THE DARK HEART OF OUR BRIGHTNESS

(mood disorders and scientific creativity)

A public lecture by

Matilde Marcolli

Professor of Mathematics, PMA division, Caltech
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

<table>
<thead>
<tr>
<th>Hypomania: (m)</th>
<th>Dysthymia: (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euphoric highs</td>
<td>Fatigue, poor concentration</td>
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<tr>
<td>Boosts of energy</td>
<td>Low self-esteem</td>
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<td>Diminishes sleep</td>
<td>Helplessness, irritability</td>
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<tr>
<th>Mania: (M)</th>
<th>Depression: (D)</th>
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<tr>
<td>Racing thoughts</td>
<td>Hopelessness</td>
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<tr>
<td>Grandiosity</td>
<td>Self-loathing</td>
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<tr>
<td>Hallucinations, delusions</td>
<td>Suicidal thoughts</td>
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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