

# THE DARK HEART OF OUR BRIGHTNESS

(mood disorders and scientific creativity)

A public lecture by

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# Our community is still mourning the loss of Andrew Lange

- Flat geometry of the universe (Boomerang experiment)
- Balzan Prize 2006, Dan David Prize 2009, NAS AAAS member
- PMA division chair

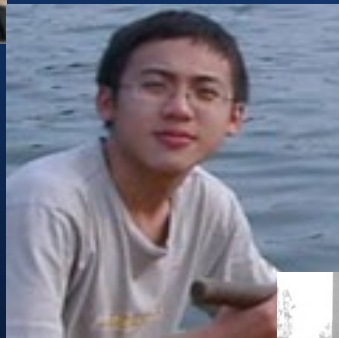
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- suffered from mood disorder
- took his own life

Many find this very hard  
to comprehend ...



# Three student deaths last year



- Brian Go
- Jackson Wang
- Long Phan

One or more may have suffered from a mood disorder....

Why so frequent?

Why so deadly?

# What are mood disorders?

Bipolar disorder is a *spectrum*



*Cyclothymia*

*Full blown MD*

# Alternating phases of (hypo)mania and depression

## Hypomania : (m)

- Euphoric highs
  - Boosts of energy
  - Diminishes sleep
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## Mania: (M)

- Racing thoughts
- Grandiosity
- Hallucinations, delusions

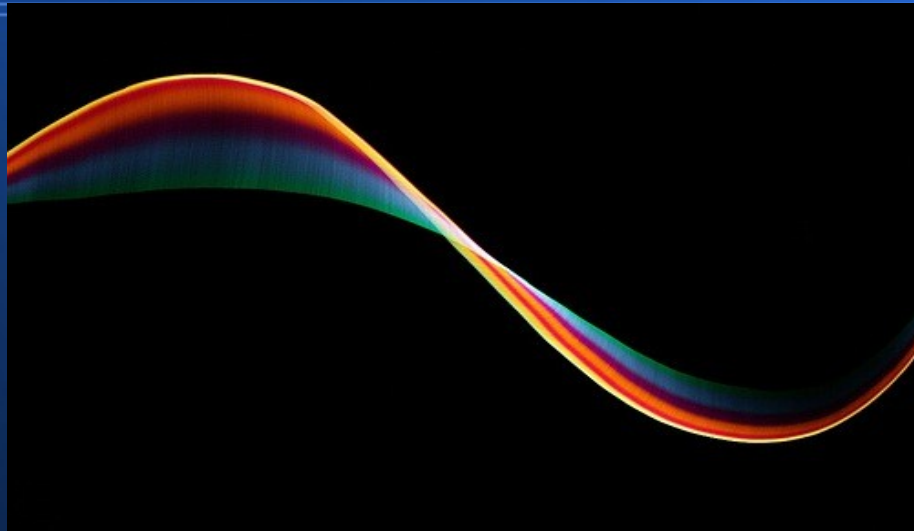
## Dysthymia : (d)

- Fatigue, poor concentration
  - Low self-esteem
  - Helplessness, irritability
- 

## Depression: (D)

- Hopelessness
- Self-loathing
- Suicidal thoughts

# Cycling through phases



- Cyclothymia (md)
- Type I bipolar (Md)
- Type II bipolar (mD)
- Rapid cycling/Mixed phases/Schizoaffective

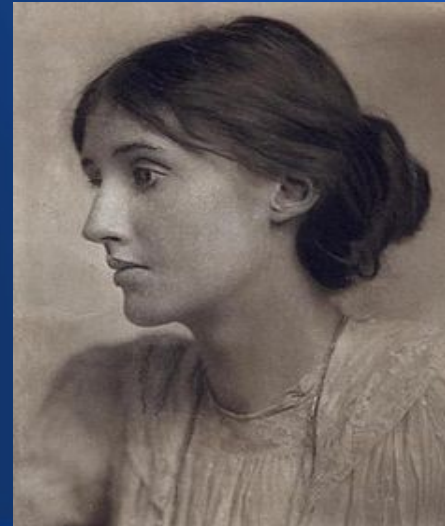
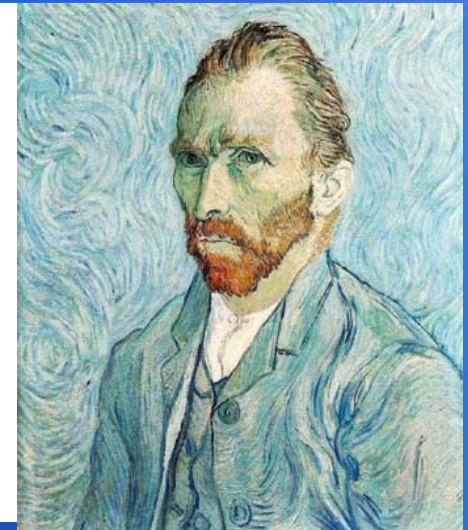
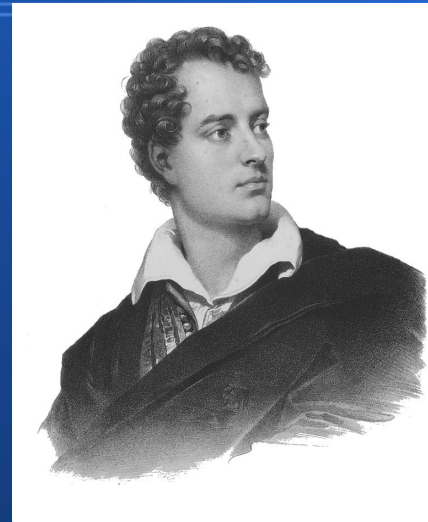
# Correlates strongly to creativity

- Incidence in the general population: ~ 1%
- Incidence in the creative professions (artists, writers, **scientists**): > 10%
- Recent study (New Scientist, Feb 2010)  
Straight A students are 4.4 times more likely to have bipolar disorder than the rest of the student population...  
Who is at risk?



# Famous cases of bipolar disorder

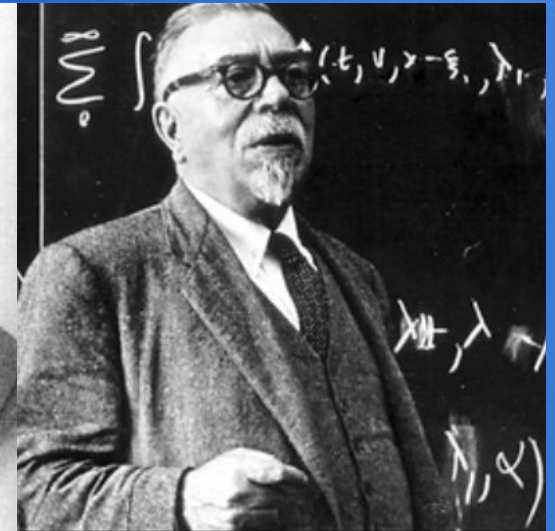
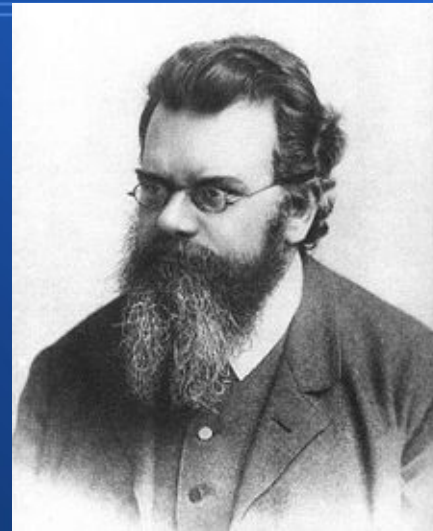
- Lord Byron (poet)
- Vincent van Gogh (painter)
- Virginia Woolf (writer)
- Robert Schumann (composer)





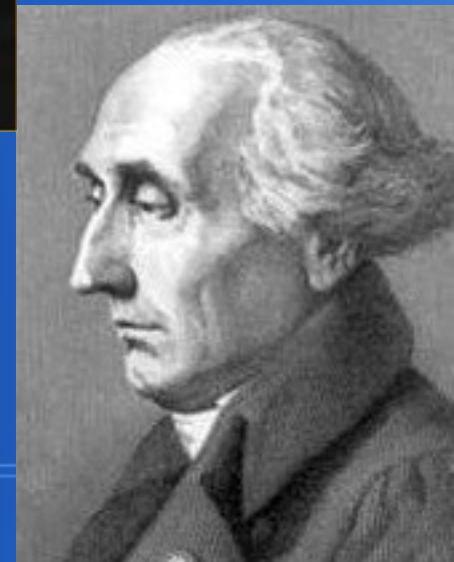
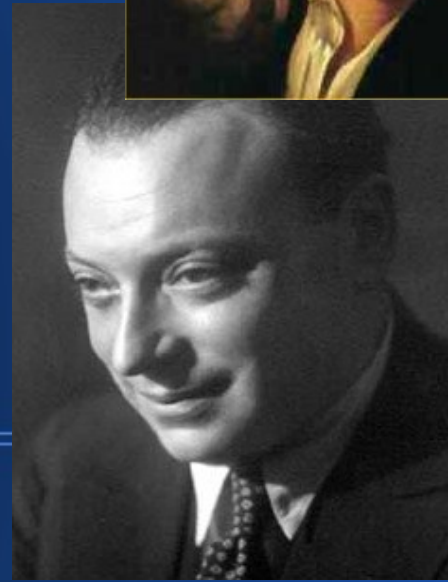
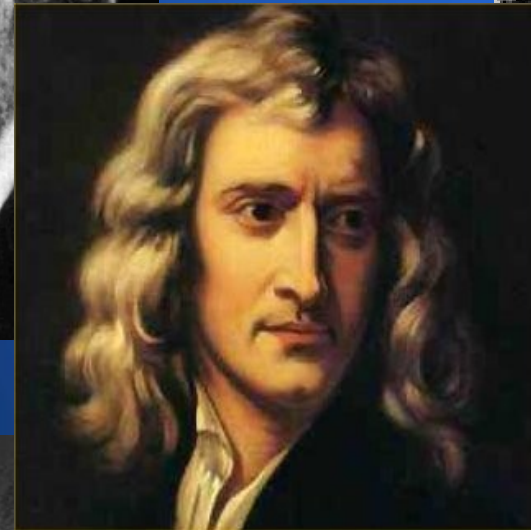
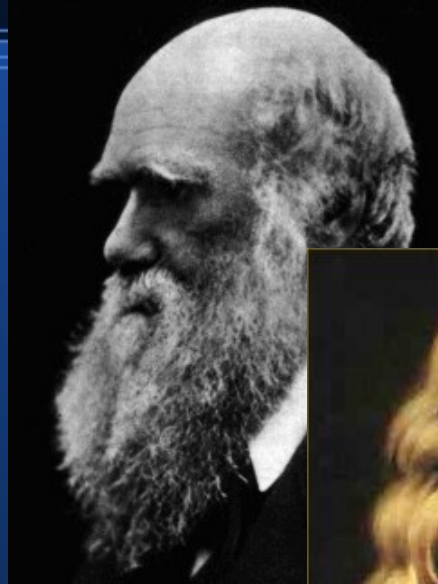
# Bipolar scientists

- Ludwig Boltzmann  
(physics -- Entropy)
- Norbert Wiener  
(math – Cybernetics)
- Georg Cantor  
(math – Transfinite theory)
- Ada Byron  
(math – Programming)



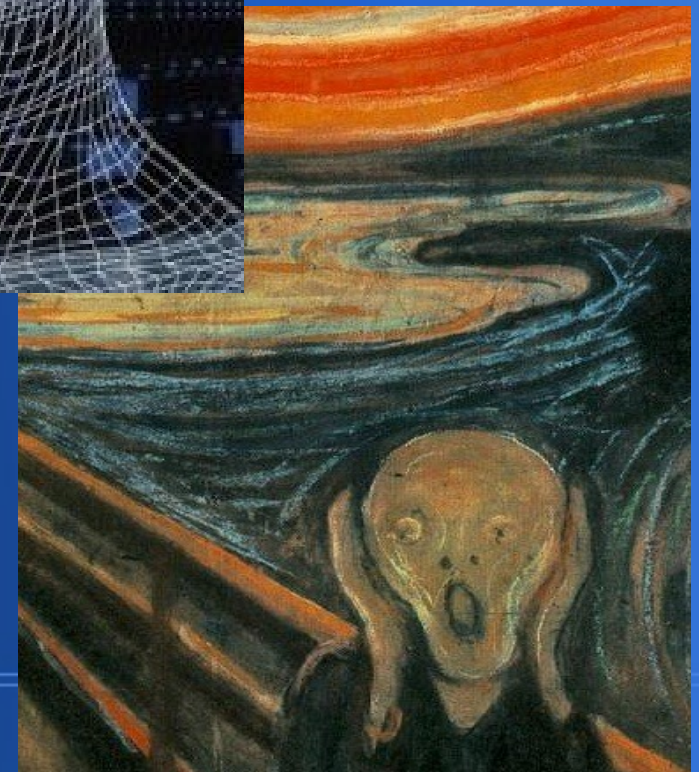
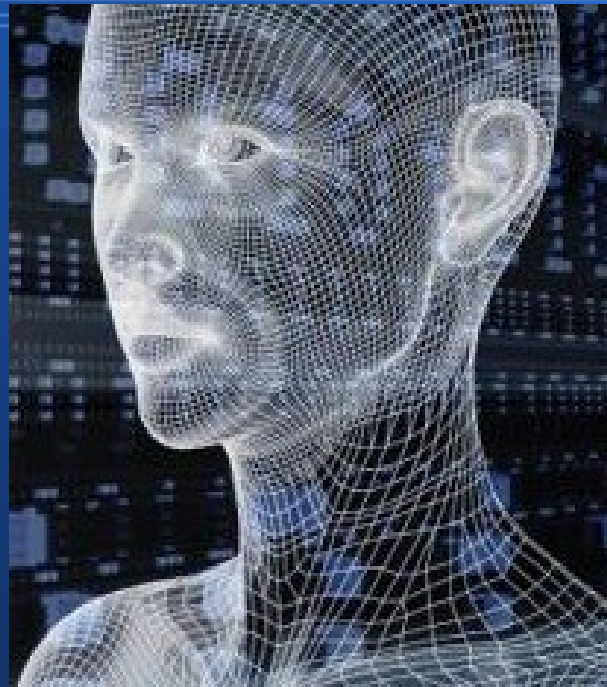
# Likely bipolar scientists

- Sir Isaac Newton  
(physics – Gravitation)
- Charles Darwin  
(biology – Evolution)
- Sofia Kovalevskaya  
(math – Diff equations)
- Wolfgang Pauli  
(physics – Quantum)
- Joseph-Louis Lagrange  
(math physics – Classical  
Mechanics)



# Much harder for scientists to admit to “mood disorder”

- The “Artistic Temperament”
- Science: balance, objectivity, detachment
- Discipline of control: hide the dark side
- Fear of discrimination in the community





# Science as a mental discipline

- Mathematics and rigorous scientific logic help mitigating the effects of mood disorder
- Highly focused activity engages hypomanic intensity in a safe and constructive way
- ... the Vulcan way to control emotions (Star Trek)



# ... but there is danger

- Bipolar disorder evolves in time: shorter intervals, more intense peaks
- Coping strategies fail with worsening
- High risk of suicide  
(Any mention of suicide from someone with bipolar disorder should ALWAYS be taken seriously!)
- Triggers and stressors



# Potential triggers (hard to avoid)

- **Frequent travel and jet lag**  
(In the past, for months I spent less than 10 consecutive days in the same country or same continent)
- **Irregular sleeping hours**  
(frequent working through the night)
- **Excessive use of caffeine or alcohol**  
(mathematicians are machines turning coffee into theorems)
- **Stress in work and personal relations**  
(watch out for narcissists and low-empathy people)  
Stress might increase going up the ladder of academic life

# Some things that can help

- Psychiatric medication  
(mood stabilizers, very careful use of antidepressants)
- Psychotherapy
- Supplements and vitamins  
(circumstantial evidence for CoQ10 effect on cyclothymia)
- Healthy diet and exercise
- Stable surroundings
- Friends and family support

How to spot who may need help?



# How to spot hypomania...

- Why does it matter? Different treatment for unipolar and bipolar depression! Danger of antidepressants for mD
- People hide depressions but hypomania is always visible (if one knows what to look for)

It's all about checking orders of magnitude

A personal example: 45 days, 6 arXiv postings, 213 pages, year average: 25 pages/month

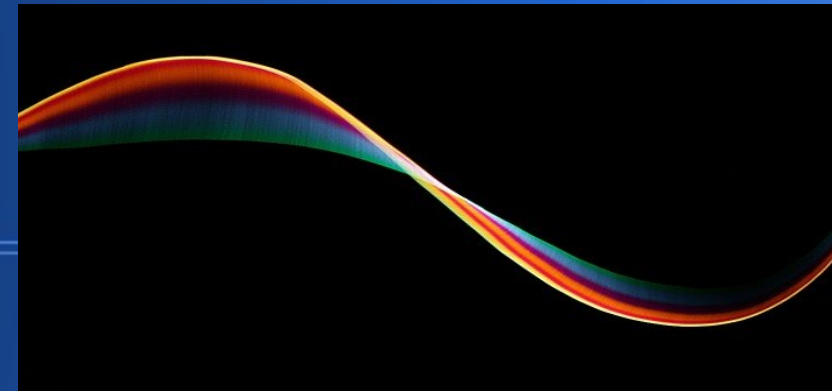
Something off scale in behavior or performance

Superhuman energy, no apparent need to rest

# The going up phase

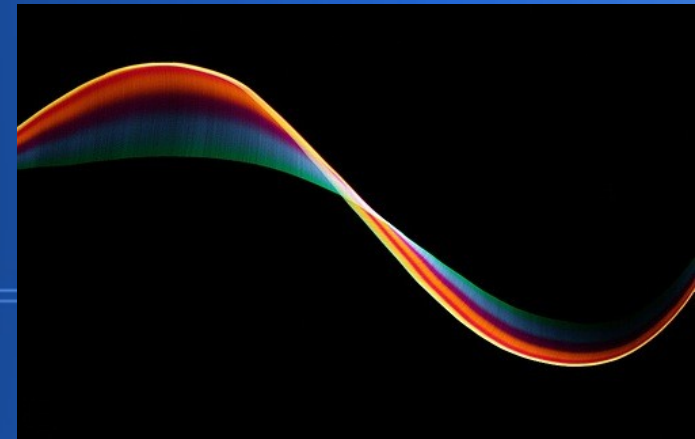
- The “wild ideas” that make science weird and beautiful (“where did that come from?” seeing connections)
- Enhanced linguistic skills (half forgotten languages suddenly come back with ease, more articulate writing)
- Strange sense of urgency (personal example: of writing a math paper in Russian in the middle of the night...)
- Extra energy (taking on too much)

Virtual particles borrowing energy from the vacuum



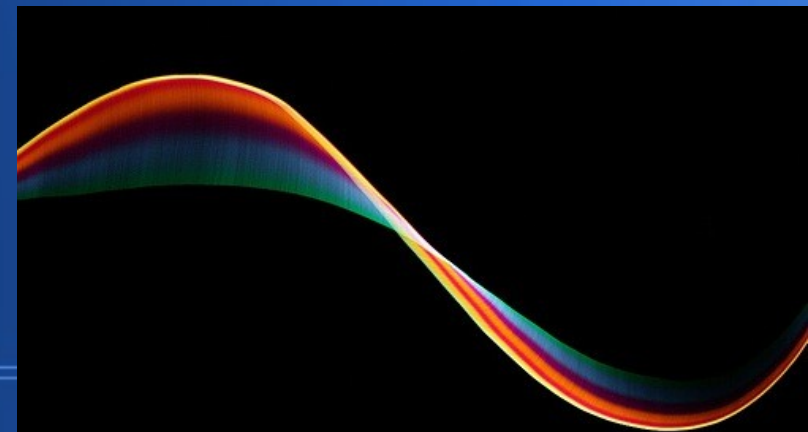
# The top of the peak

- Frightening (What if it does not stop? Can't pull the break...)
- The body consumes more energy than it has (prolonged lack of sleep, poor eating, overwork, exhaustion)
- Hypomania may turn into mania (psychosis)
- Poor judgment of the situation
- Poor choices of human relations
- Difficult to explain



# Coming down from the top

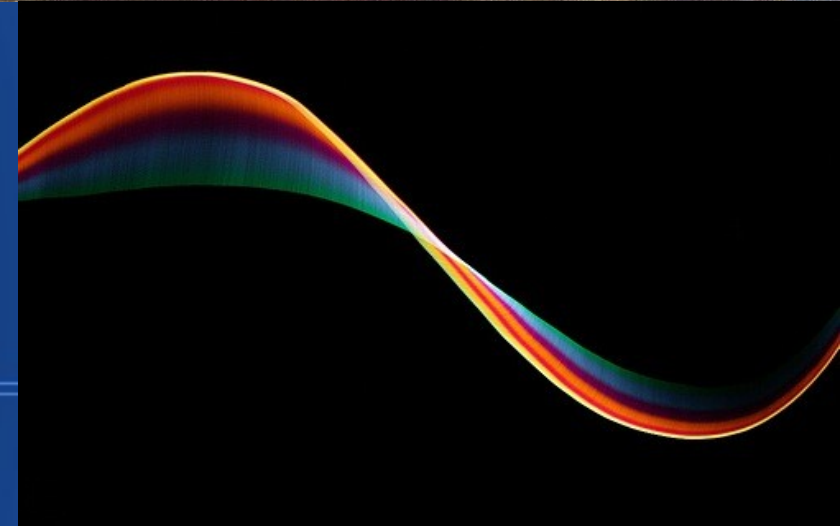
- Relief (safe crossing of a dangerous point)
- Hard to be human again (slowing down)  
Superman swallowed a big chunk of Kryptonite
- People still expect the same level of performance





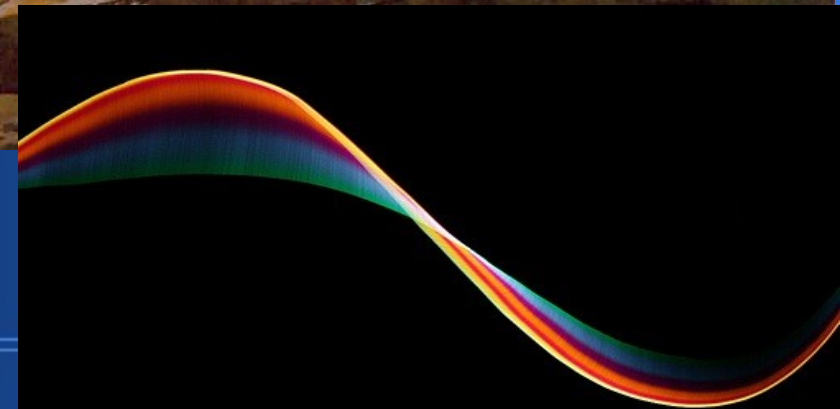
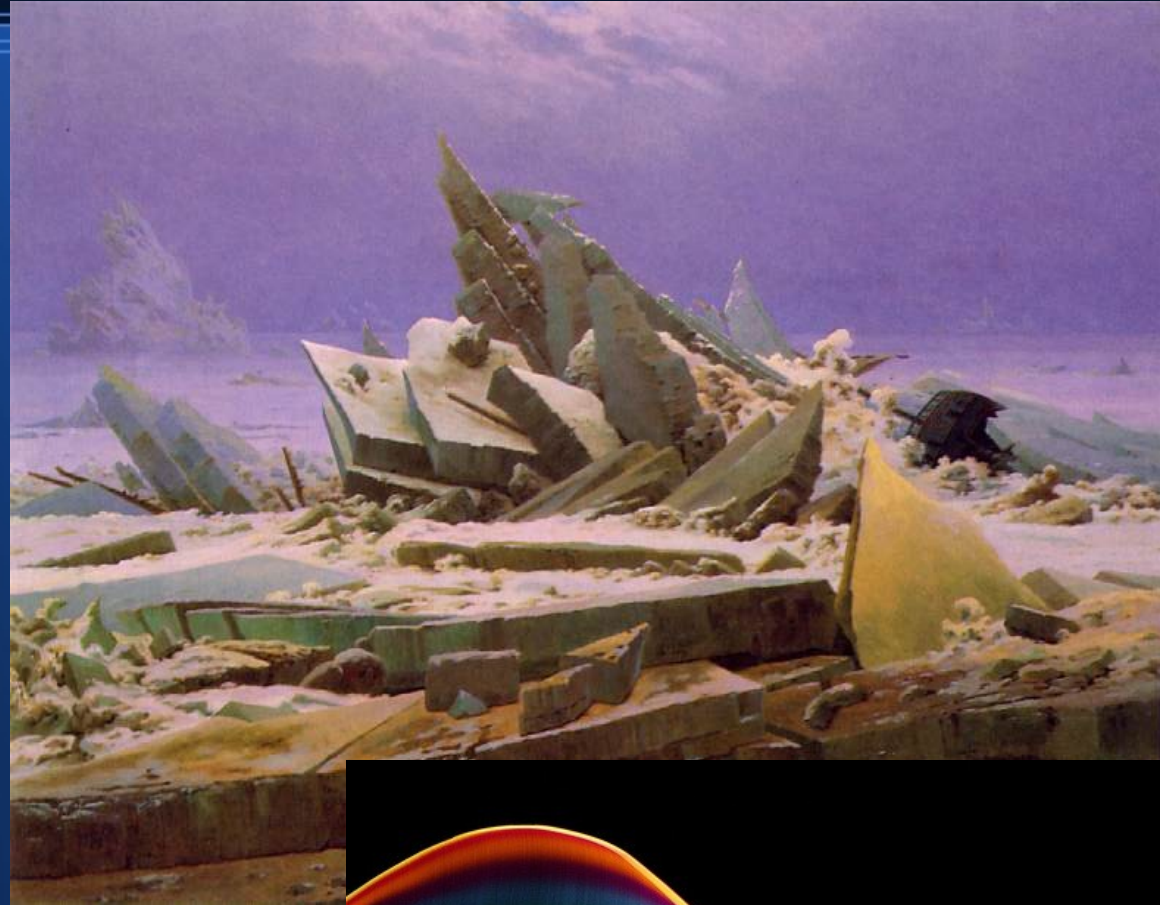
# Descent to the underworld

- **Fatigue**  
Hard to keep up with commitments made in the previous phase
- **Slow motion**  
Can be helpful for scientific creativity: the checking phase
- **Blues** (hopelessness, strong attachment to coping strategies, sometimes suicidal thoughts)



# The bottom of the pit

- Despair
- No strength left
- Fear of getting stuck there
- Painfully difficult to do anything
- Frozen landscape
- Truth about “friends”

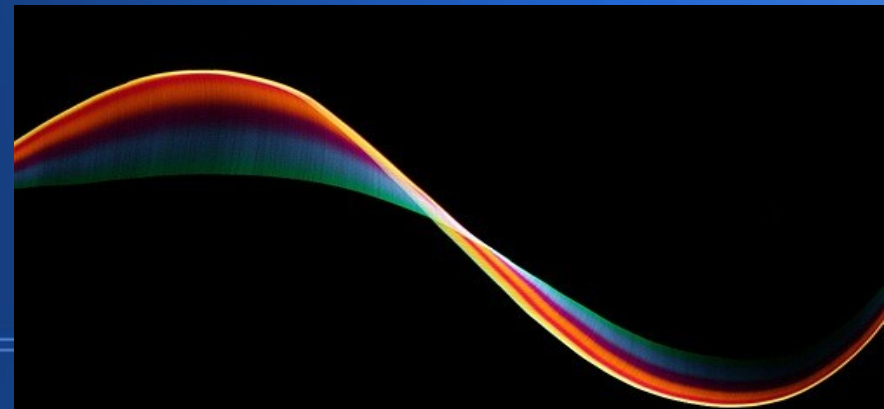


# Climbing out of the pit

- **MOST DANGEROUS TIME!**  
(energy returns but thoughts still stuck at the bottom, higher risk of suicide)
- **Obsessive thoughts**  
(if properly directed can be useful to scientific work)

## Seasonal patterns and Periodicities

*April is the cruelest month, breeding  
lilacs out of the dead land, mixing  
memory and desire, stirring  
dull roots with spring rain.  
(TS Eliot -The Waste Land)*





# A Faustian bargain

- Bipolar disorder gives advantages
- It also causes a lot of suffering: a bargain?
- As in Faust myth: it may demand your life
- Treatment question: do you want to be *cured*?
- Feared loss of creativity



# Consider this:

- Treatment with mood stabilizers does not diminish creativity (recent studies on writers)
- Check in regularly with a mental health care professional even if not on medication (spot cyclothymia worsening)
- Inform people close to you (difficult decision)
- Seek out sympathetic friends and cultivate healthy human relations



*"He's bipolar."*