



**ANTS, CIRCLE PITS & PETER  
JACKSON\***

# ANTS, CIRCLE PITS & PETER JACKSON\*

*\*and tangentially related mathematics*

# TODAY'S GOALS

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4. Consume cake

Theorem 1:

**Theorem 1: Pictures > Words**

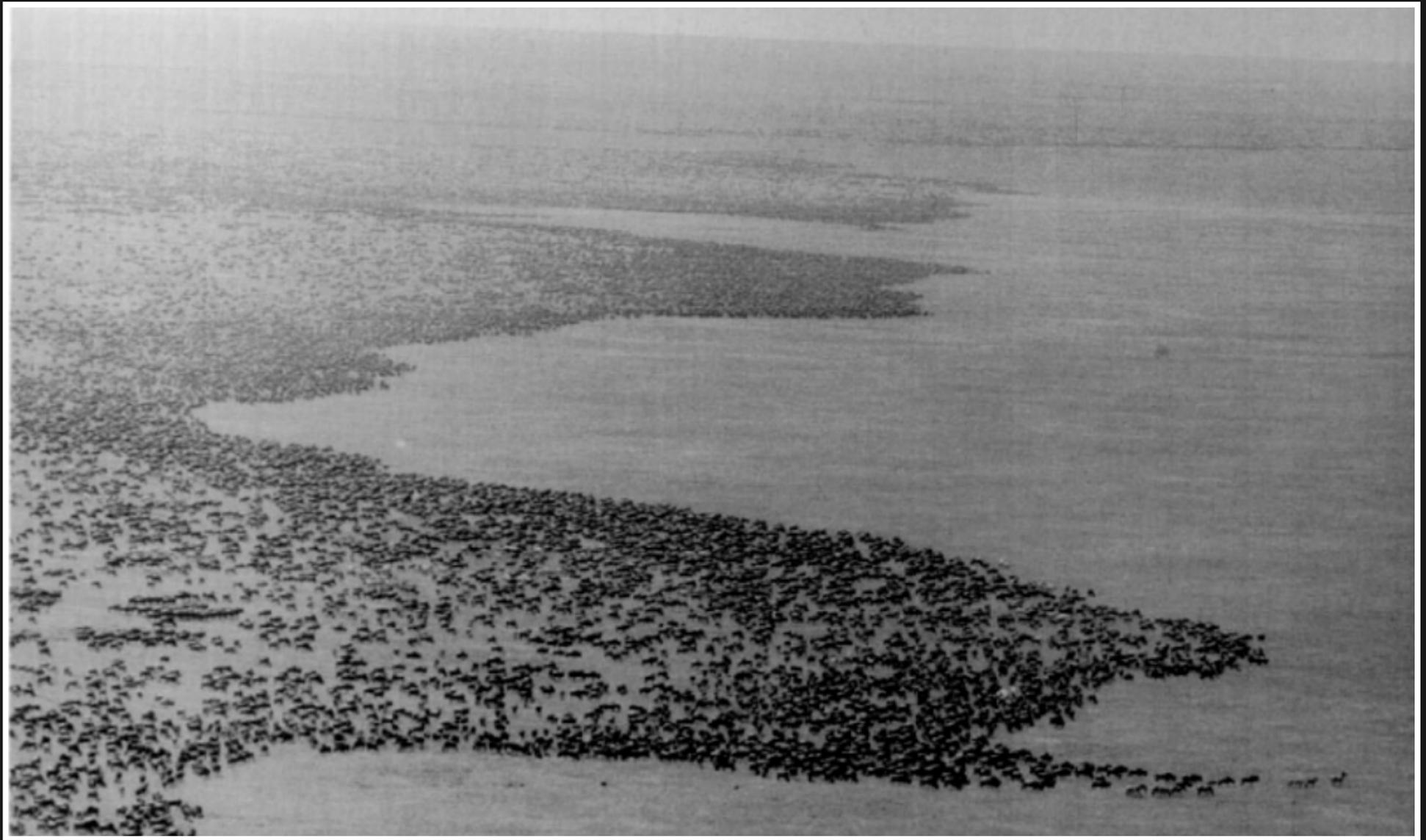
# PROOF OF THEOREM 1:

Flight of the Starlings: Watch This Eerie but Beautiful Phenomenon | Short Film Showcase









*Self-organisation is the spontaneous emergence of large-scale structure from the interactions between individuals.*

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- Energy conservation
  - Heat conservation
  - Aerodynamics

# DANGERS OF GROUPING

GeoVideo 0020 Army Ant Death Spiral 1080p



# DANGERS OF GROUPING

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Four 'absolute idiots' are rescued



Now two PRISONERS are



Princess Beatrice and Edoardo



Boris Johnson declares massive



Sinn Fein demand reunification vote



'I'm not their mammy': Sinn Fein



Storm THIR

## Flock of 200 starlings that were found dead on road may have crashed into the Tarmac and died while swerving to escape a bird of prey, police reveal

- Dead starlings were discovered near Llyn Llywenan in Bodedern on December 10
- Post-mortem examination showed some of the birds had severe internal trauma
- Thought the birds had performed an 'avoiding action' to get away from the area

By [TERRI-ANN WILLIAMS FOR MAILONLINE](#)

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### DON'T MISS

**EXCLUSIVE** Images of Strictly's Kelvin Fletcher and Oti Mabuse arriving at ANOTHER hotel at 11pm the night AFTER their 3.30am drink emerge...



**EXCLUSIVE** ... just



# DANGERS OF GROUPING

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- Models have shown that complex behaviours can arise from simple interaction rules

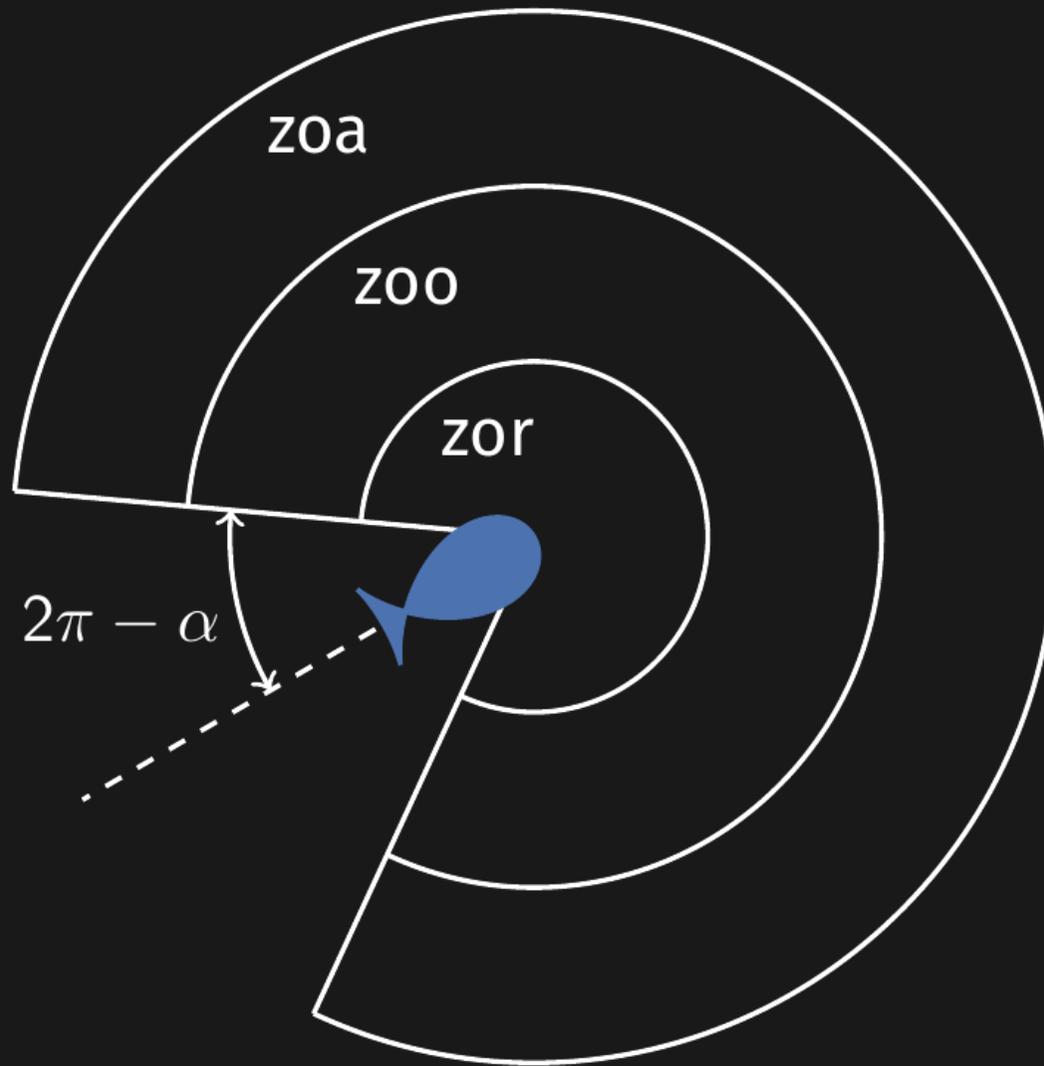
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# ZONAL MODELS



# **BOIDS (1987)**

**PETER JACKSON & MASSIVE**

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- Massive (multiple agent simulation system in virtual environment)

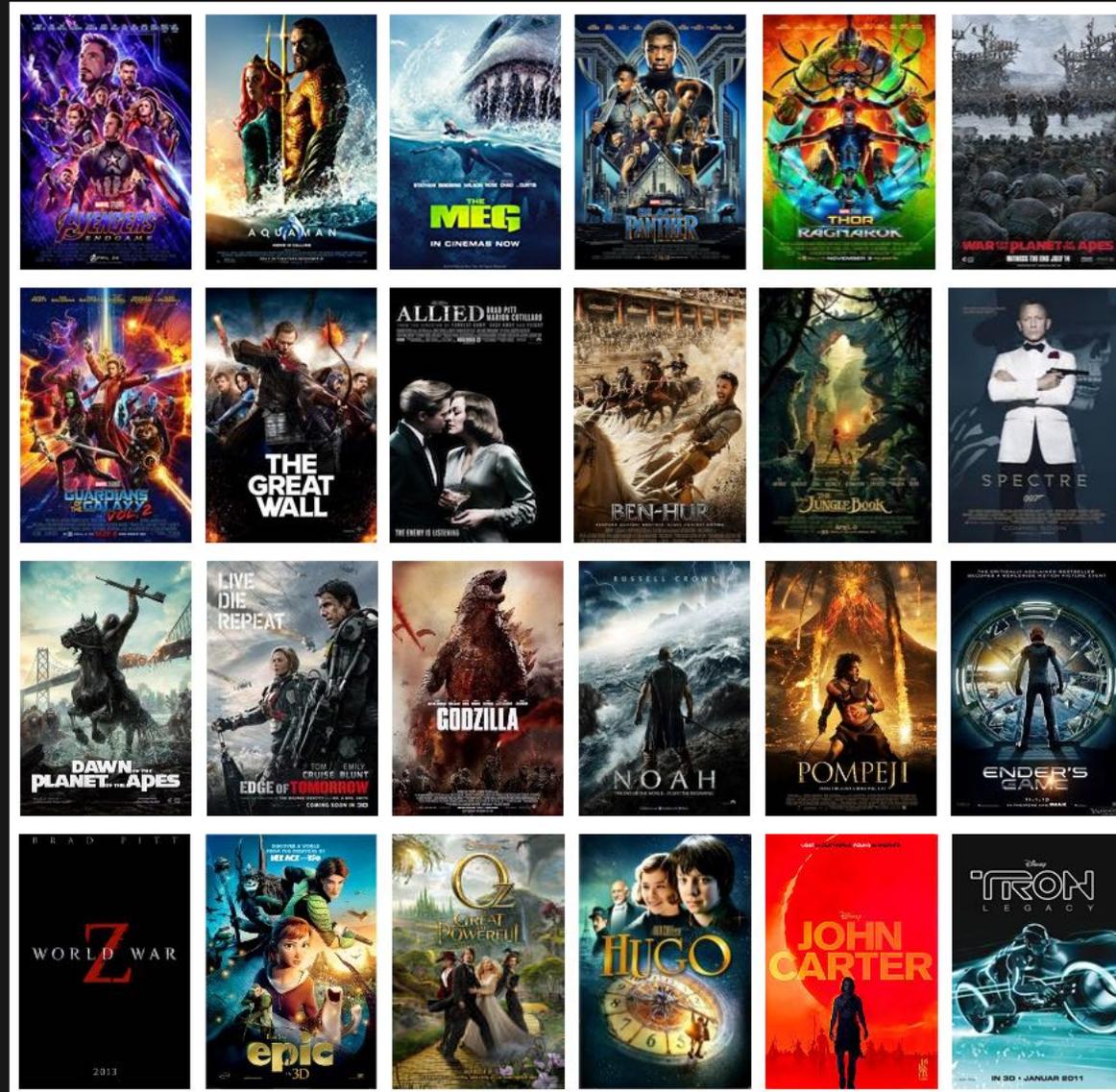
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- Used to animate intricate battle scenes

# RECENT APPLICATIONS



# FUTURE GOALS...



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Stephen Regelous, the lead developer of Massive, has since been awarded an Emmy award and an Academy award



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**Thanks for (*hopefully*) listening**

