# Tipping Point and 'Fifty Degrees Below'

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# What is Chaos Theory?

- The world-views of yesterday: Newtonian motion (constant velocity until acted upon), linear time, consistent change in the seasons

    - Associated with industrialism, mass production, precise timekeeping, etc.

    - Other depictions of perfection and predictability in today's world?

- "[M]ost of reality, instead of being orderly, stable, and equilibrial, is seething and bubbling wit change, disorder, and process" (Toffler)

- And so there is little consistency in world (e.g. tectonic plates, economics)

- Can't call mulligan; going backwards is just as unpredictable as going forwards

# What is the Tipping Point?

- Edward Lorenz, "Predictability: Does the Flap of a Butterfly's Wings in Brazil Set Off a Tornado in Texas?" (Dizikes)

    - Observes how rounding numbers in computer models can radically change weather forecasting

    - "[S]hould we make even a tiny alteration to nature, 'we shall never know what would have happened if we had not disturbed it'" (Dizikes)

- Implications

    - Profoundly challenges the way we predict the world – any detail, no matter how insignificant, can cause a snowball effect

    - Hard to comprehend the amplification and positive feedback involved.

    - If you could fold a piece of paper in half 50 times in a row, how tall would it be?

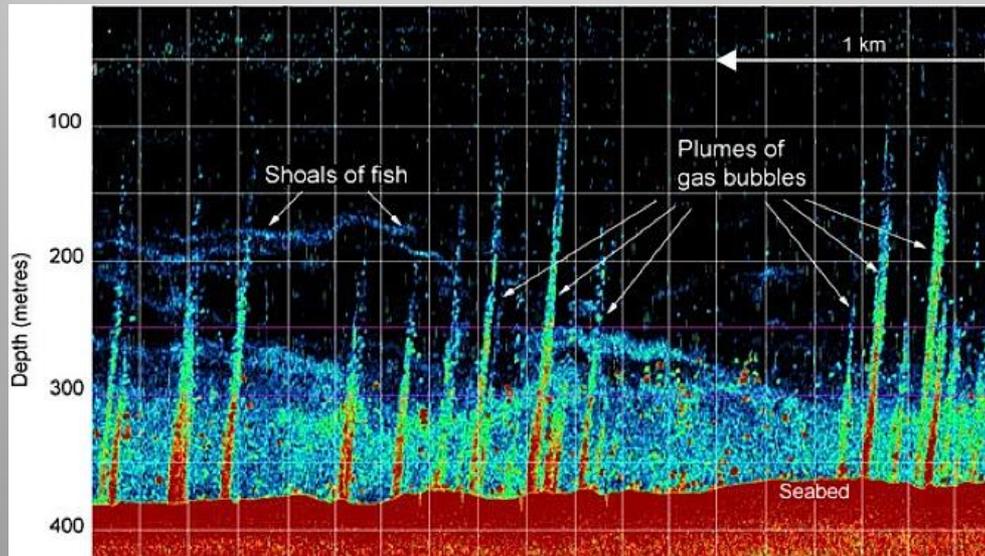        - 112 million kilometers tall – 2/3rds of the way to the Sun (Briggs)

# What is the Tipping Point?

•Such changes can be positive

   •Chemical produces enzyme, which encourages further production

   •"[A] positive-feedback loop...[could] help explain how we go from little lumps of DNA to complex living organisms" (Toffler, xvii)

•Evolution

   •"It is the processes associated with randomness, openness, that lead to higher levels of organization...Under certain conditions, entropy itself becomes the progenitor of order" (Toffler, xxi)

   •"[E]ntropy may produce, rather than degrade, order, organization – and therefore life...[w]hile certain systems run down, other systems simultaneously evolve and grow more coherent" (Toffler, xxi)

# Environmental Impact of Tipping Point

•Methane in the ocean floor

•"Between 700 trillion and 10,000 trillion tons of methane hydrate…trapped in the seafloor sediments…If the planet heats by 5.4 degrees Fahrenheit…seafloors could heat enough to release a small but significant fraction of the gases. Methane bubbling slowly into the atmosphere could raise planetary temperatures by a full degree Fahrenheit for as much as 10,000 years" (Keim)



What would be additional tipping points that would have an environmental impact?

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•Frank as an example of a tipping point.

  •"Everything had changed for him on that day he had…run into the woman in the elevator…and then, yes, broken into the NSF building and tried to recover his resignation.  Everything had changed" (Robinson, 22)

    •Frank's mystery woman decides to meet up with him, explain the surveillance (Robinson, 90-101)

•Frank realizes his evolution.

  •Frank thinks about all of the "paleolithic behaviors anthropologists had ever proposed as a stimulant to the great brain expansion" such as "talking…dancing…throwing things at things…[and] looking at fire" (Robinson, 147).  These were all things he was committed to now.

    •Positive feedback?  Is Frank's disorder accelerating?

# Tipping Point and
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• Frank gets more entangled in the conspiracy against him (removing the bug), and he gets more involved in his relationship with Caroline (Robinson, 390-400)

• The spying escalates when Caroline leaves her husband and Frank tries to assist her. Caroline's husband and several other spies show up at the park, looking for Frank. During the confrontation, Frank almost kills Caroline's husband with an axe. Frank later reflects on what he has become (Robinson, 570-90)

• Could Frank ever return to what he was before meeting Caroline? Remember that moving backward is just as unpredictable as moving forward.

• What would be other examples in the novel?