



# Truth, American Culture, and Fuzzy Logic

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# Outline

1. Premodernism → Modernism → Postmodernism
2. Why is fuzzy logic true?
3. The fuzzy logic research agenda
4. Fuzzy logic and culture
5. Conclusion and recommendations



# Modernism, pre- and post-

- Truth and its *source*
  - Premodernism: determined by the gods
  - Modernism: objective and eternal
  - Postmodernism: subjective and temporal
  - Fuzzy logic: ???
    - Invented, or discovered?



# Modernism, pre- and post-

- Truth and its *morality*
  - Premodernism: Amoral, liable to misuse
  - Modernism: Intrinsically good –  
“Consecration to the pursuit of the truth”  
(Wiener)
  - Postmodernism: Amoral, liable to misuse
  - Fuzzy logic: ???



# Modernism, pre- and post-

- Truth and how it is *learned*
  - Premodernism: Divine revelation
  - Modernism: Deduction and observation
  - Postmodernism: Intuition and experience
  - Fuzzy logic: ???
    - Deduction, or induction?
    - Bottom-up, or top-down?



# Modernism, pre- and post-

- Truth and its relationship to the *individual*
  - Premodernism: Learned through religion
  - Modernism: Learned by individuals
  - Postmodernism: Learned by social groups
  - Fuzzy logic: ???



# Modernism, pre- and post-

- Does fuzzy logic work because it is true, or is it true because it works?
- Is fuzzy logic valuable because it is objectively true, or because it works?
- How important is mathematical rigor?
- What determines if research contributions are valid?



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# Why is fuzzy logic true?

- modern
- ↓
- postmodern
1. Because God created it.
  2. Because it is logical.
  3. Because it reflects reality.
  4. Because it is an expression of man's wisdom.
  5. Because man created it.
  6. Because it has been proven.
  7. Because the community has come to a consensus.
  8. Because it is useful.
  9. It is not true because it is only a human construct.
  10. It is not true because truth does not exist.



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# Fuzzy logic research agenda

- What are we trying to accomplish?
  - What problems are important?
  - What approaches are best?
  - What constitutes good research?
    - 1970s: 64/568 papers were applied – **11.3%**
    - 2000s: 1232/19494 were applied – **6.3%**
  - How important is present vis-à-vis future?



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# Fuzzy logic and culture

- Mathematization
  - Greeks, 600 BC – 200 BC  
Euclid, Pythagoras, Plato, Archimedes, ...
  - China and Islam, 200 BC – 1200 AD
  - Renaissance, 1200 AD – 1800 AD  
Fibonacci, Aquinas, Bacon, Copernicus, ...  
Laplace: “I have no need for that hypothesis.”
  - Postmodernism, 1800 (1960) – present  
(backlash)



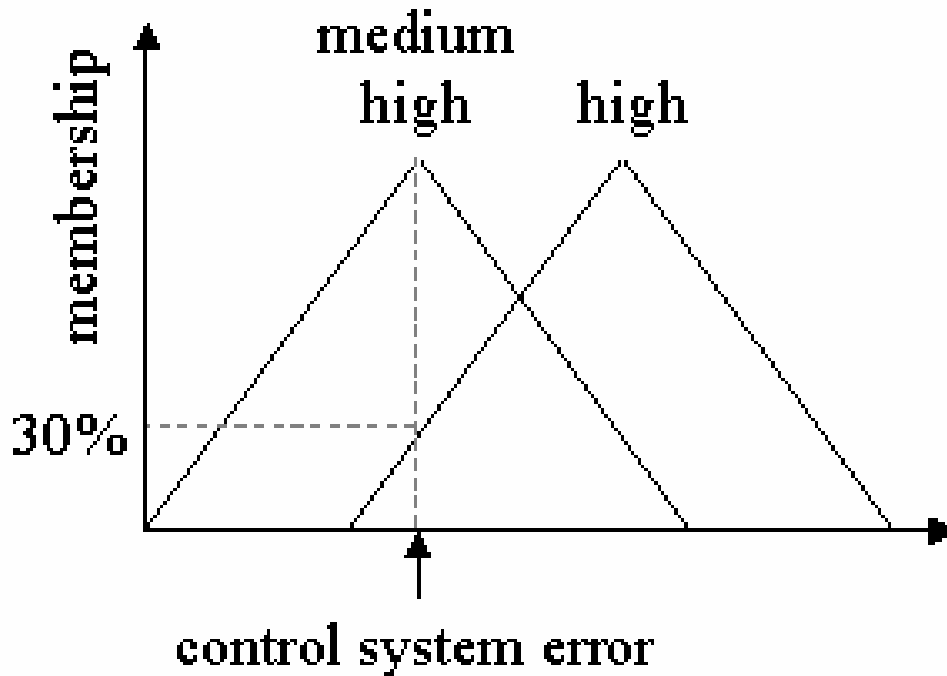
# Fuzzy logic and culture

- *Postmodernism*: Thomas Kuhn, *The Structure of Scientific Revolutions*, 1962
- *Fuzzy logic*: Lotfi Zadeh, "...we need a radically different kind of mathematics, the mathematics of fuzzy or cloudy quantities ..." 1962
- Both emphasize ambiguity and paradox, applications and practicality

# Fuzzy logic and culture

Is fuzzy logic fuzzy?

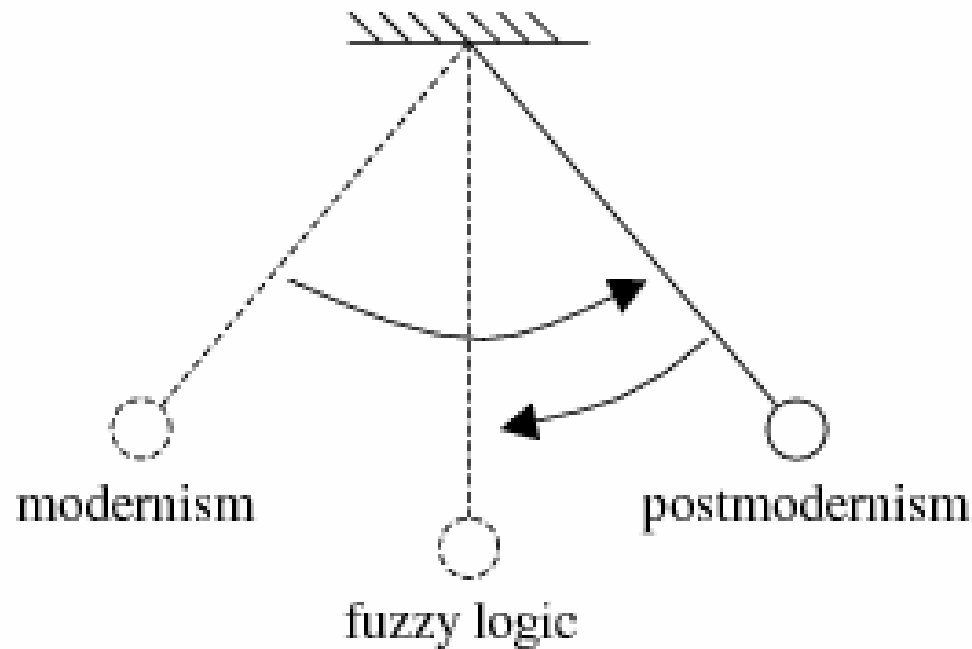
It relies on crisp, rigorous mathematics.



*“There is a difference between a shaky or out-of-focus photograph and a snapshot of clouds and fog banks.”*

# Fuzzy logic and culture

Fuzzy logic provides a balance between modernism and postmodernism



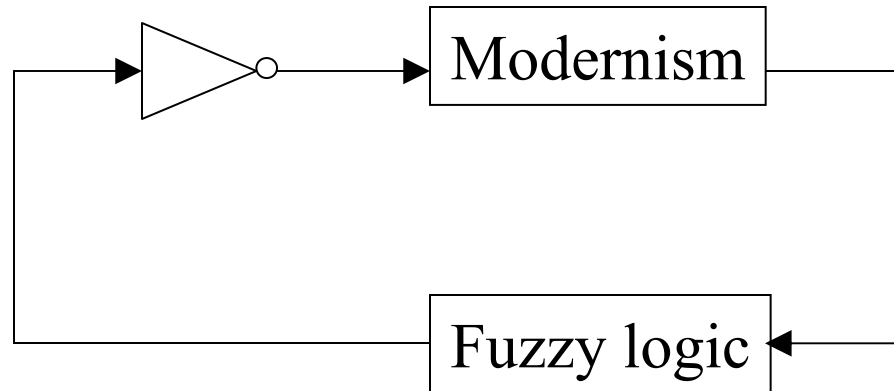


# Fuzzy logic and culture

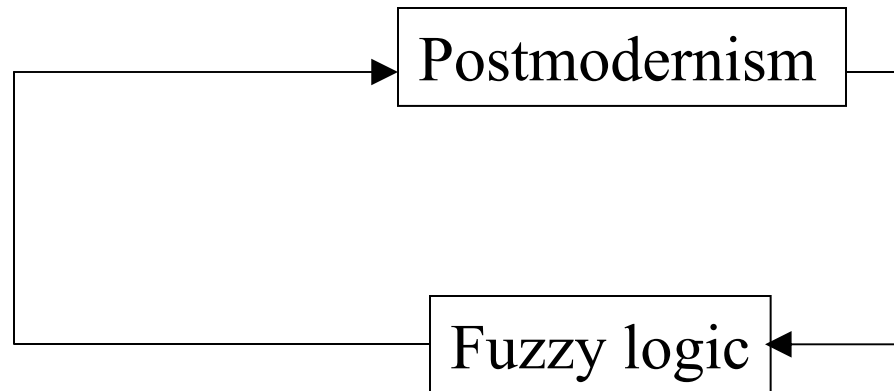
- Early criticisms of fuzzy logic
  - “No doubt Professor Zadeh’s enthusiasm for fuzziness has been reinforced by the prevailing political climate in the U.S. – one of unprecedented permissiveness.”
  - “The danger of fuzzy theory is that it will encourage the sort of imprecise thinking that has brought us so much trouble.”

# Fuzzy logic and culture

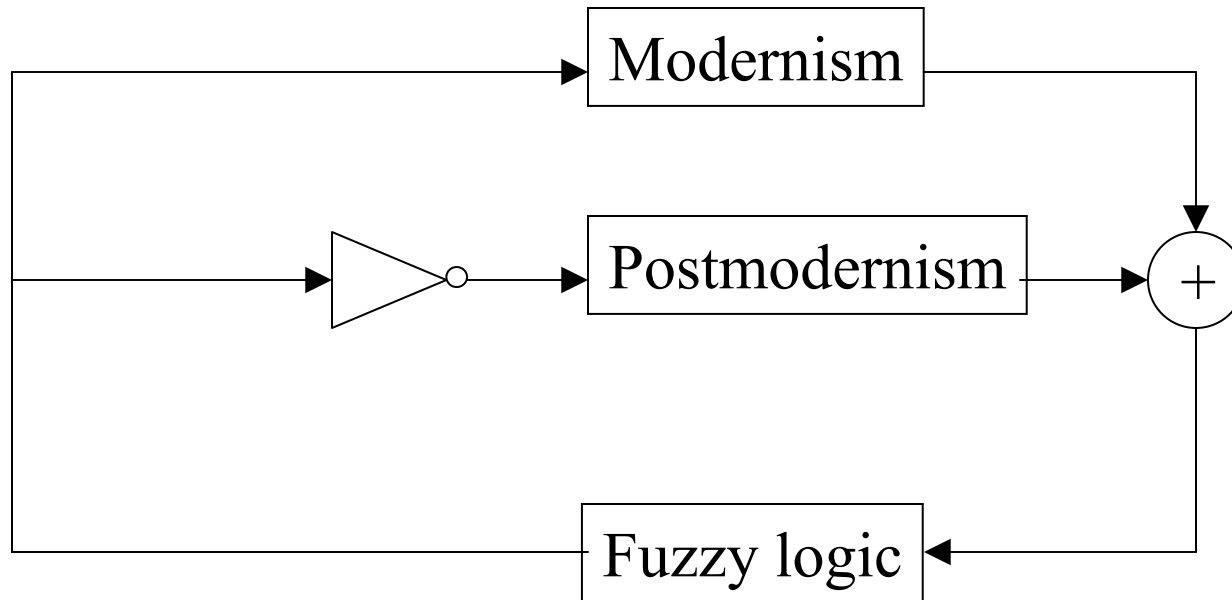
*Stabilizing*



*Destabilizing*



# Fuzzy logic and culture





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# Conclusion

- Fuzzy logic has limitations
- Fuzzy logic can affect culture
- Fuzzy logic has a research agenda, either intentional or not

# The fuzzy logic perspective

