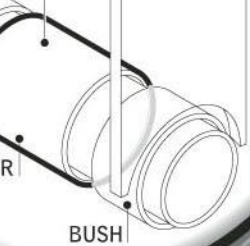
LOCATION OF ATTACKER



DISASTER OF FLIGHT 4590

The ground staff leave 'spacer' (a component of the landing gear) out of service – four days before crash

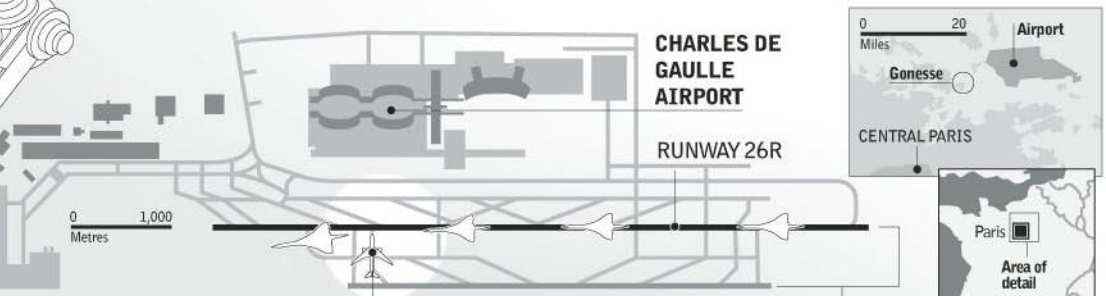
LENGTH 12 inches
DIAMETER 5 inches



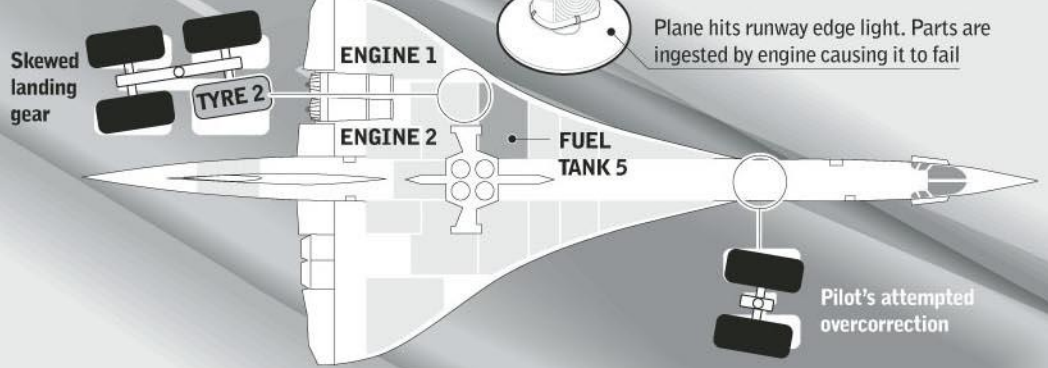
2 Tyre hits metal strip on runway and explodes sending chunks of tyre into fuel tank five. Fuel catches fire

3 Missing spacer may have caused landing gear to skew left, plane then skids towards runway edge and out of control

4 Pilot forced to take-off below recommended minimum speed to avoid ploughing into grass and impact with 747 on taxiway

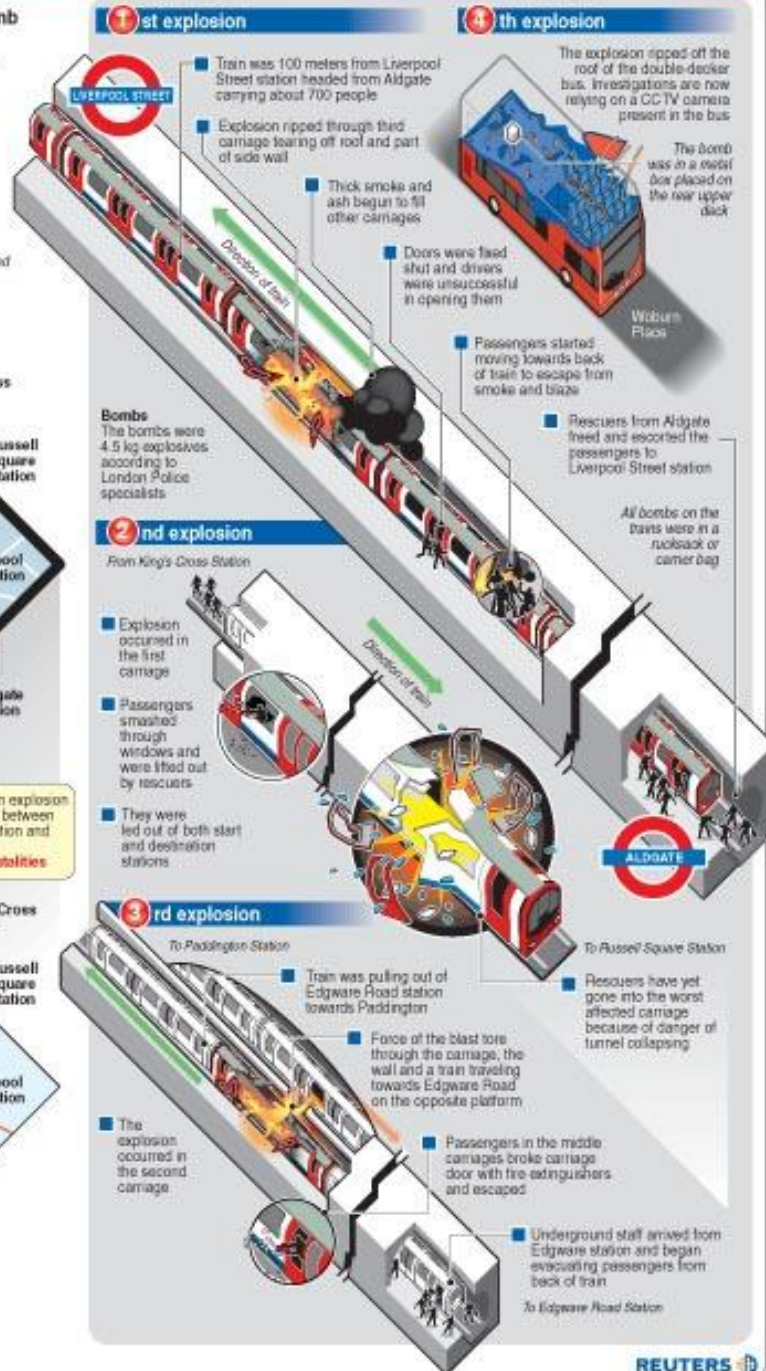
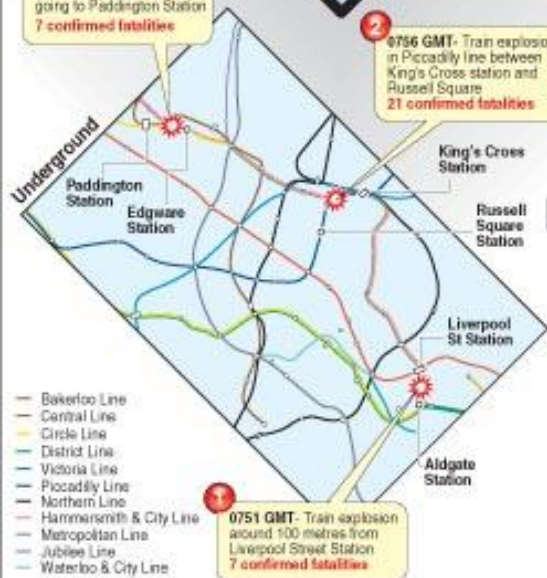


BOEING 747 WITH JACQUES CHIRAC ONBOARD



LONDON BLASTS

More than 50 people were killed and 700 injured in bomb attacks on a bus and several underground trains in London on Thursday. Officials believe the blasts bore hallmarks of an al-Qaeda terrorist attack



SUPERintrigante

Perguntas instigantes, respostas surpreendentes

BOCA EM AÇÃO COMO É O TRÁFICO NA FAVELA?

Os pontos de tráfico de drogas, conhecidos como "bocas", operam como empresas, escondidos em favelas e bairros pobres das grandes cidades. Os criminosos se organizam em uma hierarquia preocupada em garantir duas coisas: o abastecimento constante de cocaína, maconha e outros entorpecentes e o sistema de proteção contra a polícia ou quadrilhas rivais.

Para garantir a eficiência do negócio, são contratados diversos funcionários. O esquema de segurança e a acirrada disputa entre traficantes põem em risco a vida de compradores e moradores da favela. "Até chegar à boca, o usuário tem que andar na favela. Ele é avaliado e nem percebe. Se os seguranças pensarem que ele é um policial disfarçado, atiram", diz o delegado Carlos Roberto Alves de Andrade, da Delegacia de Repressão ao Crime Organizado do Departamento de Narcóticos de São Paulo. **5**

por Christian Seix

CRÍME ORGANIZADO

VÁRIOS FUNCIONÁRIOS ESTÃO ENVOLVIDOS NO ESQUEMA DE TRÁFICO

AVIÓZINHOS

Os garotos que levam a droga da boca para os clientes são mais comuns no Rio de Janeiro. Em São Paulo, onde as favelas são planas, a distância entre a boca e o consumidor é pequena e o serviço deles nem sempre é necessário.

ALTO ESCALÃO

Traficantes de maior hierarquia ficam posicionados sobre lajes e barracos, onde podem se proteger melhor e alistar em caso de tentativa de invasão. Carregam fuzis, ideais para combates a longa distância.

A BOCA

Geralmente fica perto de riachos, esgotos ou barrancos, para dificultar a chegada da polícia. Em uma mesma favela, podem existir várias bocas e nem toda a droga fica aqui. Barracos conhecidos como "paiol" são usados para armazenamento de grandes quantidades e da munição da quadrilha.

GERENTE DA BOCA

É responsável pela chegada da droga e pela contratação do pessoal. É ele que comanda toda a operação dentro da favela e, por isso, é sempre alguém de muita confiança do dono da boca.

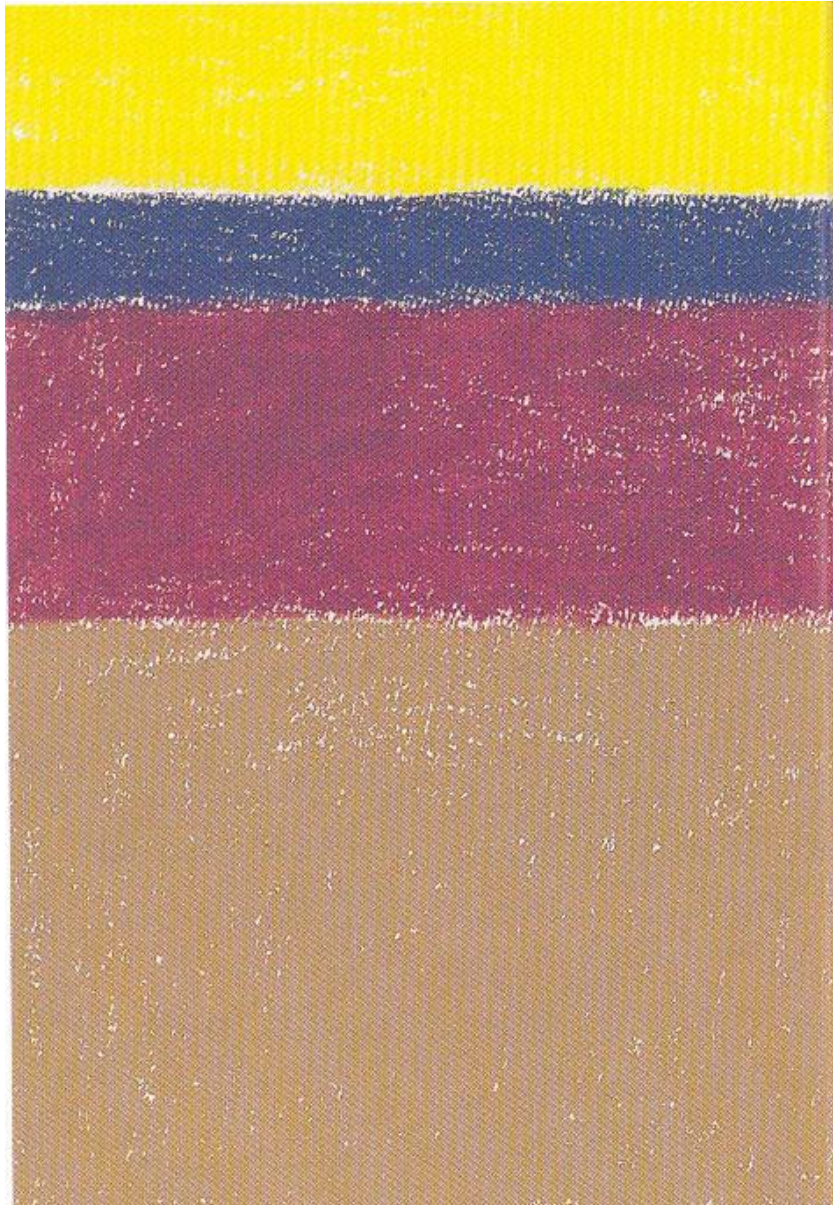
SEGURANÇAS

A função deles é proteger os arredores da boca da polícia e de traficantes rivais. Eles usam armas próprias para combater a curta distância.

ENQUANTO ISSO...

O dono da "boca" não lida diretamente com a venda da droga. Ele comanda o tráfico de um barraco ou casa afastada, por meio dos gerentes. Bocas bem-sucedidas podem transformar traficantes em homens ricos e bem de vida.

3. Contrast principle



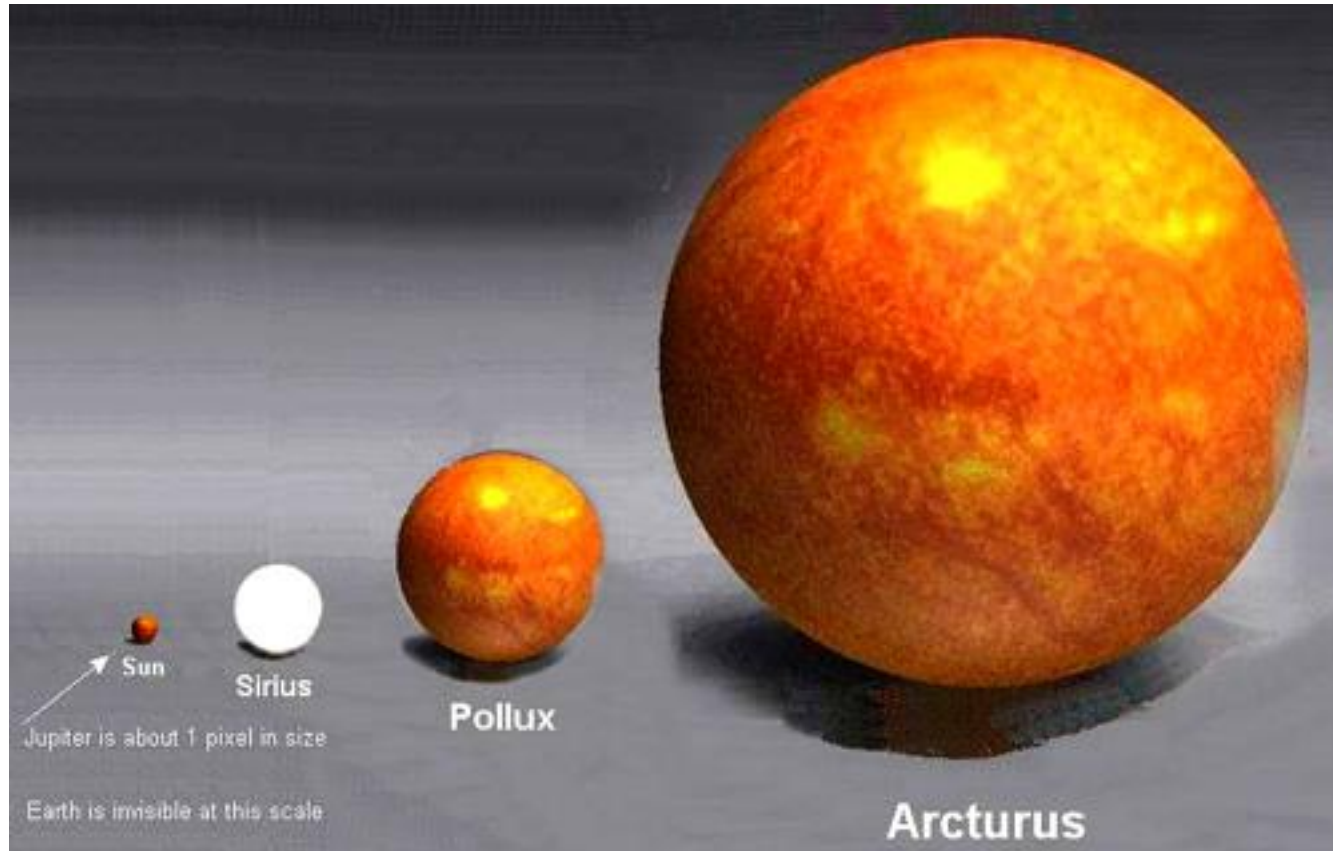
17人は中国語をしゃべり
9人は英語を
8人はヒンディー語とウルドゥー語を
6人はスペイン語を
6人はロシア語を
4人はアラビア語をしゃべります
これではうやく、村人の半分です
あとの半分は
ベンガル語、ポルトガル語
インドネシア語、日本語
ドイツ語、フランス語などを
しゃべります

17 would speak Chinese,
9 English,
8 Hindi and Urdu,
6 Spanish,
6 Russian, and
4 would speak Arabic.
That would account for half the village.
The other half would speak Bengal, Portuguese,
Indonesian, Japanese, German, French,
or some other languages.

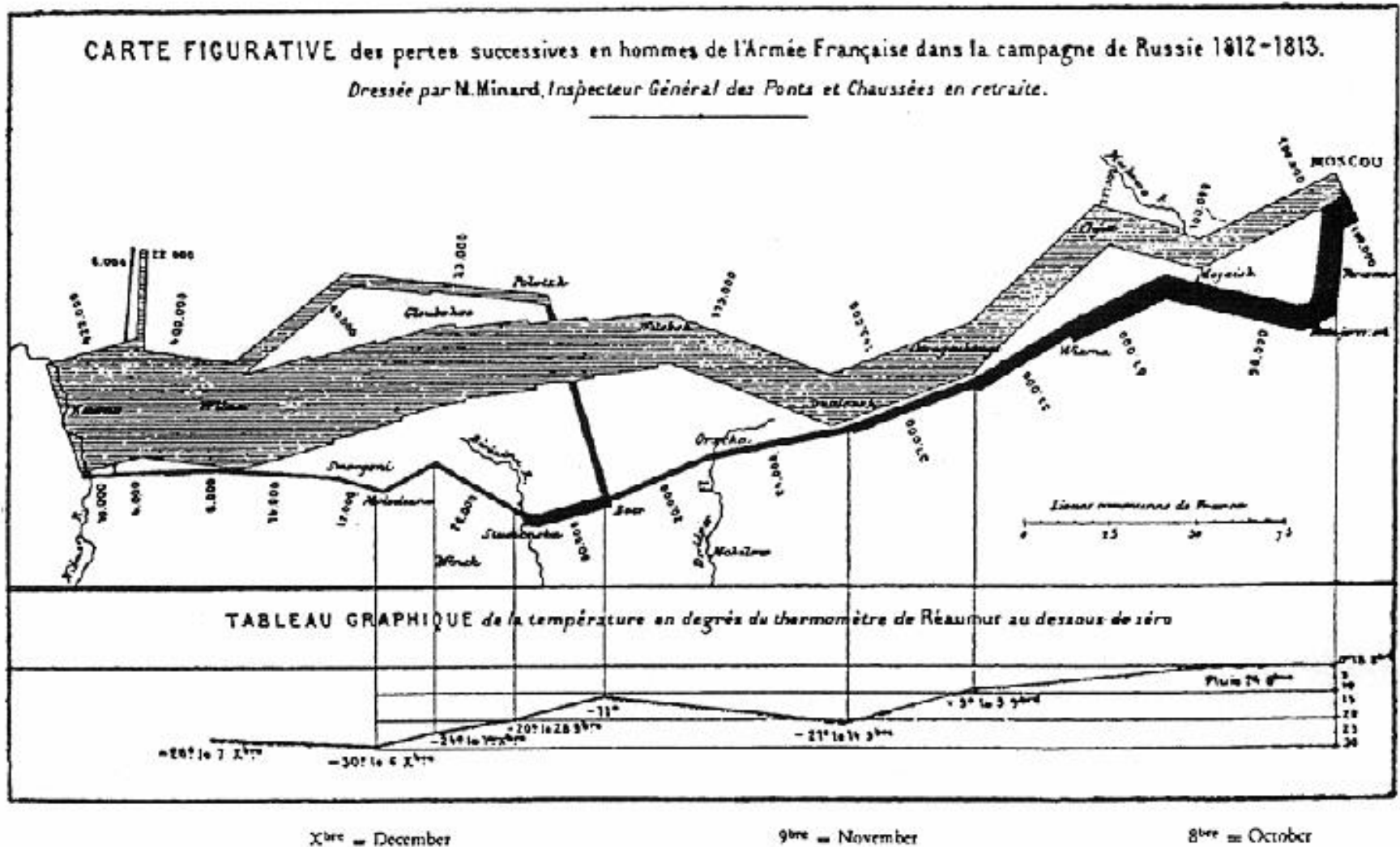
3. Contrast principle

- Information resides mainly in regions of change (Claude Shannon)
- Our visual system responds mainly to edges - they are more attention grabbing, more interesting than homogeneous areas
- In representation, it is important to compare and contrast information in the same visual field to improve effectiveness of communication

3. Contrast principle



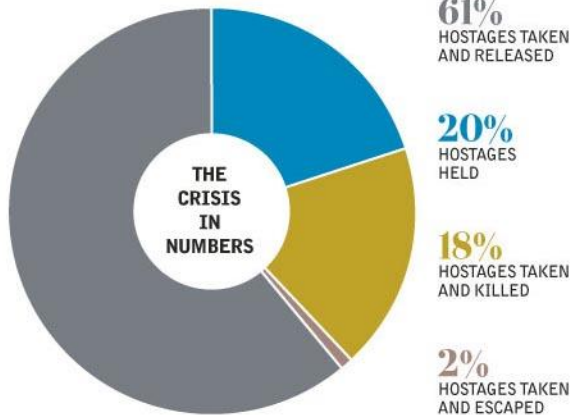
3. Contrast principle



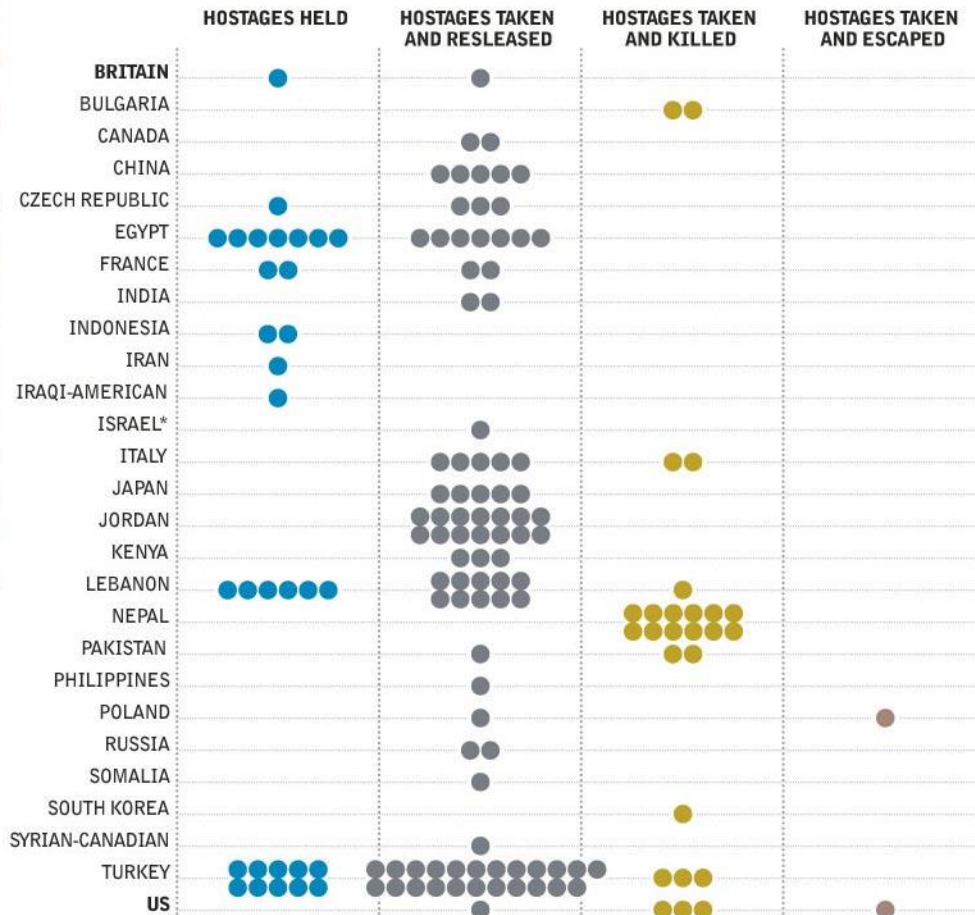
CAPTURED IN IRAQ: CHARTING THE HOSTAGE CRISIS



French hostages Christian Chesnot and Georges Malbrunot (top) are still held hostage. In April, captors threatened to burn detainees Noriaki Imai and Soichiro Koriyana alive if Japanese forces were not removed from Iraq.



KEY
● ONE HOSTAGE



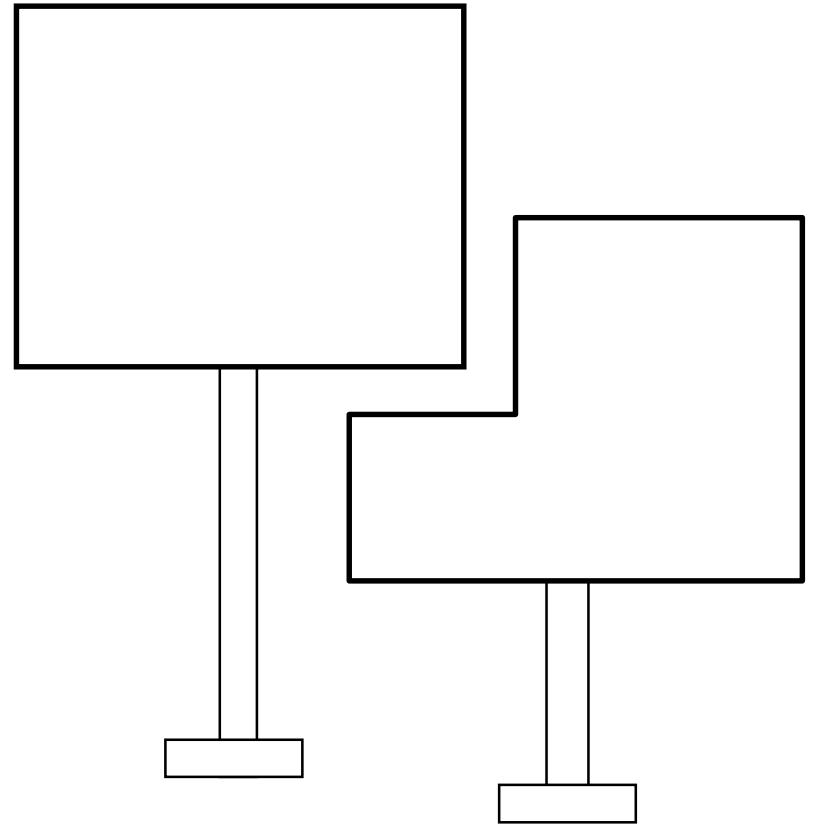
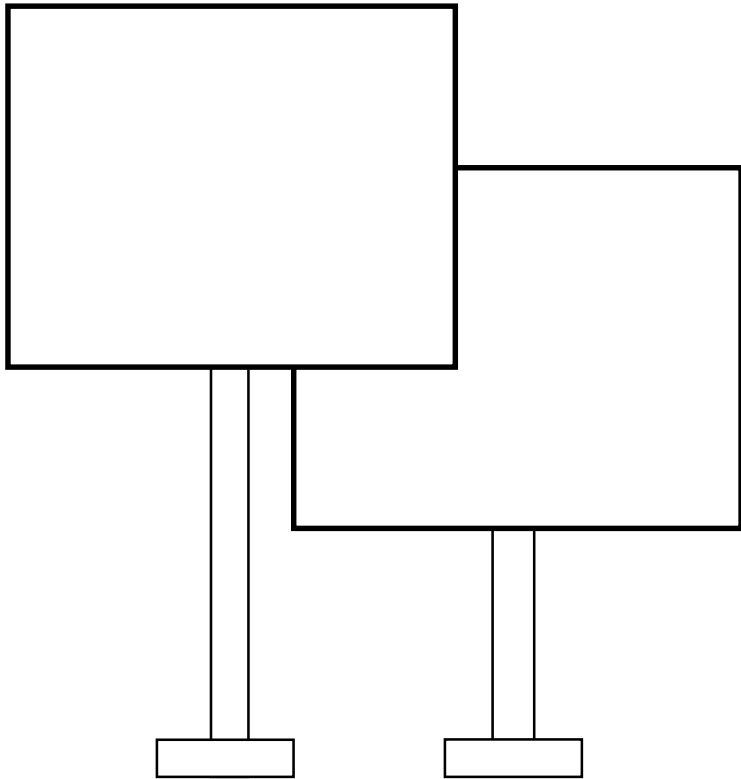
American hostages Jack Hensley and Eugene Armstrong were killed last month

*Arab Christian from East Jerusalem

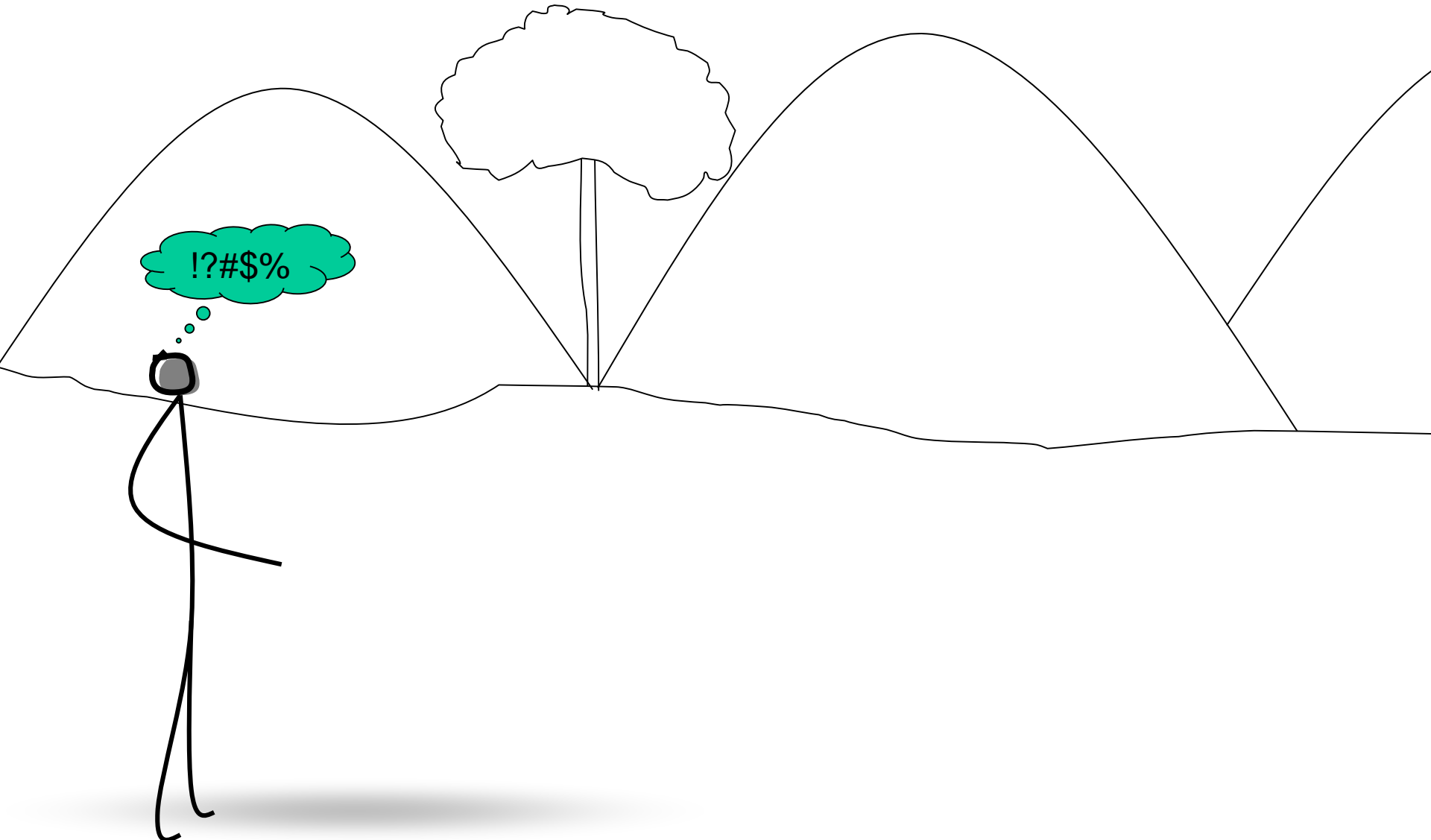


Released Italian charity workers Simona Pari (left) and Simona Torretta

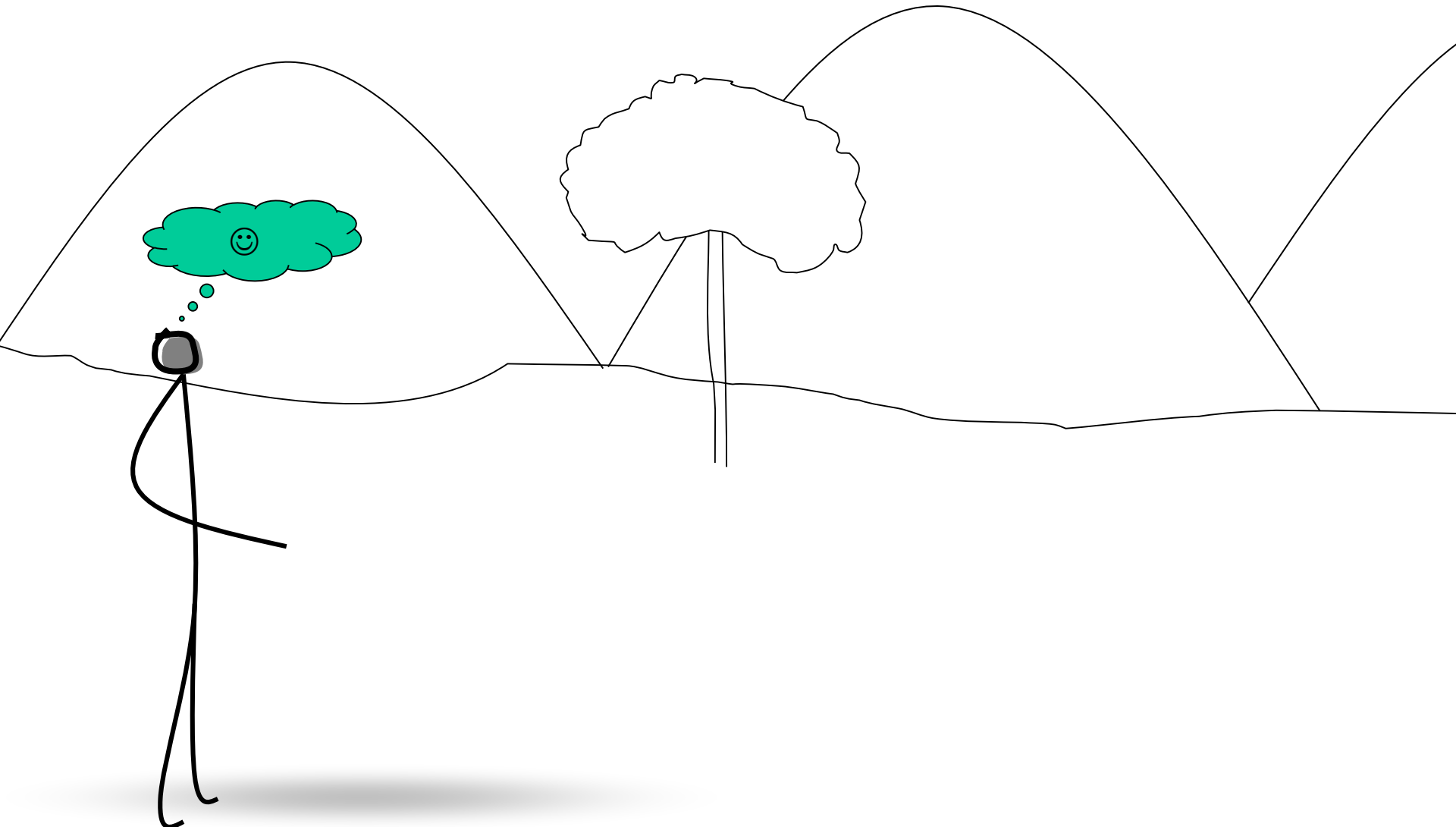
4. Viewpoint principle



4. Viewpoint principle



4. Viewpoint principle



4. Viewpoint principle

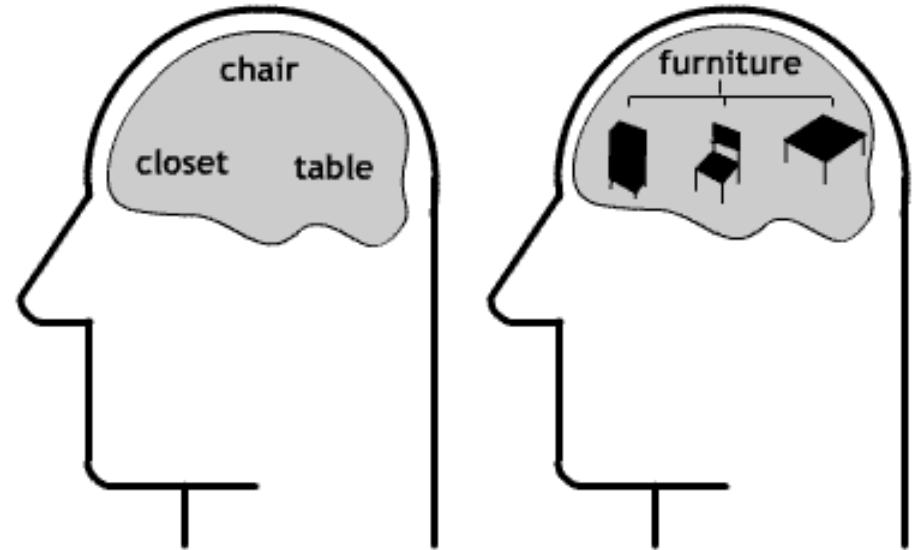
- Our visual system rejects unique viewpoints and prefers generic viewpoints
- In general, it abhors suspicious coincidences
- Avoid distracting visual conundrums

5. Metaphor

- A metaphor is a mental tunnel between two concepts that appear dissimilar on the surface
- It is useful to explain the unfamiliar in terms of the familiar
- It also allows us ignore irrelevant, potentially distracting aspects of an idea and enables us to 'highlight' the crucial aspects
- Encoding the world more economically

5. Metaphor

- Why are visual metaphors and besides effectively communicating are also rewarding?
- Seeing a deep similarity and categorizing was vital for survival
- Several viewer-centred representations of a chair are linked to form a viewer-independent representation of 'chairness'



Cognition

Storytelling and narrative We remember and process information more effectively when we experience it in narrative form

Metaphor We learn by comparing something new to something we are familiar with

Attention Management Our working memory is limited. The Magical Number 7 (or 3 or 4?)

Seven Basic Plots*

- Overcoming the Monster
- Rebirth
- Quest
- Journey and Return
- Rags to Riches
- Tragedy
- Comedy

*Christopher Booker, *The Seven Basic Plots: Why We Tell Stories*. 2005.

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Primary Metaphors*

- Affection Is Warmth
- Important Is Big
- Happy Is Up
- Intimacy Is Closeness
- Bad Is Stinky
- Difficulties Are Burdens
- More Is Up
- Categories Are Containers
- Similarity Is Closeness
- Linear Scales Are Paths
- Organization Is Physical Structure
- Help Is Support
- Time Is Motion
- States Are Locations
- Change Is Motion
- Actions Are Self-Propelled Motions
- Purposes Are Destinations
- Purposes Are Desired Objects
- Causes Are Physical Forces
- Relationships Are Enclosures
- Control Is Up
- Knowing Is Seeing
- Understanding Is Grasping
- Seeing Is Touching

*From Joe Grady's PhD dissertation at Berkeley, 1997, as quote in George Lakoff and Mark Johnson, *Philosophy in The Flesh*

Visual Metaphors

- Important Is Big
- Happy Is Up
- More Is Up
- Categories Are Containers
- Organization is Physical Structure
- Similarity Is Closeness
- Purposes Are Destinations
- Control is Up