

# Percepção e arte

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USP

# Visão e arte - tópicos

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**Estrutura  
básica do  
sistema  
visual**

**Funções  
visuais  
básicas e arte**

**Arte no  
sistema  
visual  
alterado**

# Visão e arte - tópicos

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# Visão e arte - tópicos

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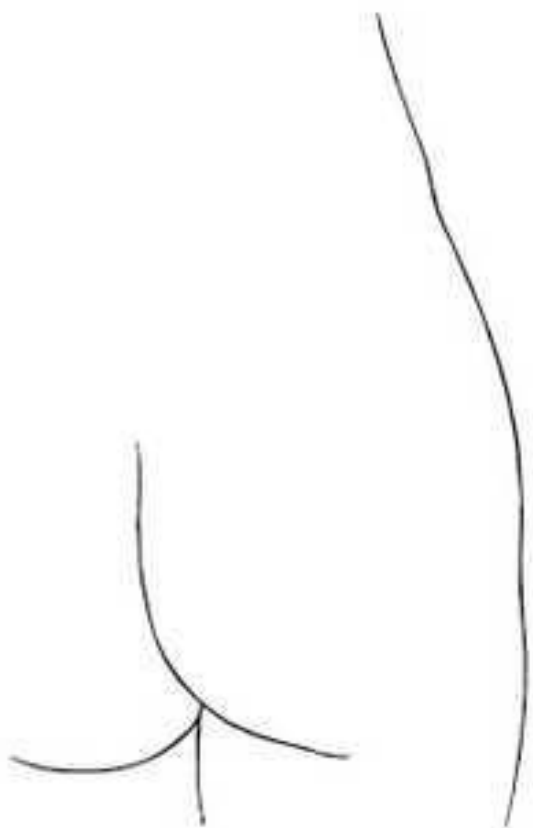
**Estrutura  
básica do  
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sistema  
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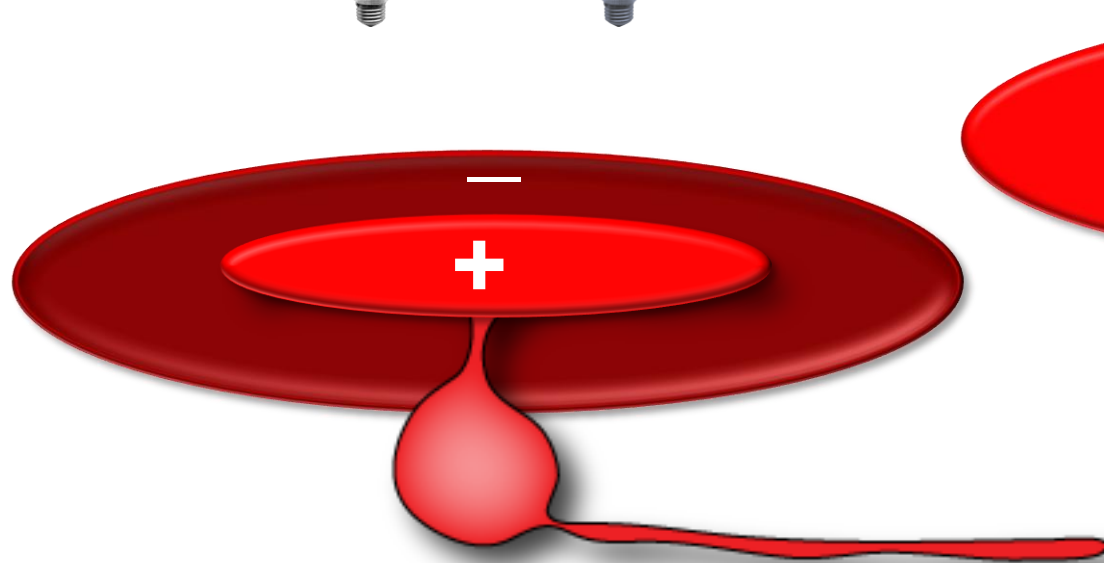
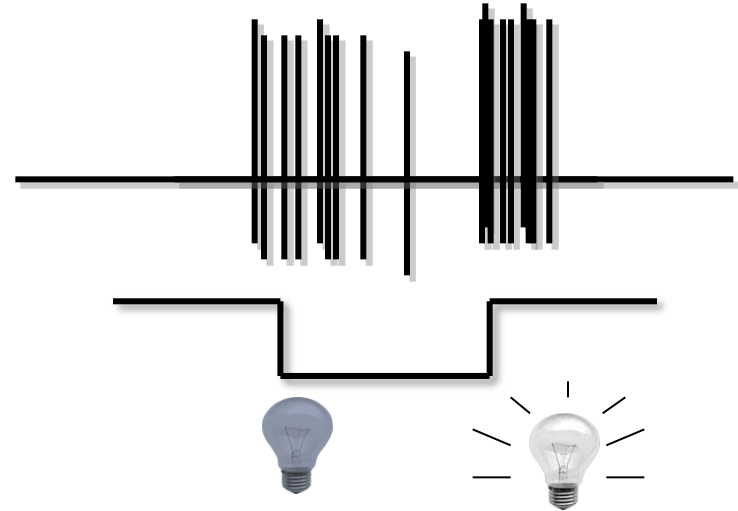
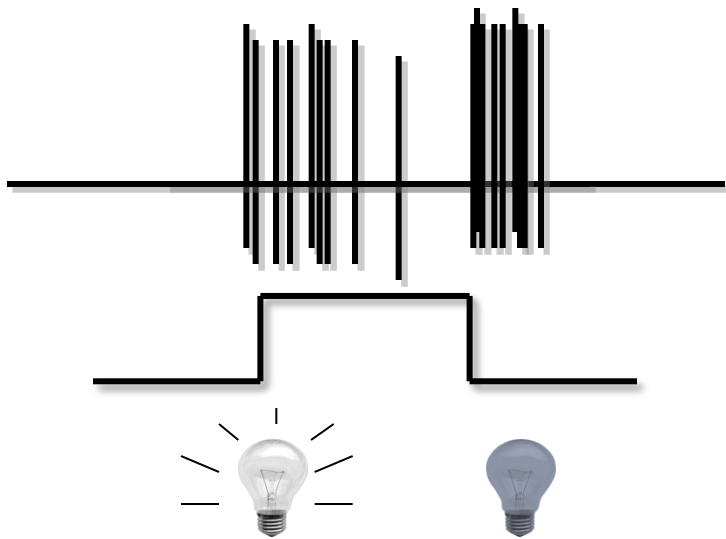
Lascaux, França – 20.000 anos



Picasso



# Visão acromática



células ganglionar ON



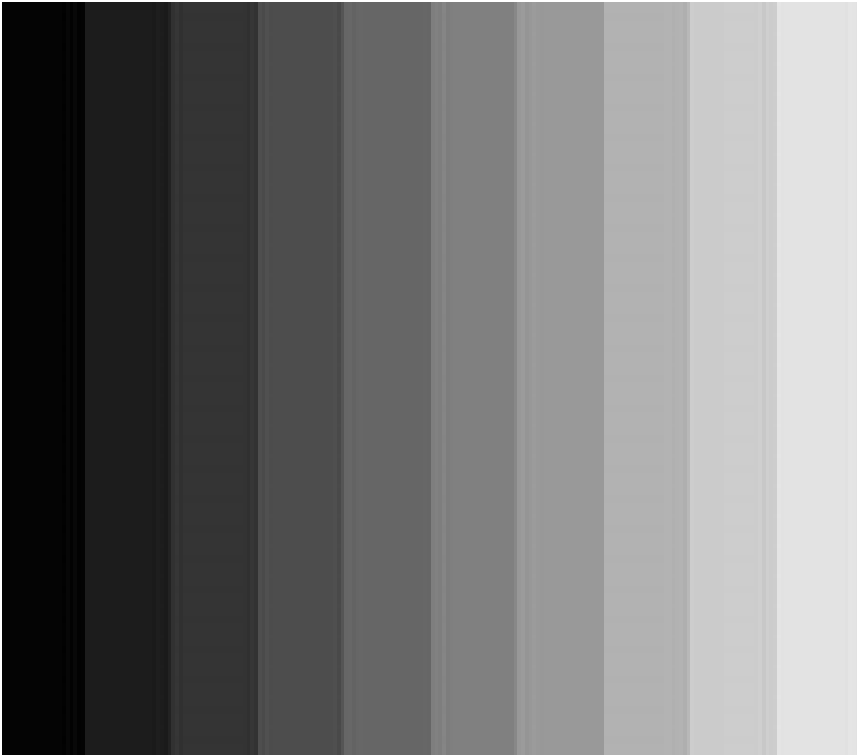
célula ganglionar OFF



# Visão acromática - Bandas Mach

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O contorno do artista

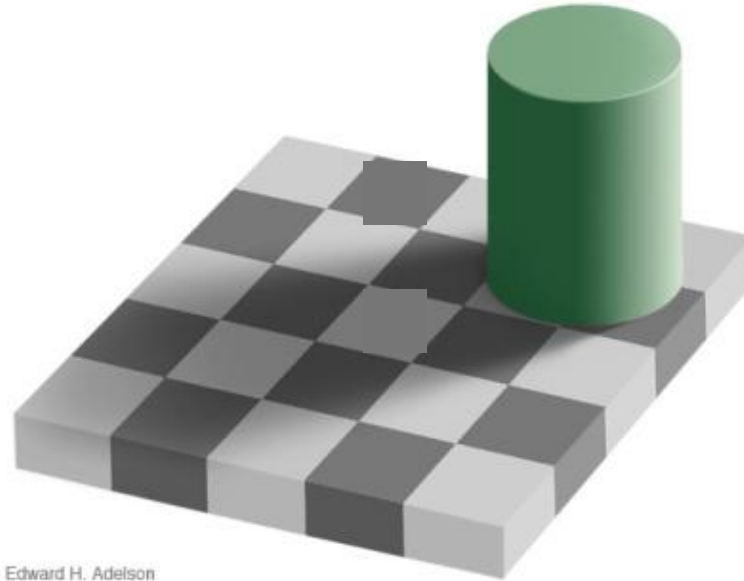




Georges Seurat - O nó preto, 1881

# Visão acromática - Sombra

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Edward H. Adelson



# Chiaroscuro

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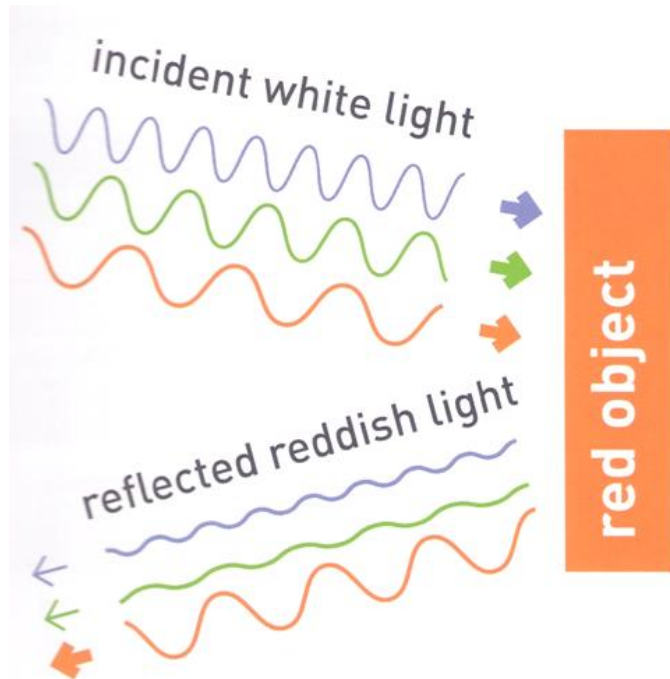


Caravaggio, Cristo na Coluna

# Visão de cores

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## 1. A luz refletida pelo objeto



# Visão de cores

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## 2. Receptores de luz na retina

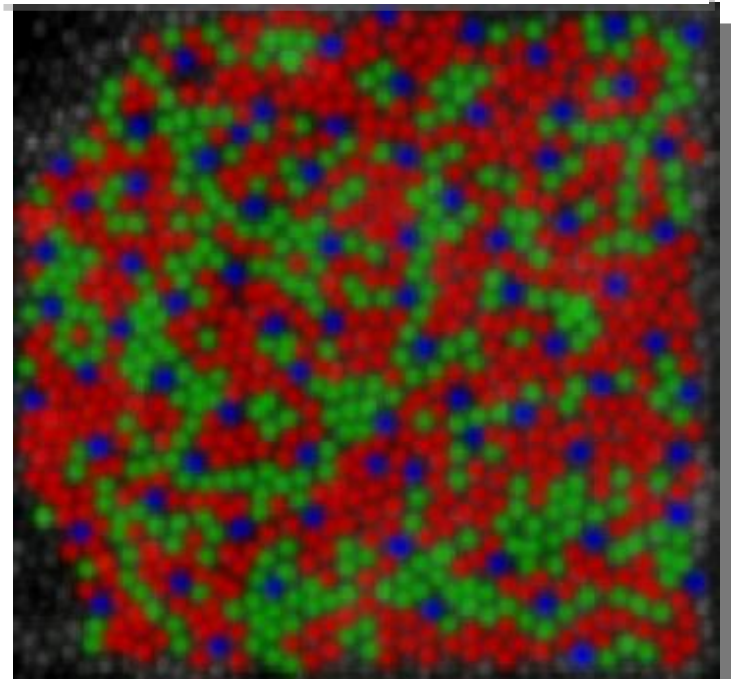
Cone S

Cone M

Cone L



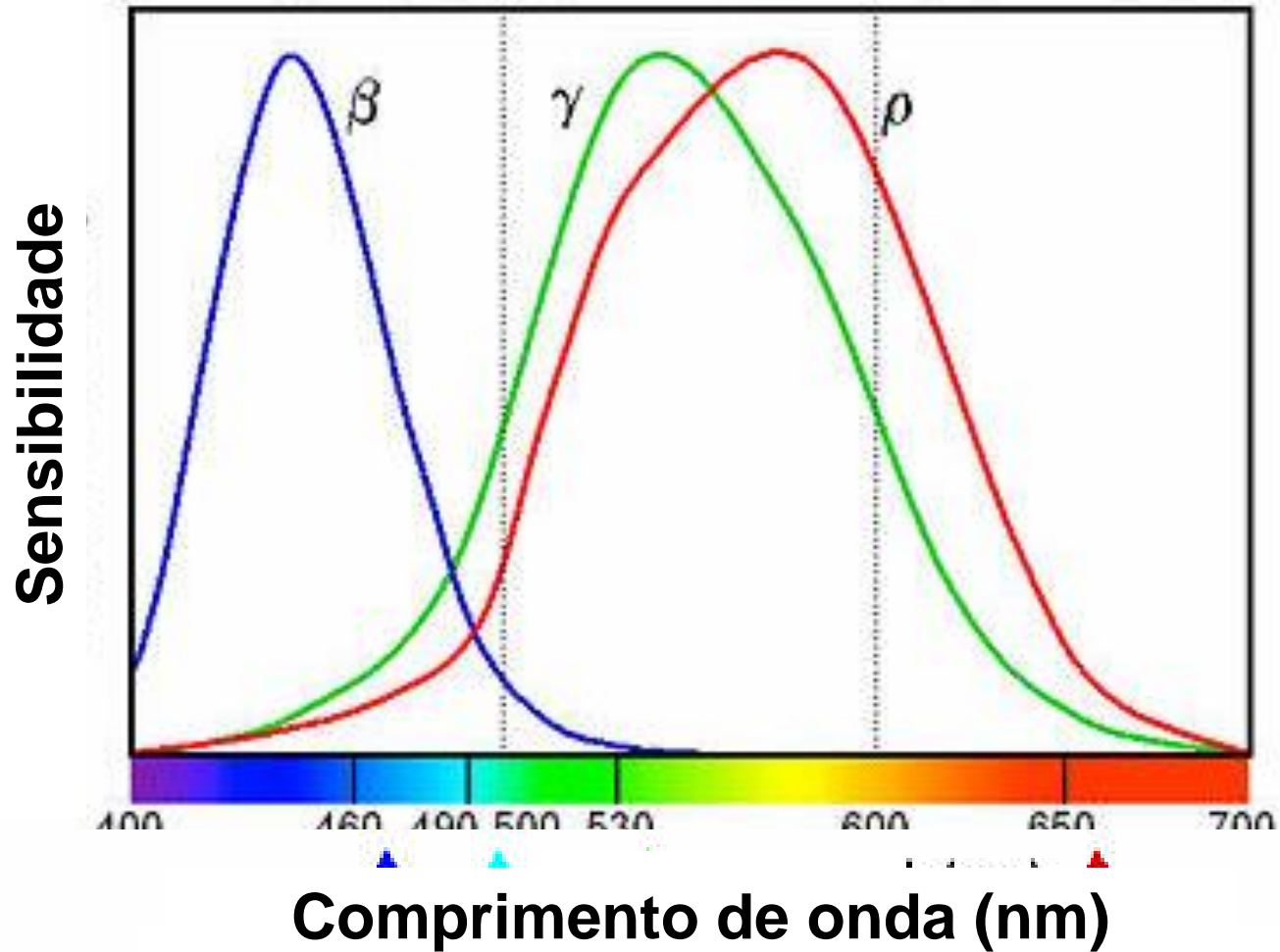
Mosaico na retina



Roorda & Williams, 1999

# Visão de cores

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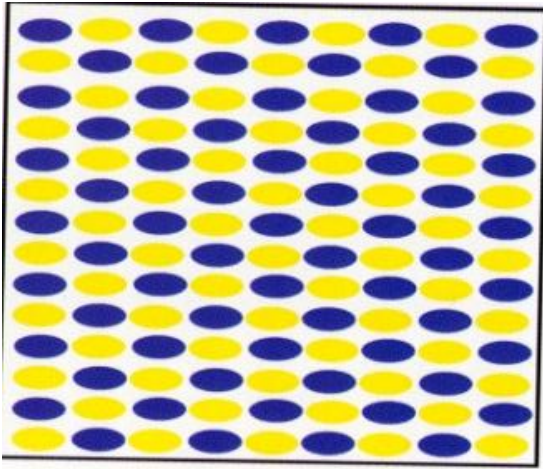




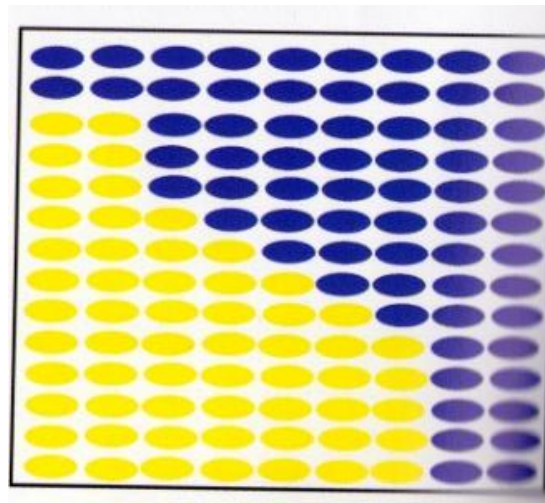
# Mistura de cores

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## Pontilismo



Pontilismo



Convencional



Impressão

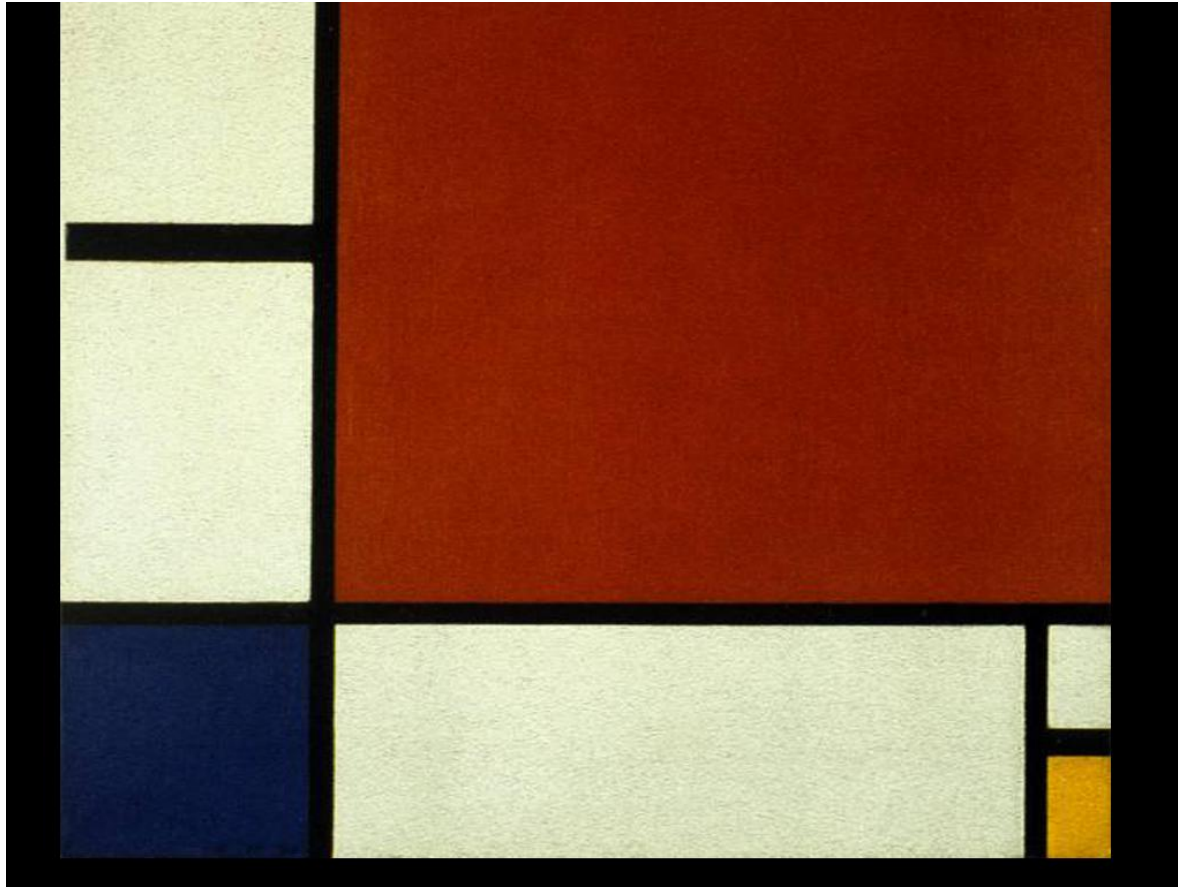




**Georges Seurat – Tarde de domingo na Ilha de *La Grande Jatte***

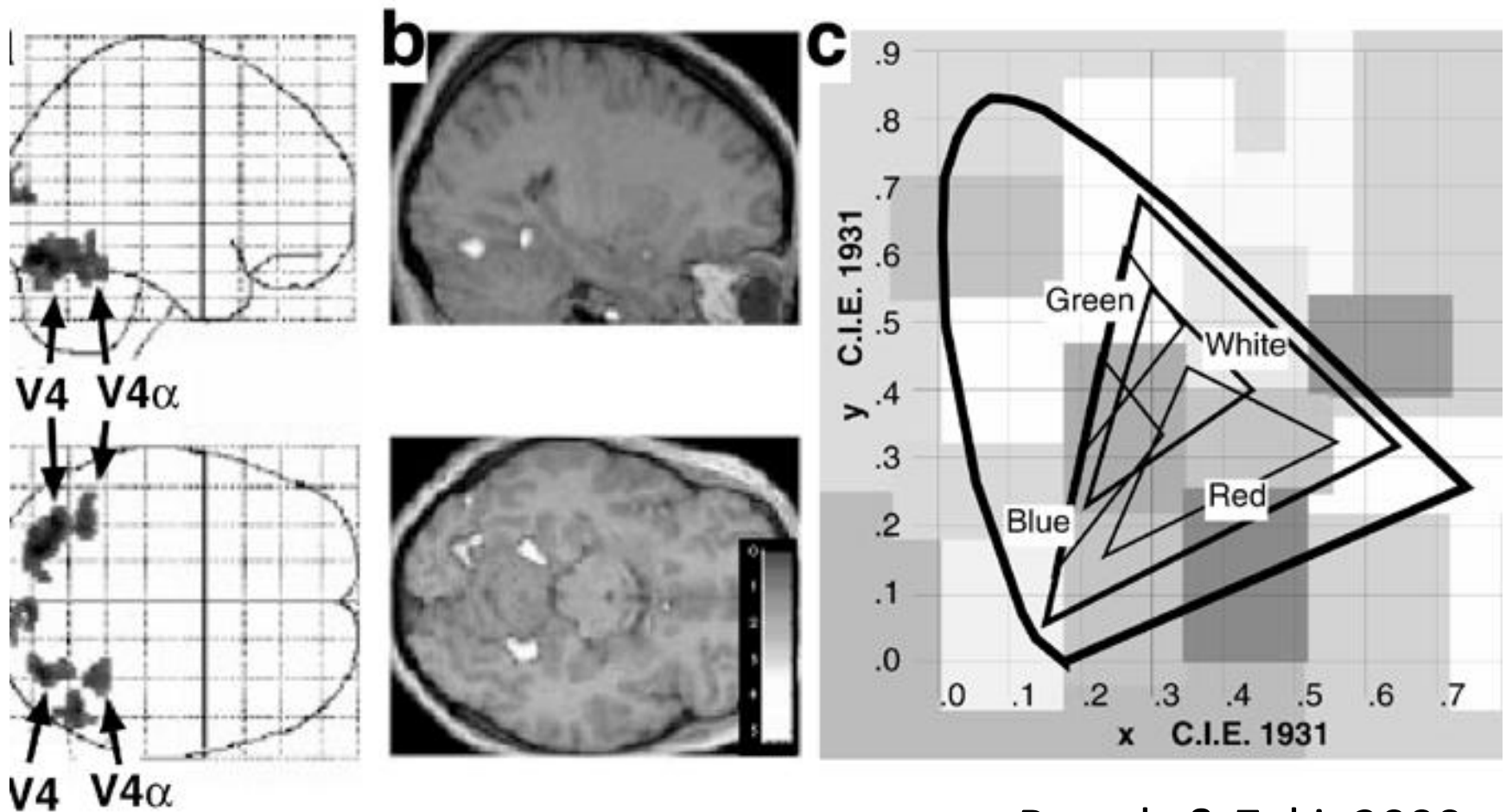
# Inspiration preceding brain science

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Composition II in Red, Blue, and Yellow, 1930. Peter Mondrian

# Color processing in the brain



Bartels & Zeki, 2000

# Visão de forma

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- Contornos
  - Surrealismo
  - René François-Ghislain Magritte (1898–1967)

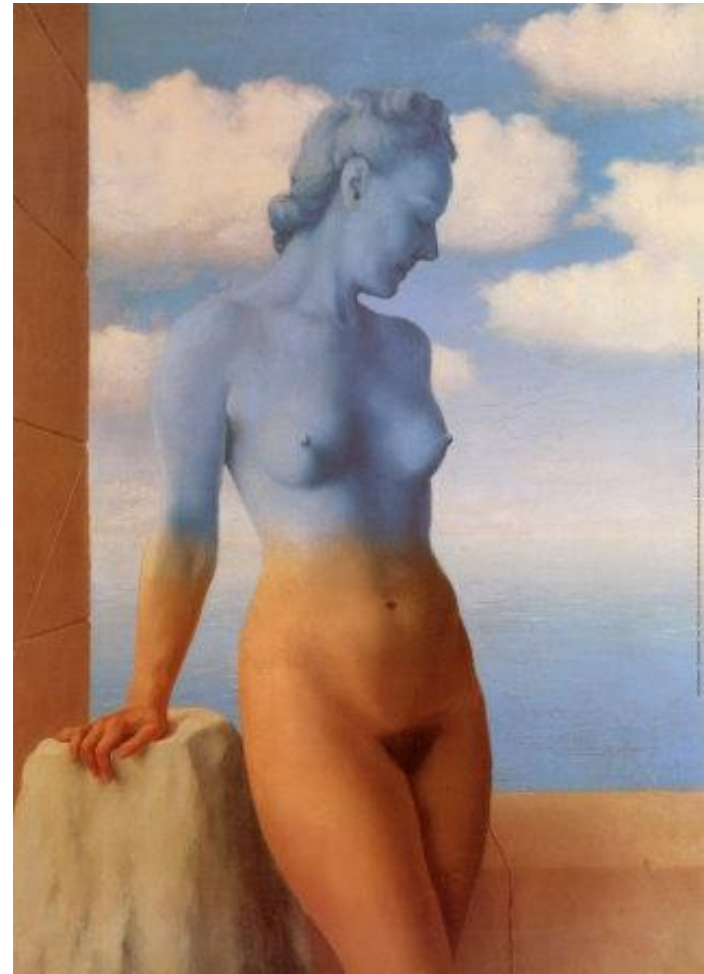


# Magritte e contornos ilusórios

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*La Grande Famille, 1963*



*La Magie Noire (Black magic), 1933,34*

# Como superfícies são percebidas? Como elementos da cena se organizam e sinalizam um objeto?



*La Grande Famille, 1963*



*Black Magic, 1933,34*

# Segregação figura/fundo

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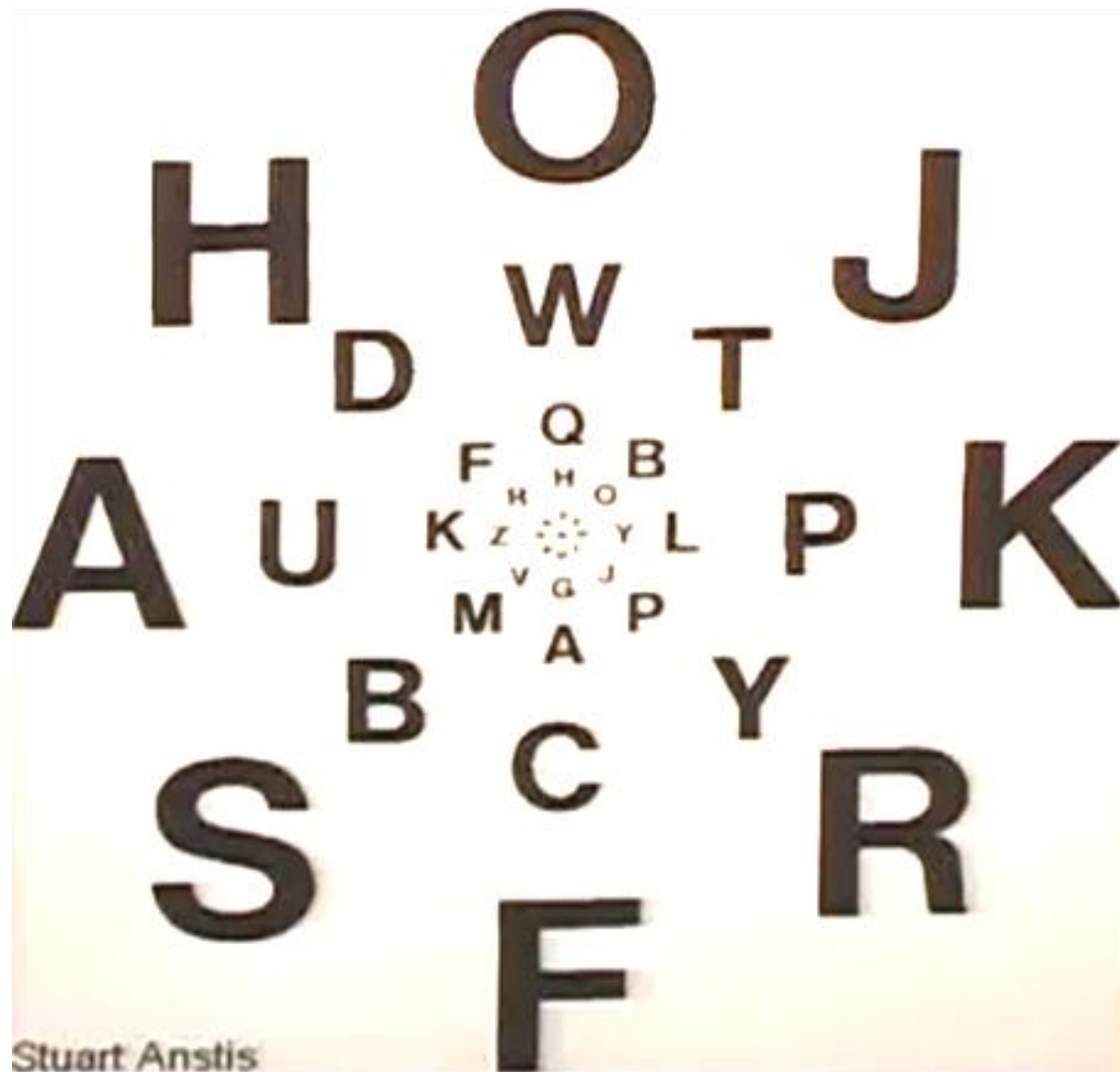






# Percepção de forma

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# Mona Lisa

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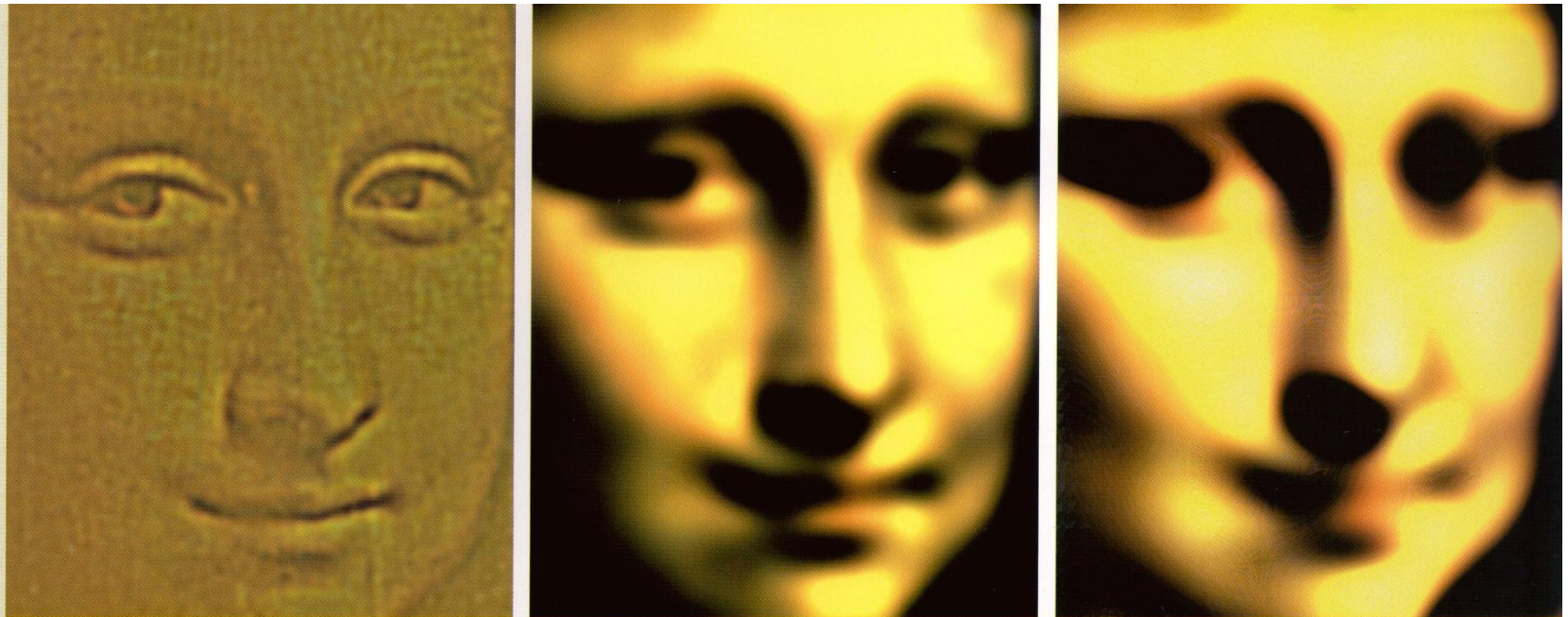
# Mona Lisa

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# O sorriso de Mona Lisa

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Livingstone, 2002

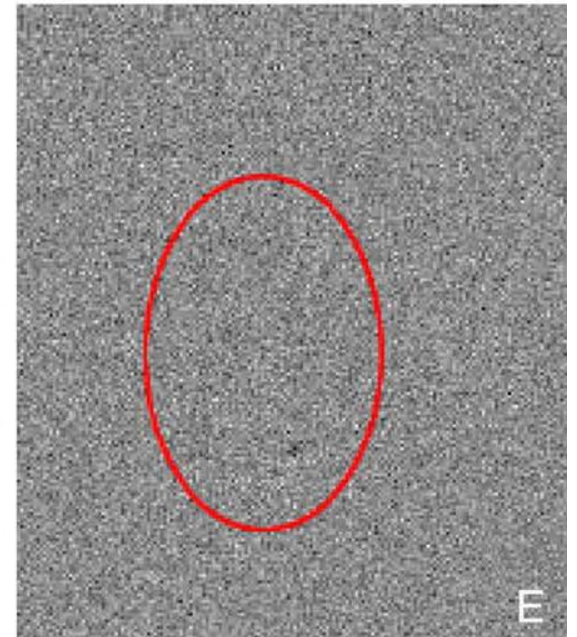
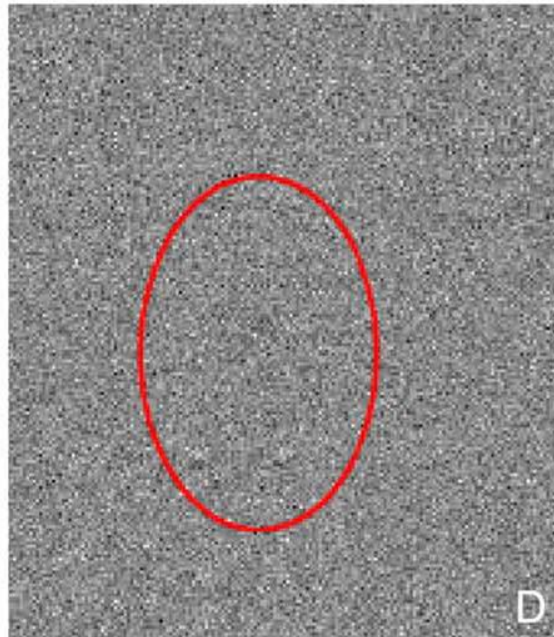


# O sorriso

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Ambigüidade



Kontsevich & Tyler, 2004

# O sorriso

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Triste e Feliz



# Visão de profundidade

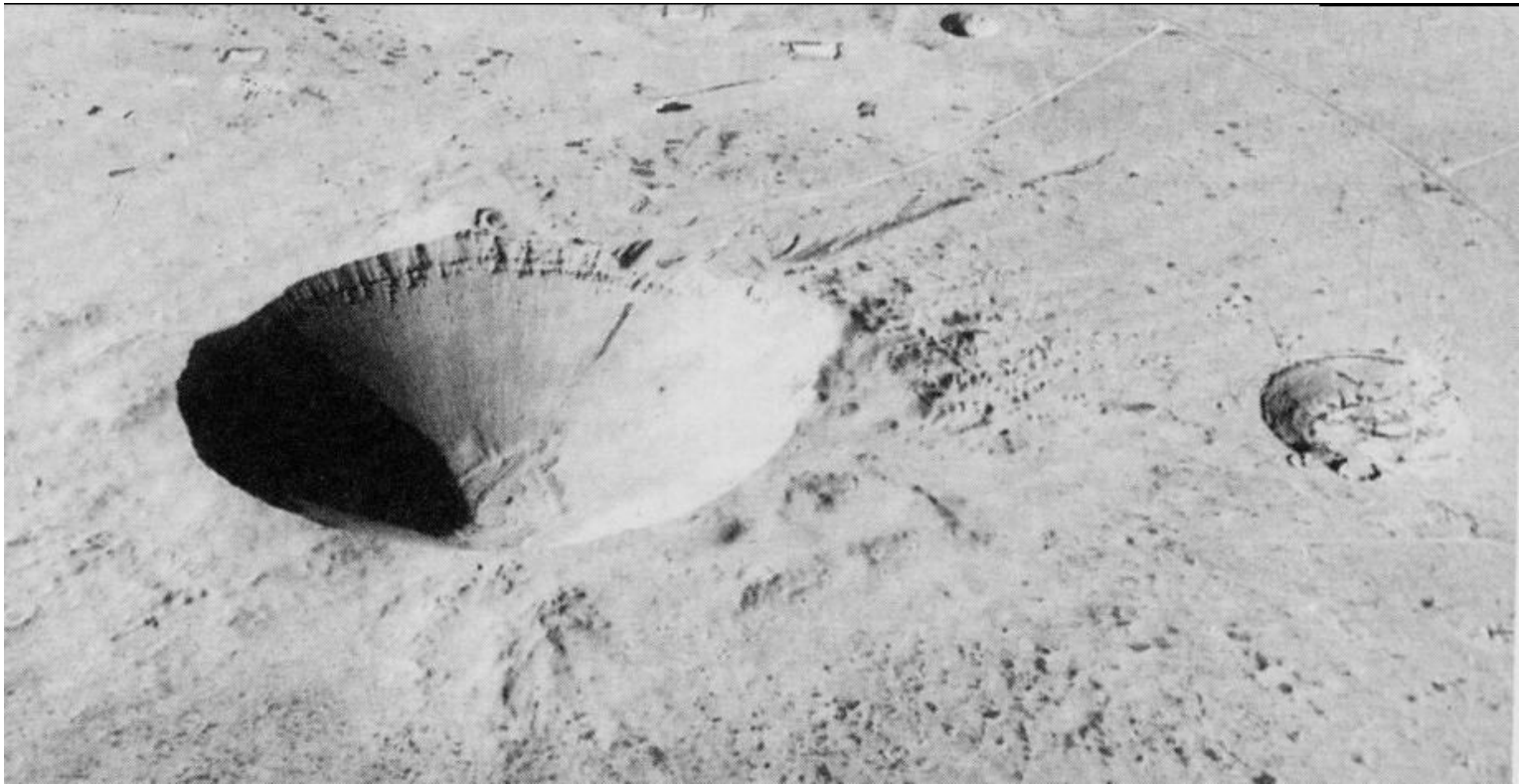
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- 3D a partir de 2D
  - Sombreamento
  - Perspectiva



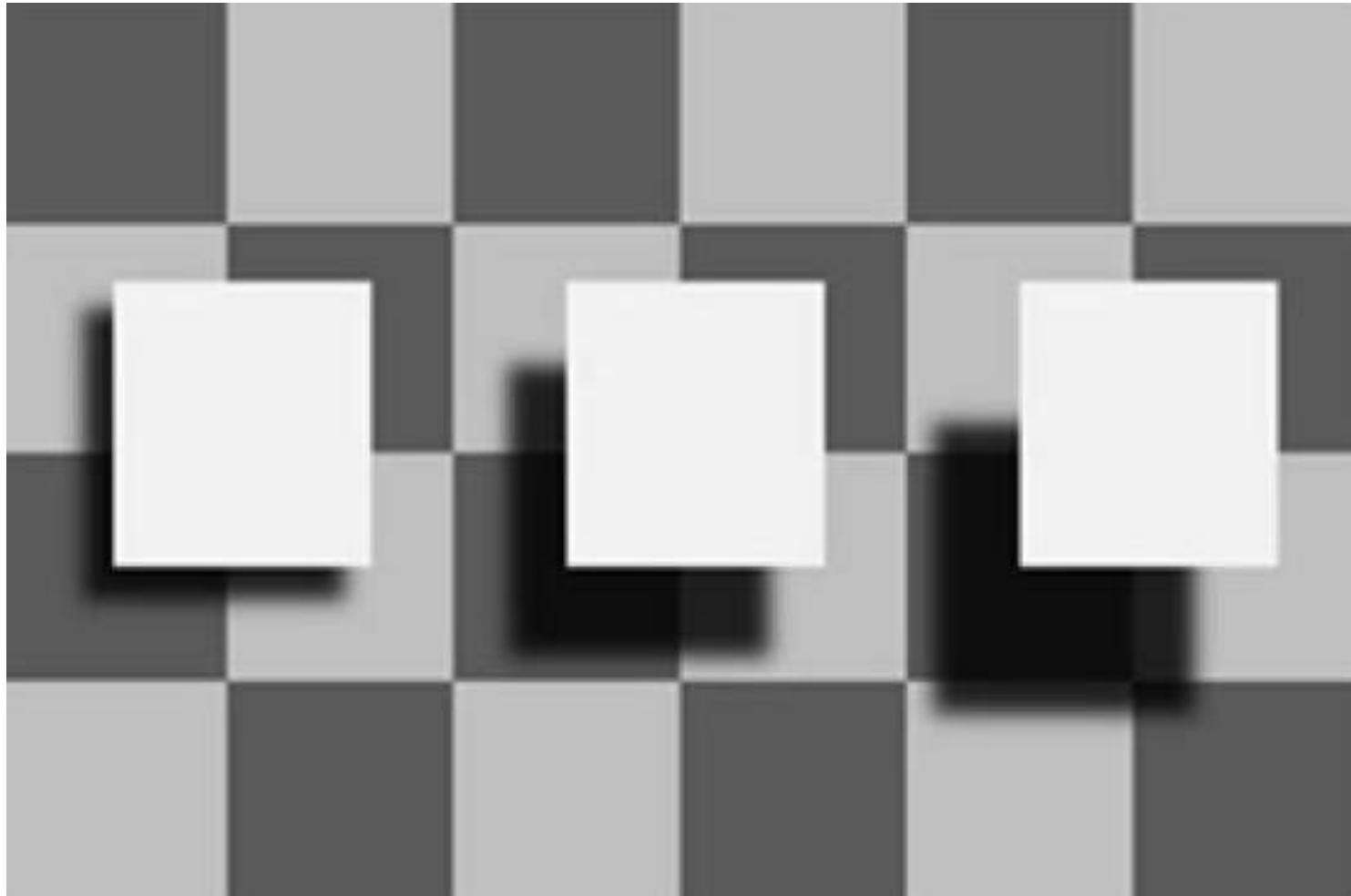
# Visão de profundidade - sombra

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# Visão de profundidade - sombra

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Andre Derain, Retrato de Henri Matisse, 1905

“Eu não pinto coisas. Eu apenas pinto a diferença entre elas”

Henri Matisse

# Visão de profundidade - cor

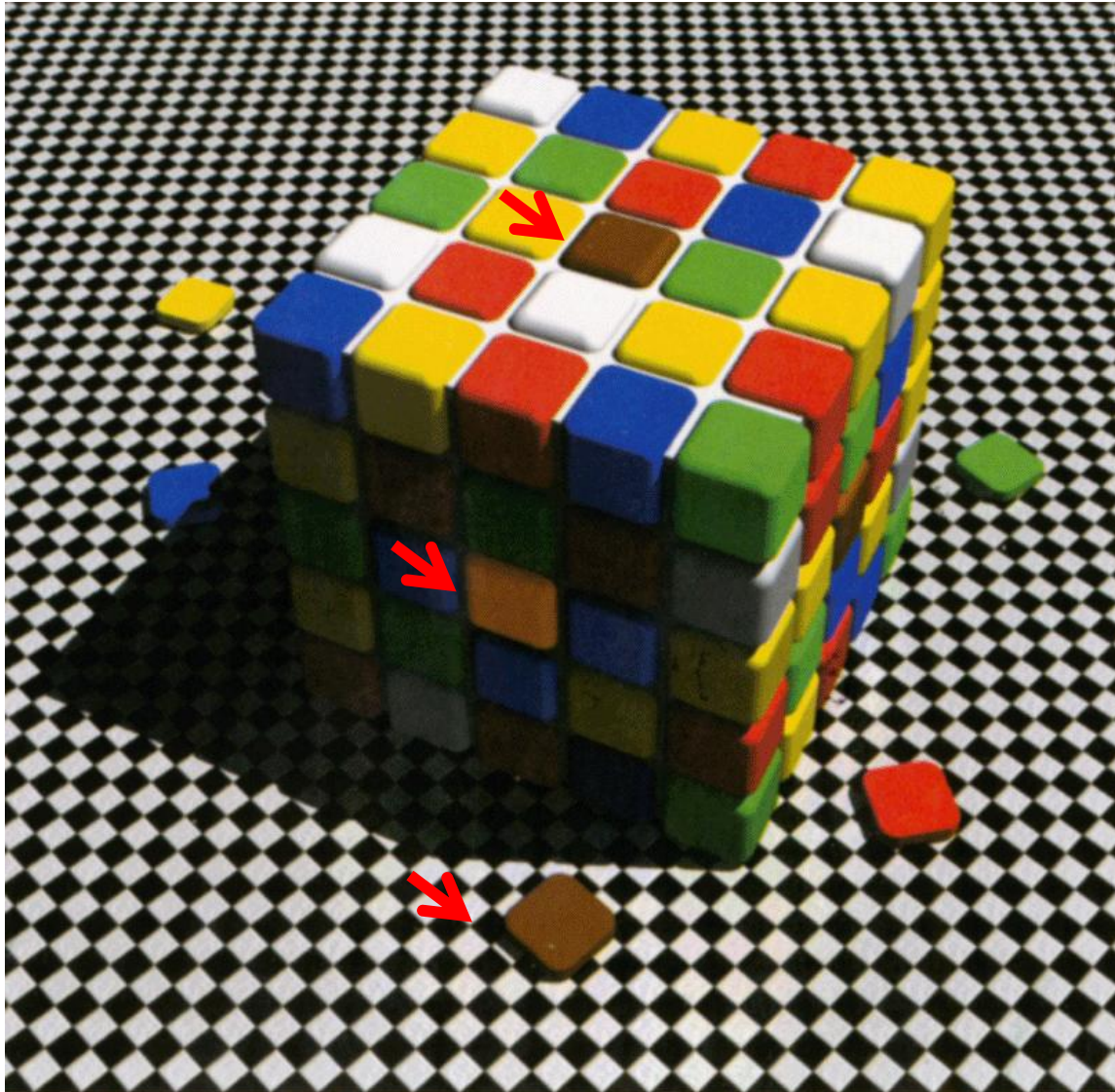
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# Visão de cores – contraste de cor

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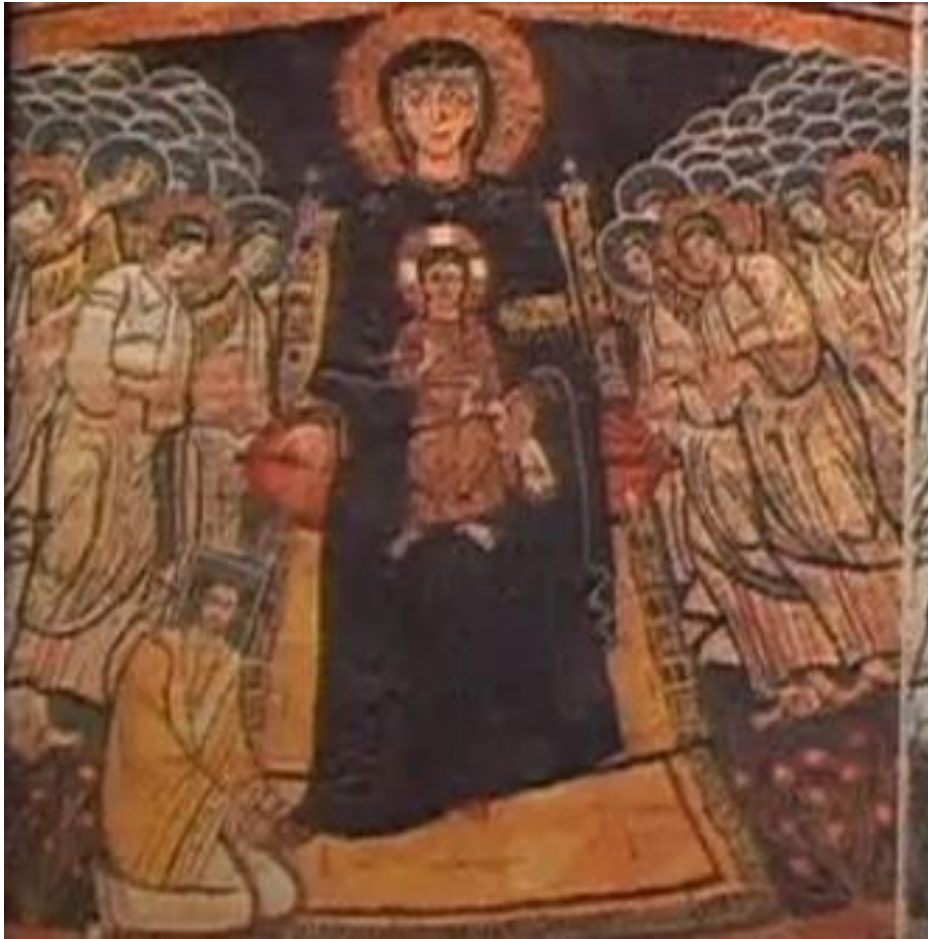
# Visão de profundidade - cor

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# Visão de profundidade - cor

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# Visão de profundidade - cor

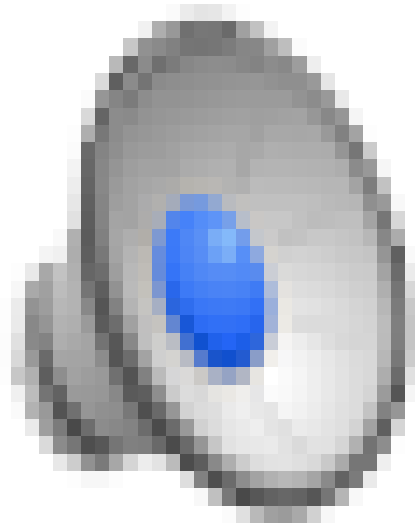
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# Movimento

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- Impressionismo
  - Favorecido por baixo contraste de cor





Joaquín Sorolla: *La hora del baño* , 1904

# Inspiration preceding brain science



Black Beast, 1939. Alexander Calder.

# Inspiration preceding brain science

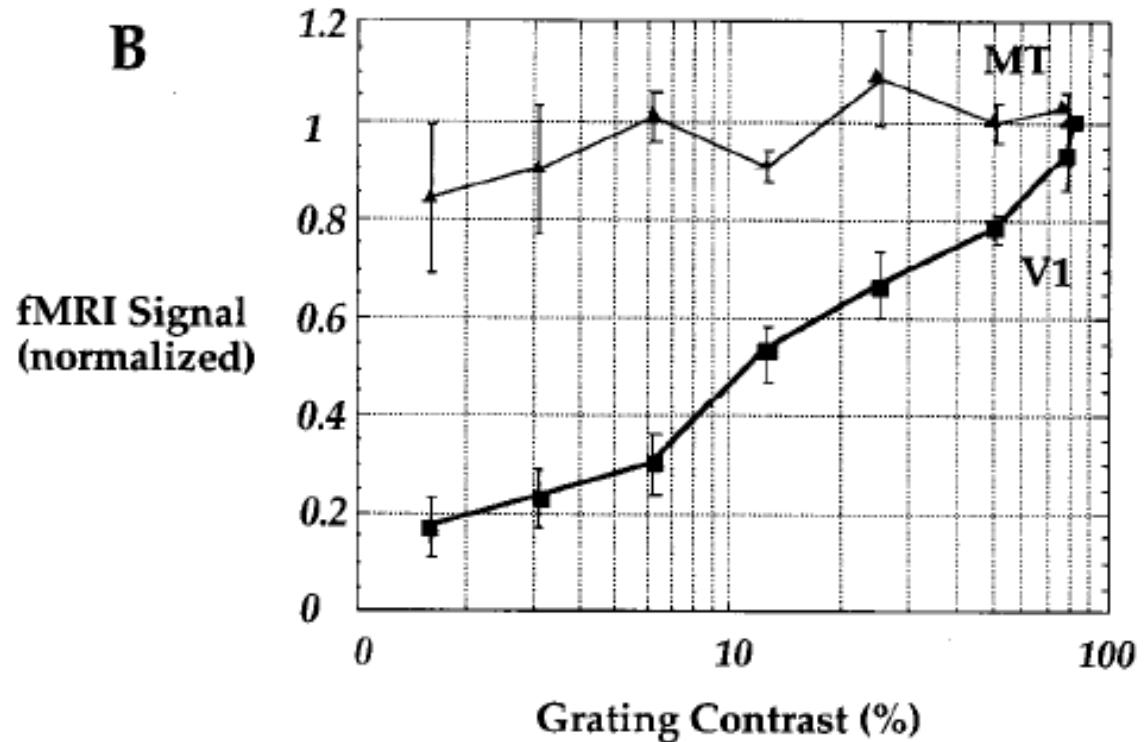


Métamatic n° 7, 1959. Jean Tinguely



# Motion processing in the brain

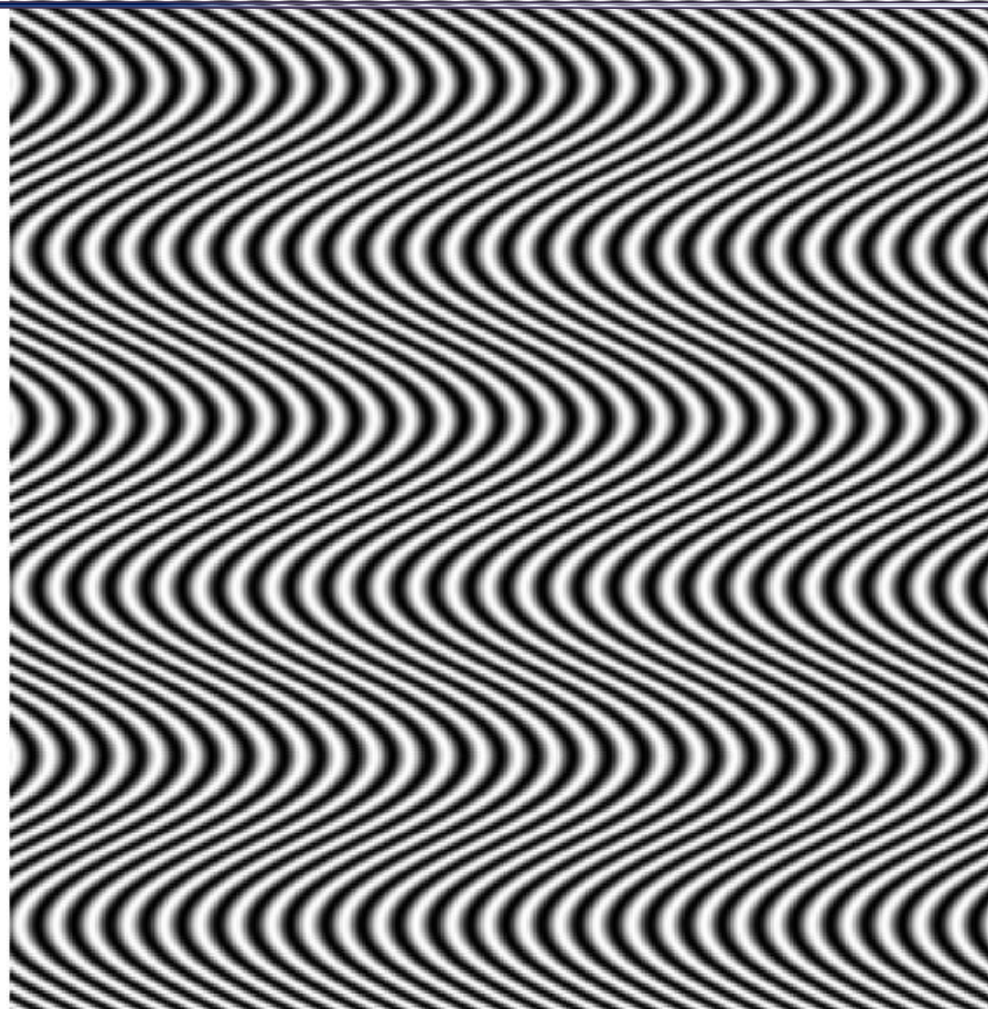
- 1990`s
  - MT area or V5
    - Responds well to luminance contrast
    - Activity decreases with color



TOOTELL et al, 1995

# Artistic experience - aesthetics

- Motion
- Shimmering
- Discomfort



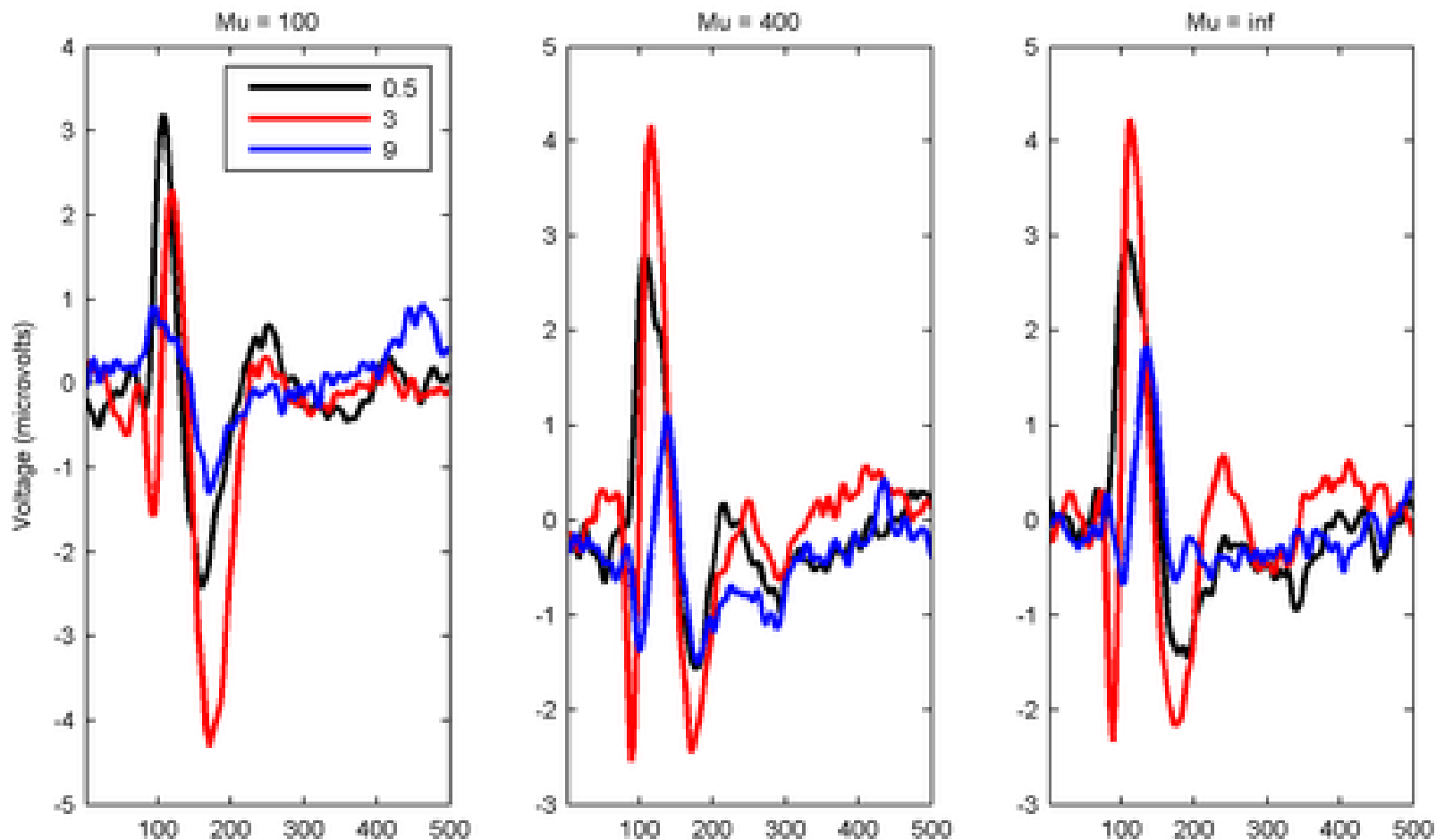
(O'Hare et al, 2015)

O' Hare L, Clarke ADF, Pollux PMJ (2015) VEP Responses to Op-Art Stimuli. PLoS ONE 10(9): e0139400.

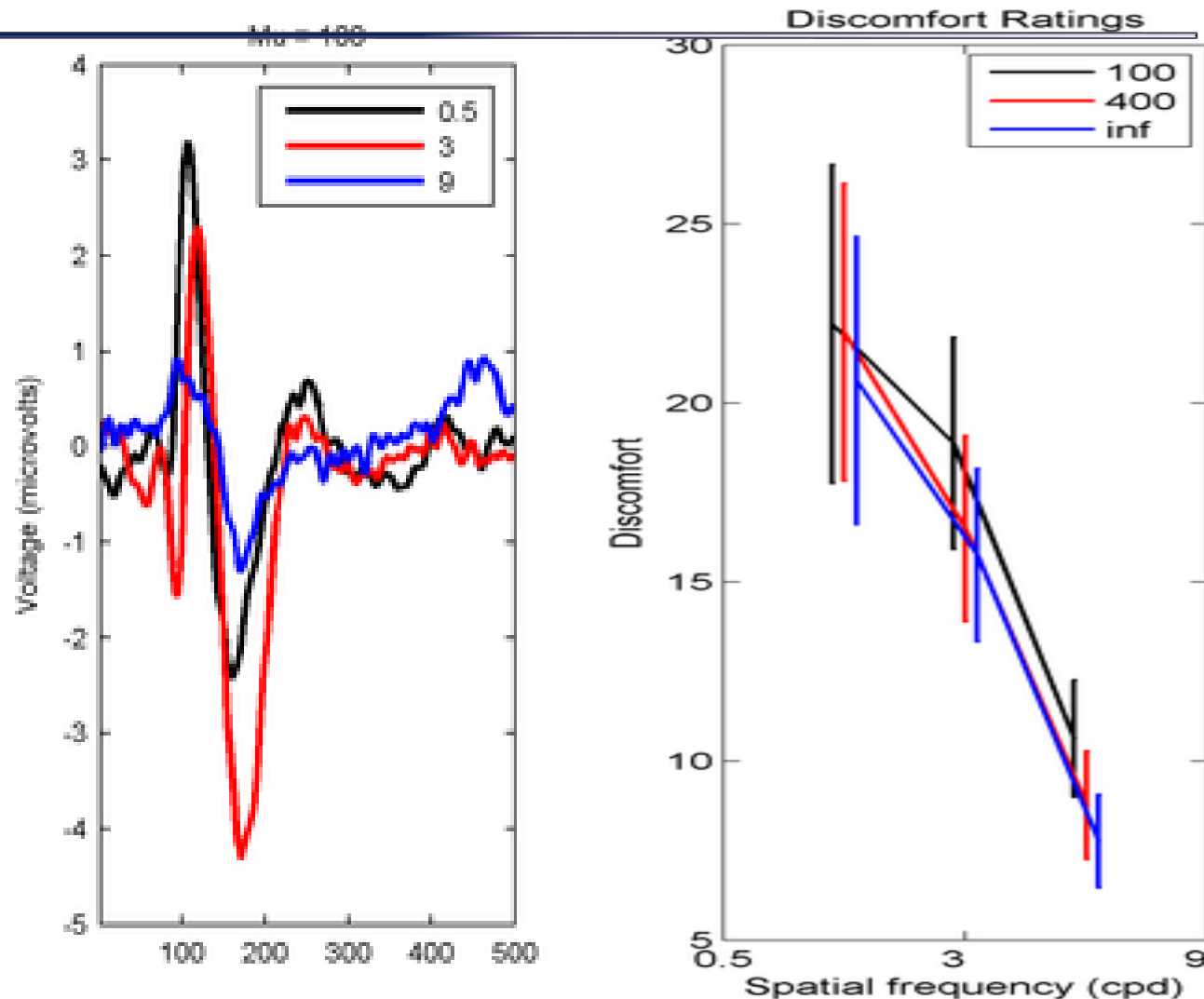
doi:10.1371/journal.pone.0139400

<http://journals.plos.org/plosone/article?id=info:doi/10.1371/journal.pone.0139400>

# Op-art - Visual Evoked Potential



# Brain waves & subjective discomfort



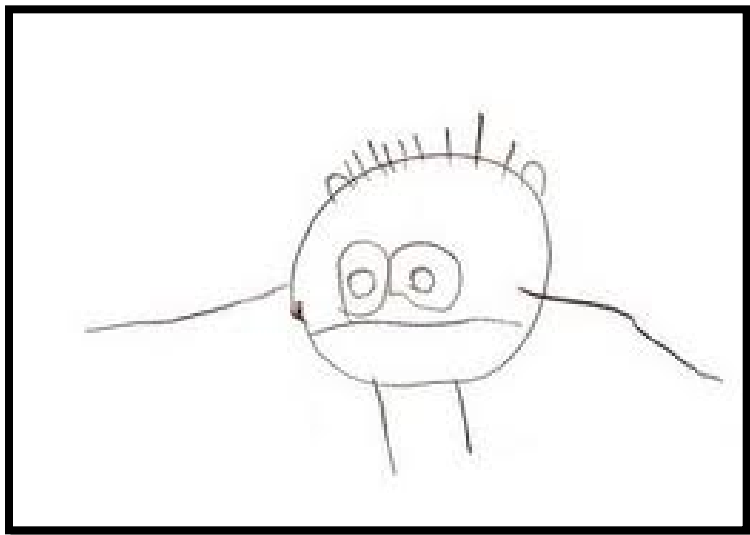
# OP art - PVE

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- Amplitude do PVE correspondeu ao julgamento de desconforto para frequências espaciais mais altas
- Linhas mais curvas também tiveram julgamento maior de desconforto
- Junção movimentos oculares e nível de atividade cortical compuseram fatores associados ao nível de desconforto

# Reconhecimento de faces

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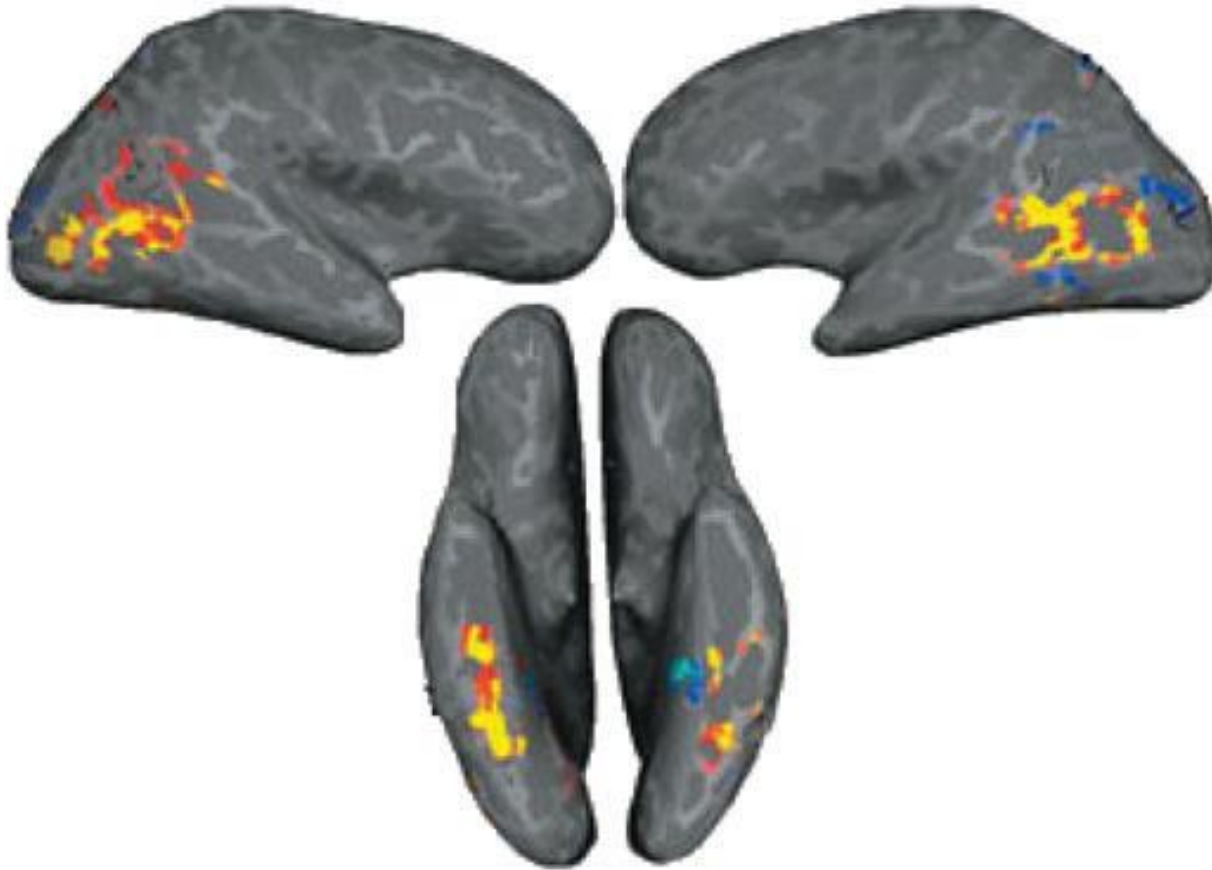
# Picasso

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# Reconhecimento de faces

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# Outline

- Artistic Experience
  - Aesthetics
- Artistic Expression
  - Inspiration & creativity



# Artistic experience - aesthetics

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Madame X, John Singer Sargent

- Humans seek for aesthetic experiences
- Neural correlates
  - Similar across people but aesthetic sense is highly variable among individuals

# Artistic experience - aesthetics

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- Humans seek for aesthetic experiences
- Neural correlates
  - Similar across people but aesthetic sense is highly variable among individuals



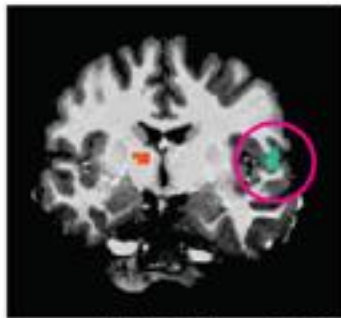
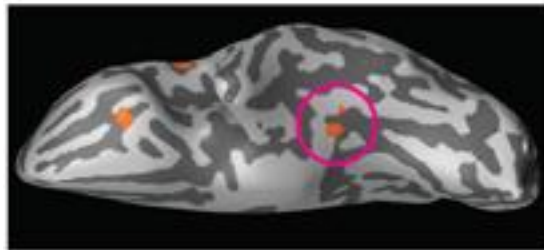
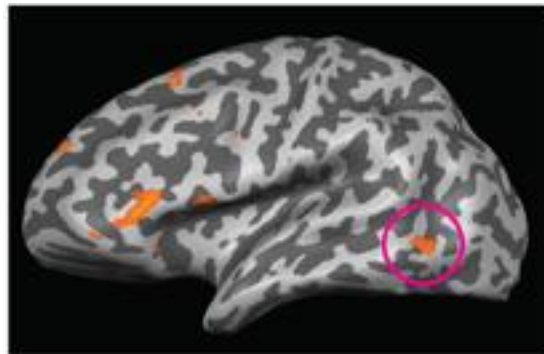
# Individual aesthetic experience

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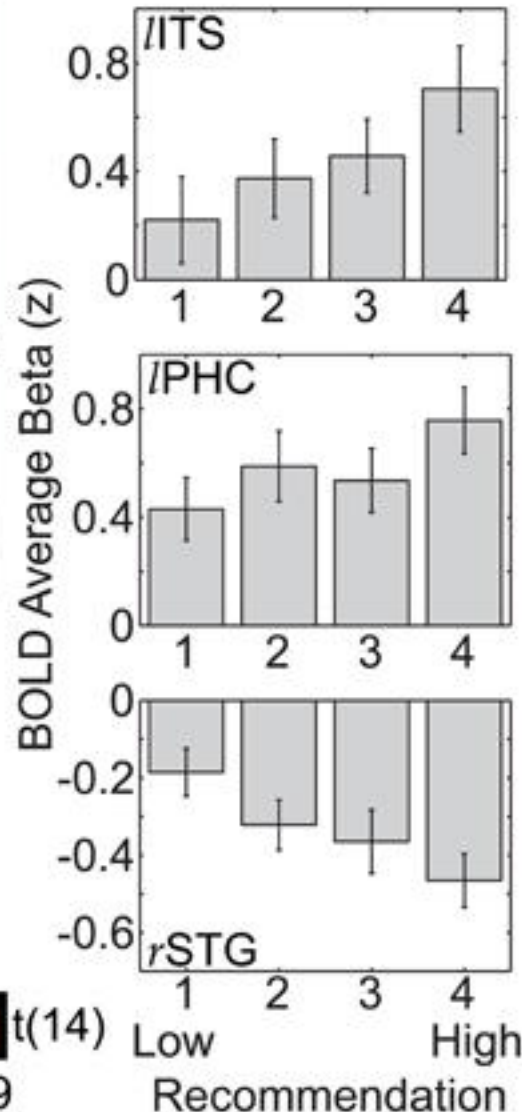


how strongly do these paintings move you?

# Sensory (occipito-temporal) and Striatum

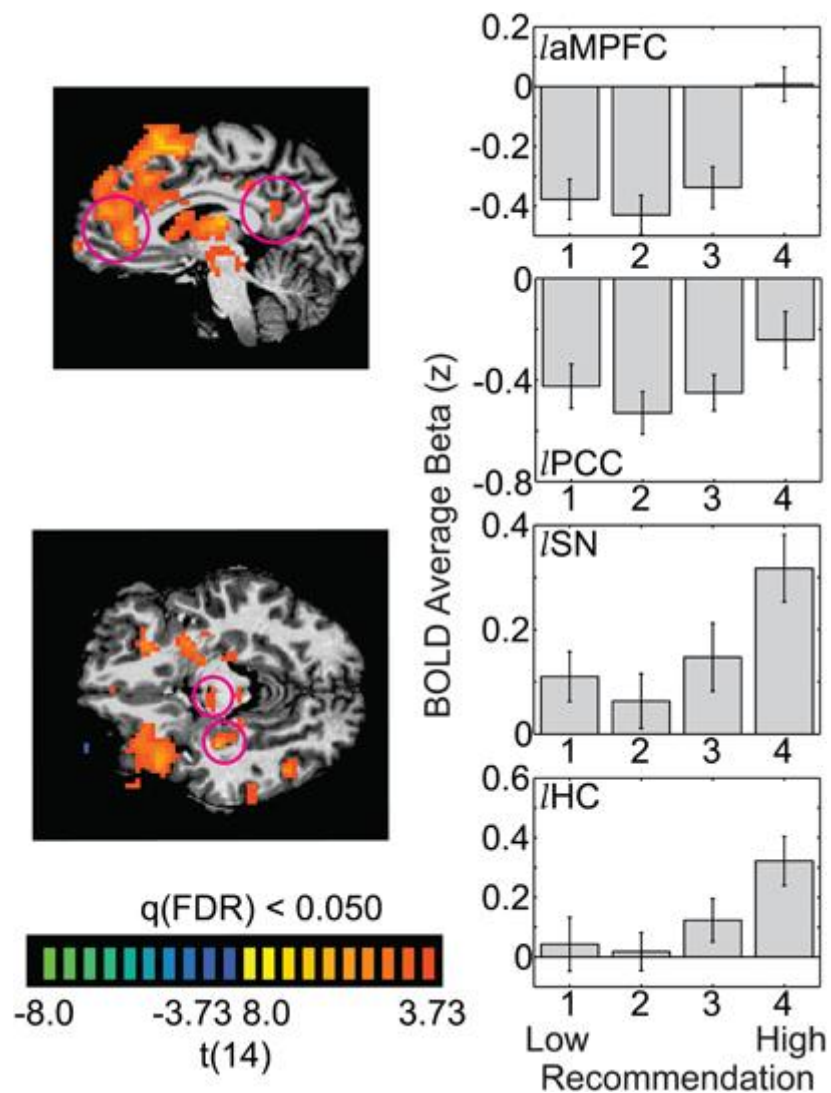


q(FDR) < 0.050



BOLD varied linearly with 4-level ratings

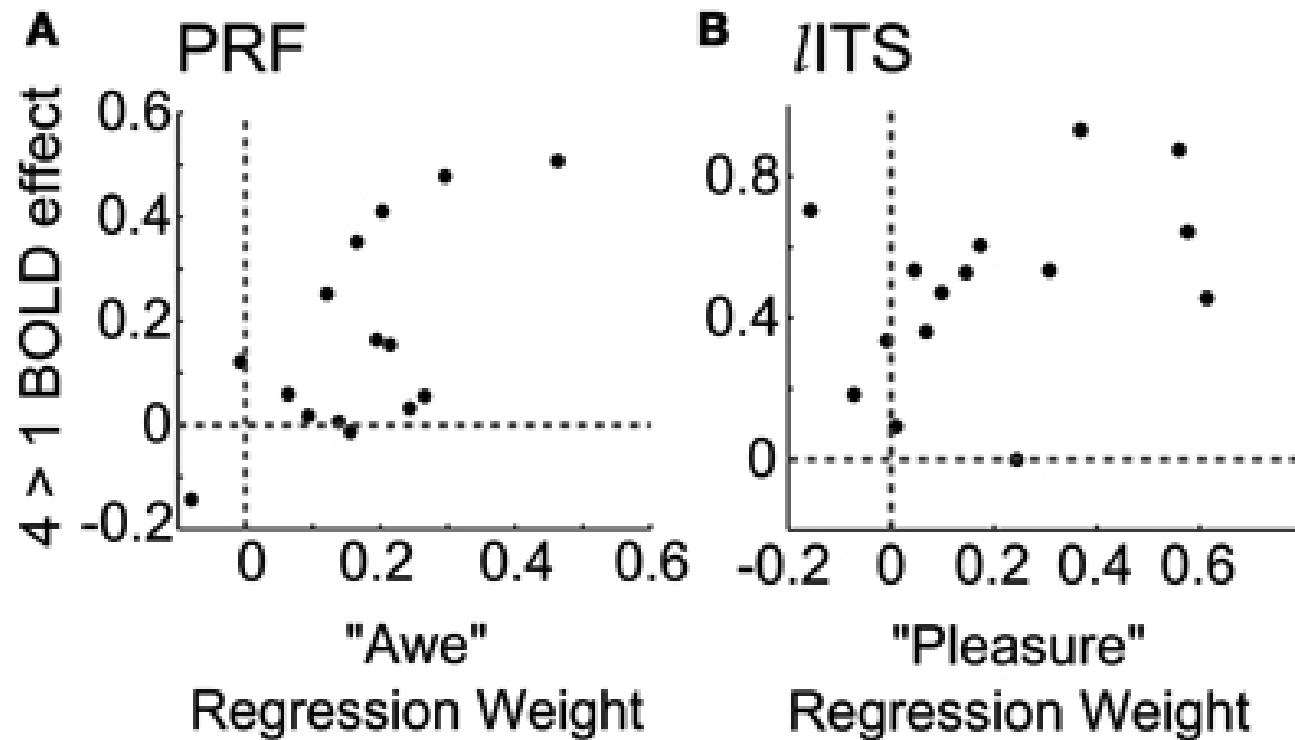
# Frontal and subcortical areas



Step-like activity. Increase only for the most moving artworks

# BOLD response & subjective judgement

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Subcortical areas are related to the individual differences in the importance of the evaluation

# Aesthetic differences

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- Relies on
  - Integration of neurally separable sensory and emotional reactions and central structures → subjective and personal nature of aesthetic experience



# Degas

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Bailarinas  
descansando, 1884



Duas bailarinas, 1898



Duas dançarinas descansando, 1912



# Van Gogh

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- Xantopsia
  - Intoxicação por solventes



# Van Gogh

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- Xantopsia
  - Intoxicação por solventes



# Monet

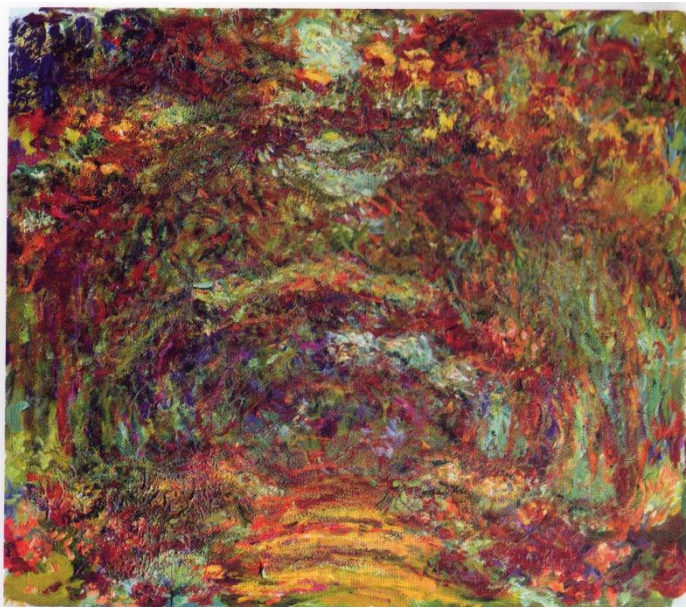
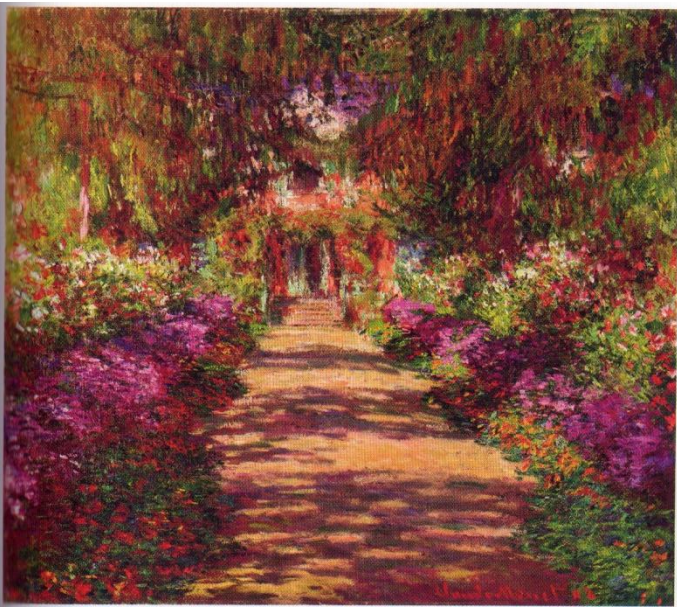
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# Monet

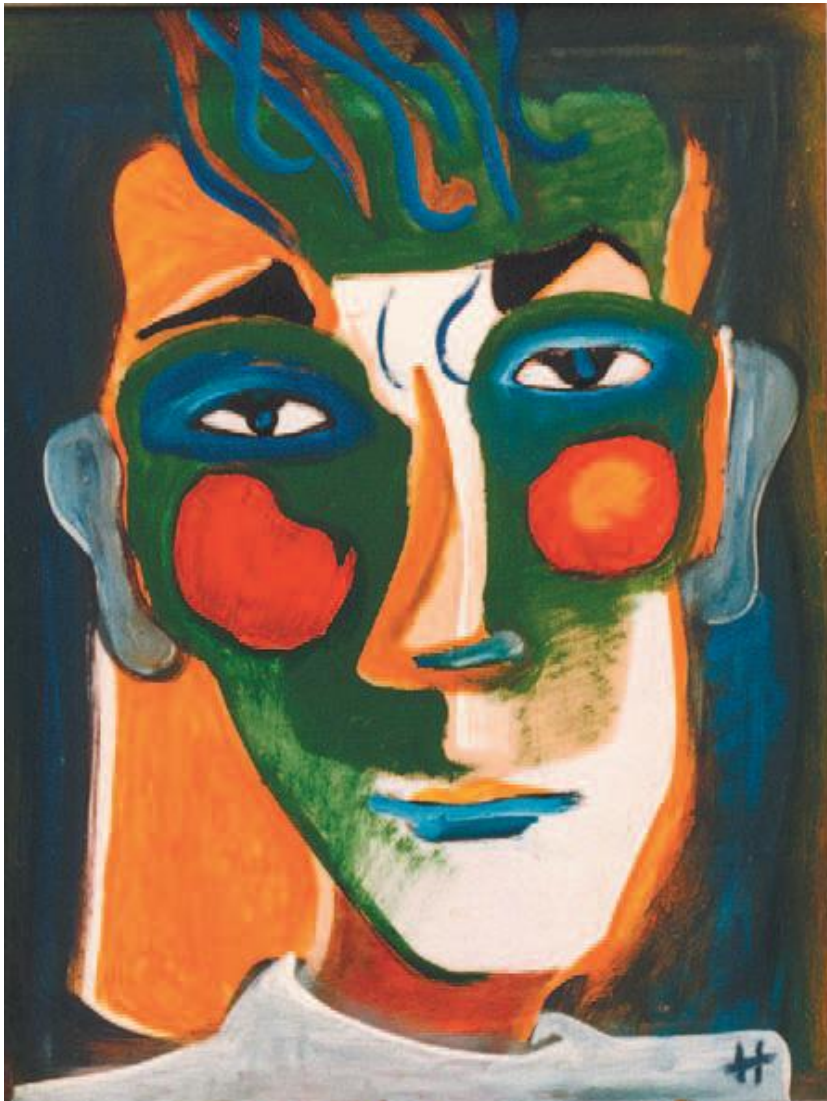
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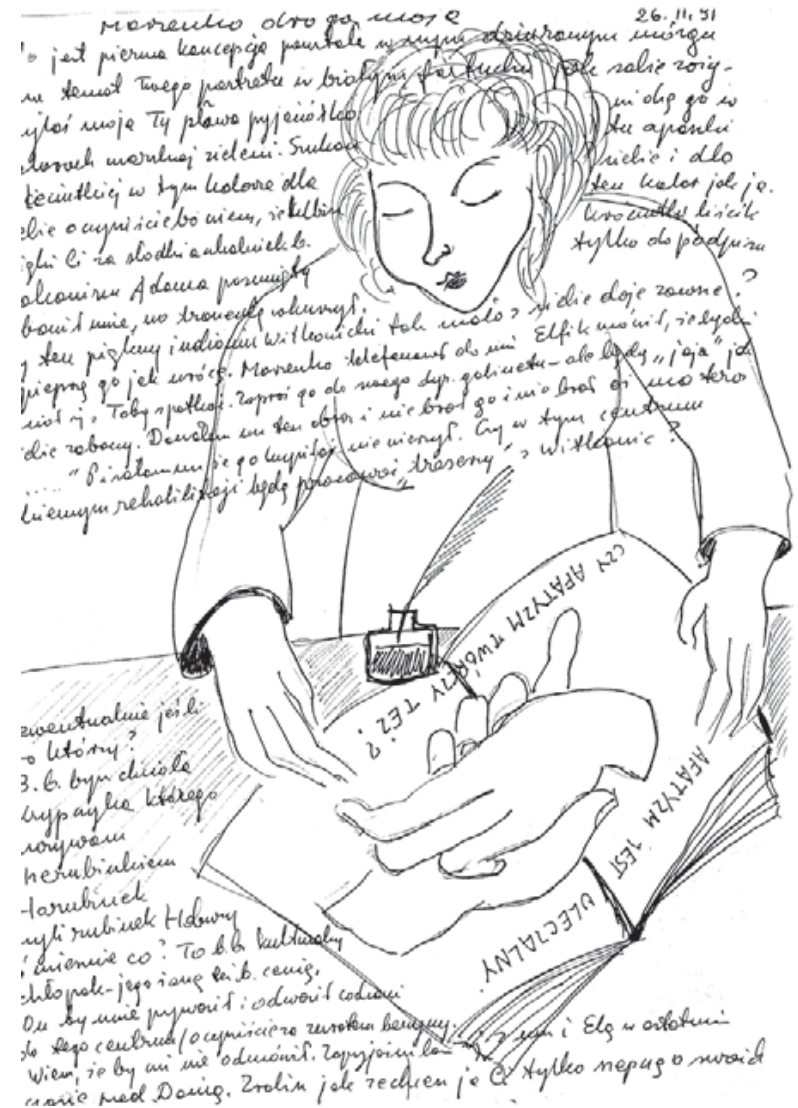




# Artistic expression - inspiration



Elfik, Krystyna Habura

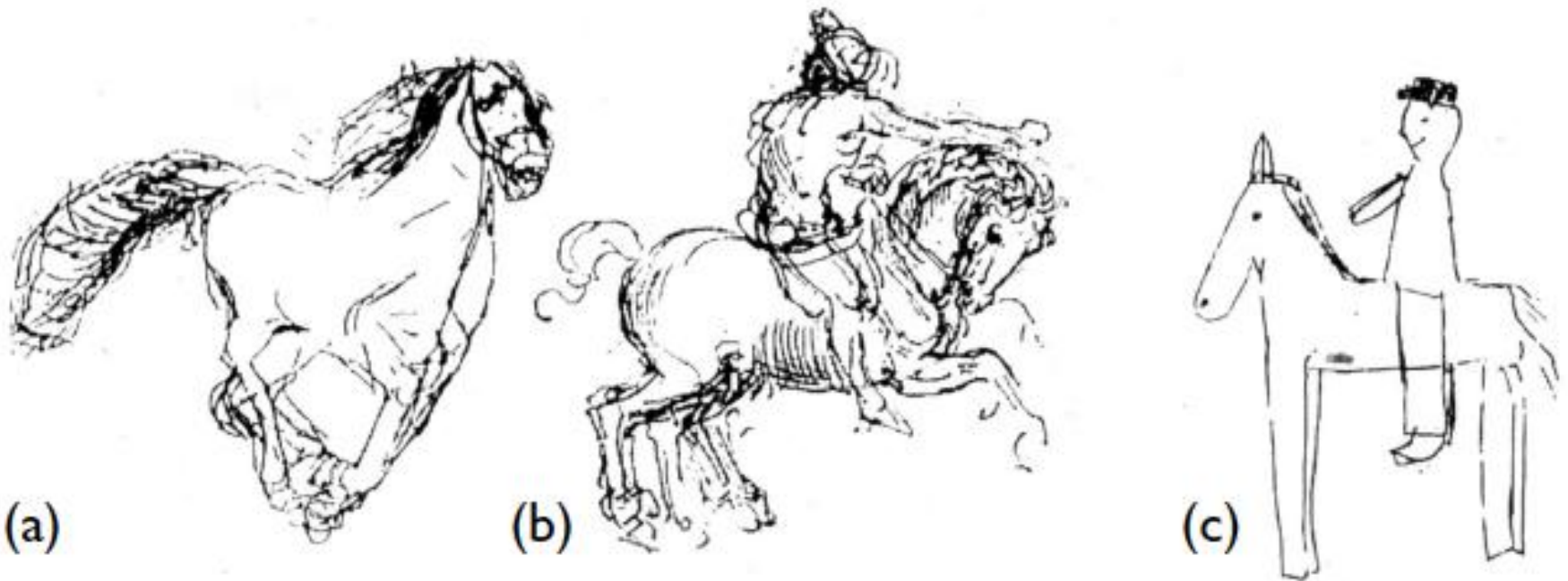


Painted letter, Krystyna Habura



# Artistic expression – ability

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# Clifton Pugh

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- Daltonismo
- 3 Prêmios Archibald



# Resumo

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- Não vemos o mundo diretamente
  - Entrada sensorial processada de retina ao cérebro
    - Identificação de padrões
    - Contexto
    - Experiência anterior
- Visão não é transmissão de imagem. É processamento de informação
  - Atividade neural

# Resumo

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- Fisiologia da visão pode determinar percepção de arte
- Artistas fazem uso deste fato
- O trabalho artístico vai além dos processos visuais
  - Grandes artistas com visão alterada

# Artistic expression & the brain

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- Brain function clearly affects art creation
  - For the good and for the bad
- Artistic creation is in agreement with brain scientific knowledge

# References

1. VEP Responses to Op-Art Stimuli. O'Hare, Louise; Clarke, Alasdair D. F.; Pollux, Petra M. J.. PLOS ONE Volume: 10 Edição: 9 Número do artigo: e0139400 Publicado: SEP 30 2015
2. The brain on art: intense aesthetic experience activates the default mode network. Por: Vessel, Edward A.; Starr, G. Gabrielle; Rubin, Nava. FRONTIERS IN HUMAN NEUROSCIENCE Volume: 6 Páginas: 1-17 Publicado: APR 20 2012
3. Rehabilitation of an artist after right-hemisphere Stroke. MariaPaçhalska1ABCDEF, , Bożena Grochmal-Bach, Magdalena Wilk, Leszek Buliński. Med Sci Monit, 2008; 14(10): CS110-124.
4. The Artful Brain. V. S. Ramachandran. Fourth Estate, 2002
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- Os girassóis de Van Gogh. Lacerda E.M.C.B. *Neurociências*;5(2):57-120. 2009

# Obrigada

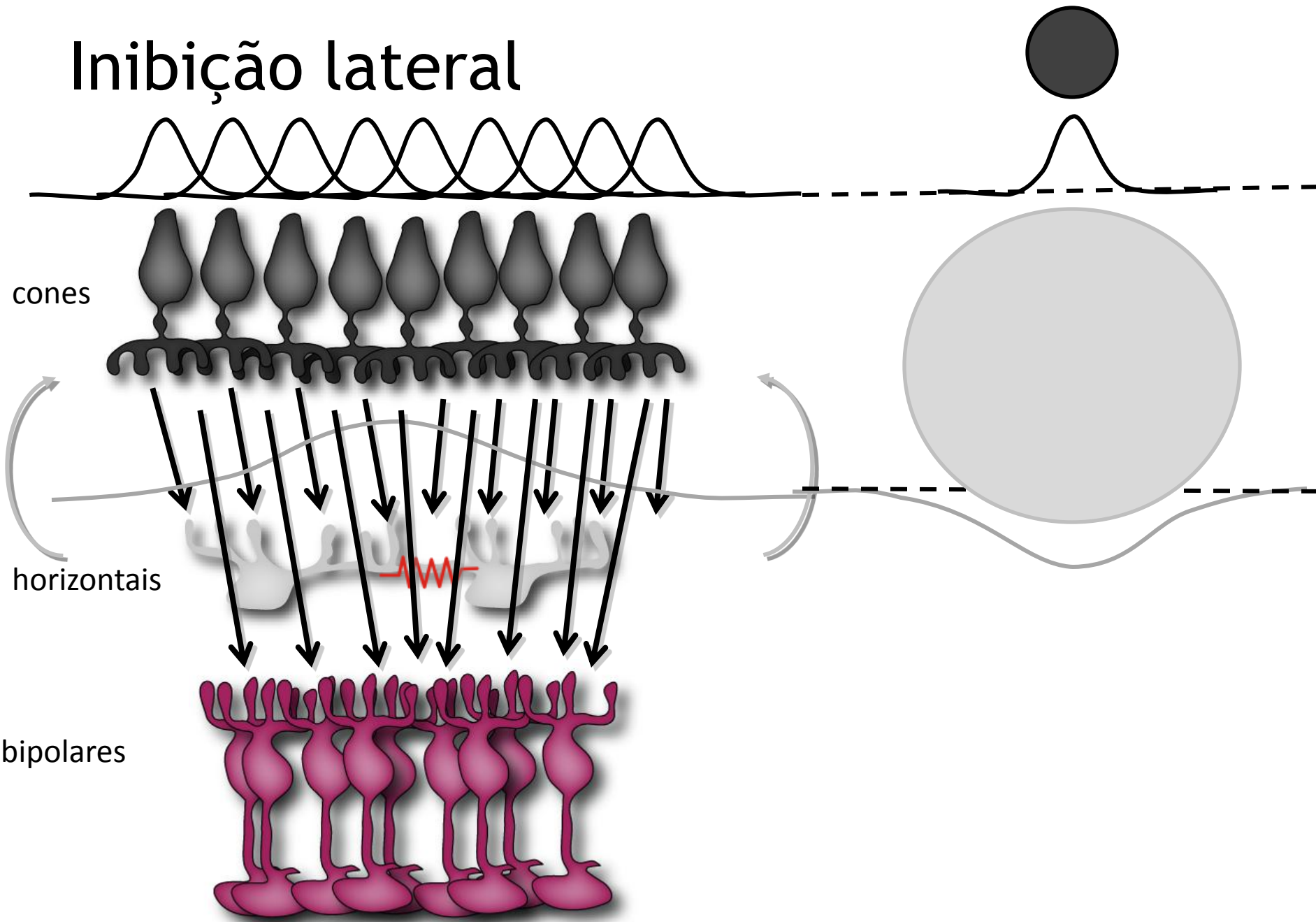
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# Slides extra

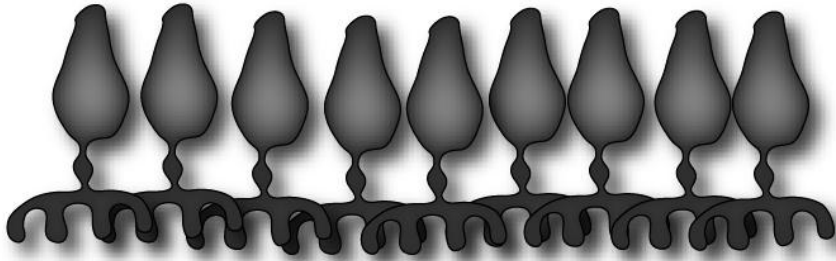
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# Inibição lateral



# Inibição lateral

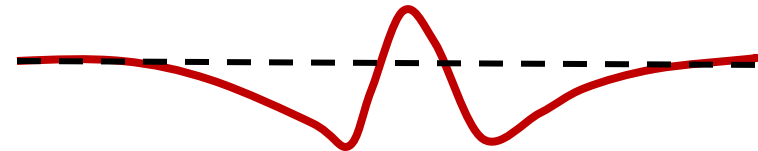
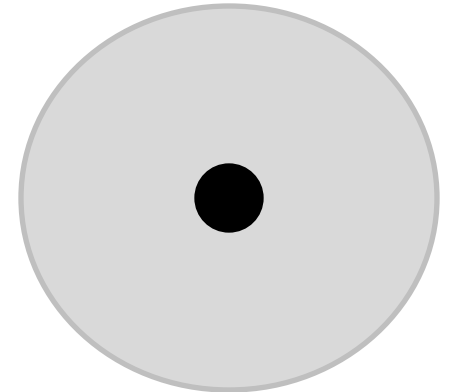
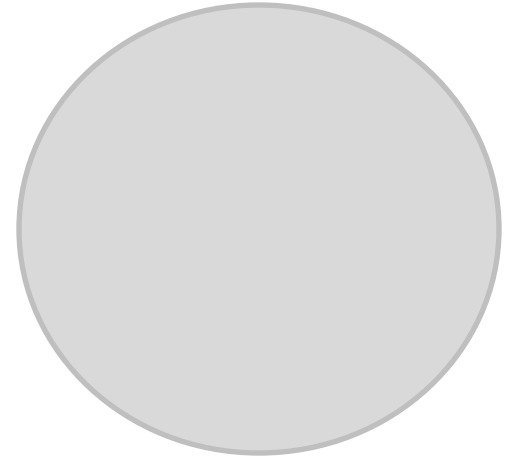
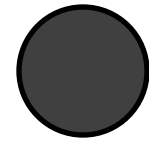
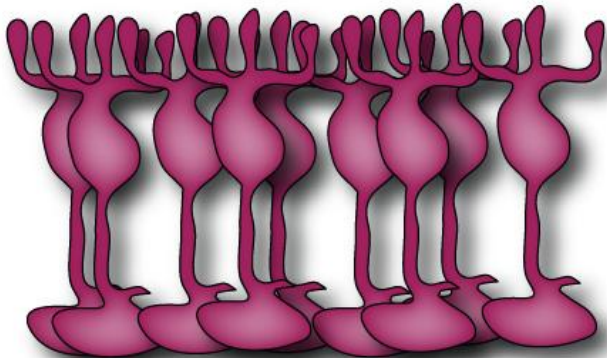
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horizontais



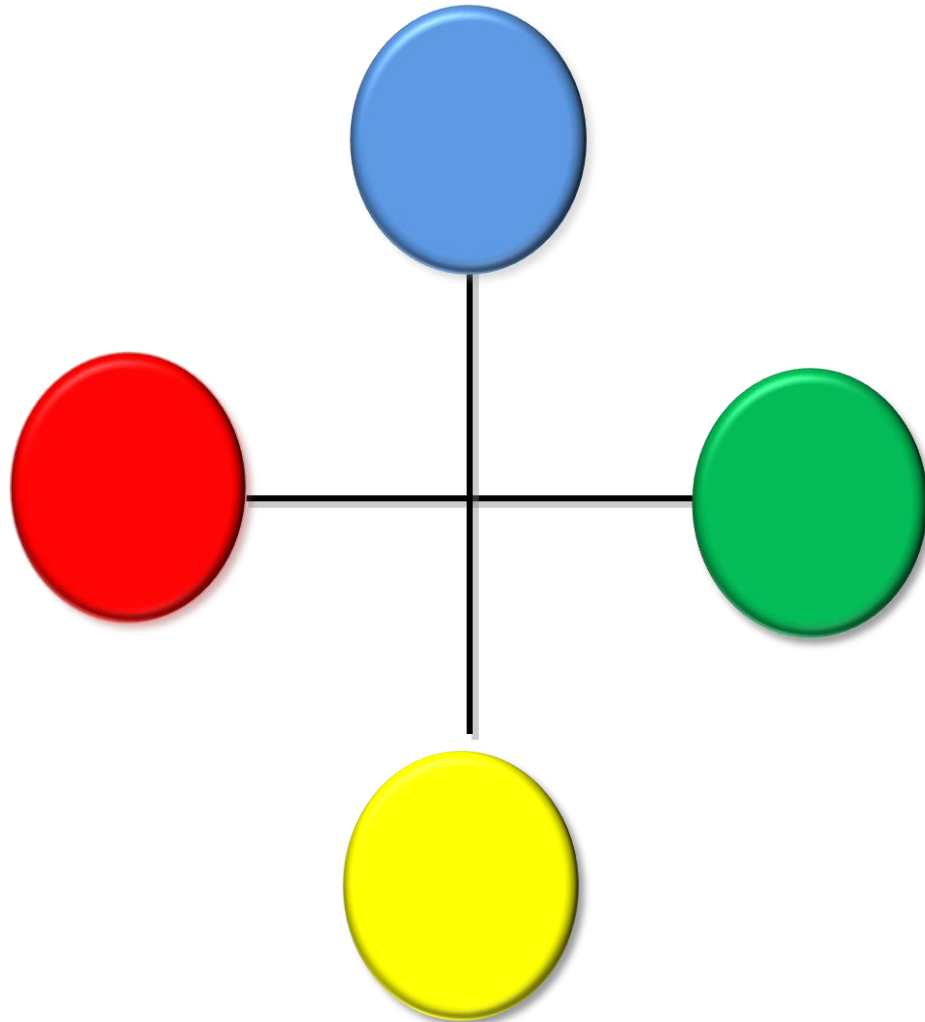
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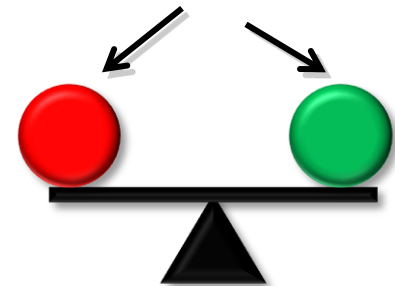


# Oponência cromática

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**Oponência de  
coress**

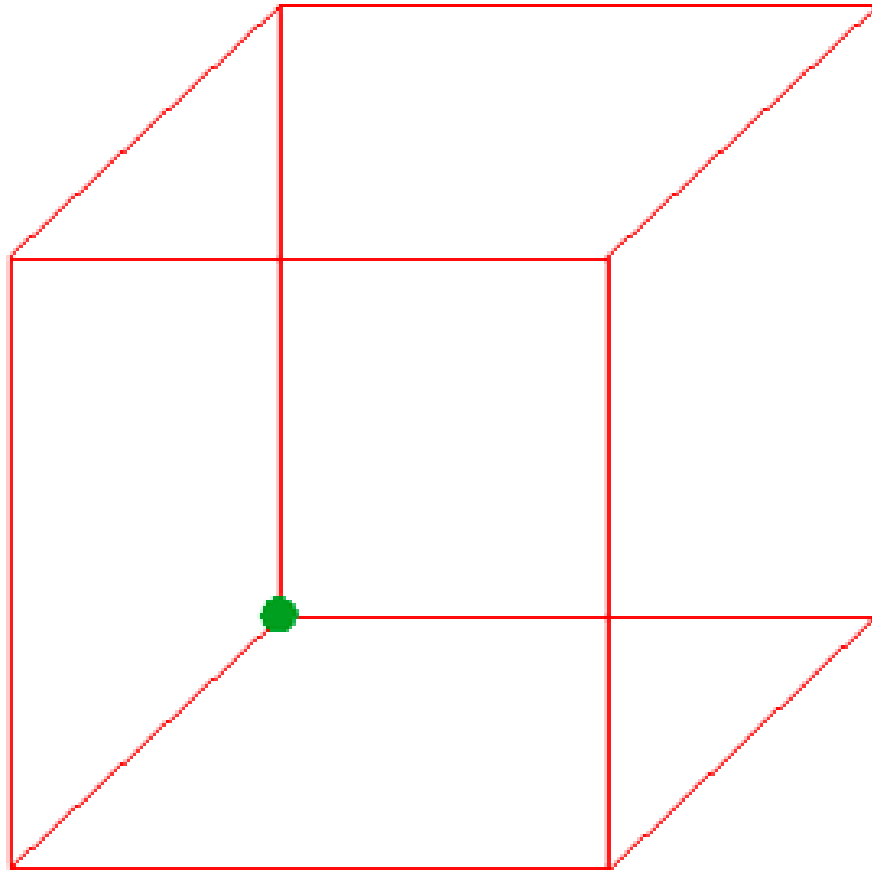


# Esref Armagam

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# Percepção: teste das hipóteses possíveis



# Percepção: teste das hipóteses possíveis

