

System Dynamics

A Tool for Investigating Church and Religious Growth



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Church Growth Modelling

Aims of Talk



- **System dynamics methodology**
 - Tool modelling church growth, religious change
- **Explain SD with a simple model of church growth**
- **Applications**
 - Denominational level
 - Congregational level – pastor's views
 - Potential sociological research

What is System Dynamics?

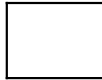


- **Industrial Dynamics 1950s-60s**
 - **Originator JW Forrester MIT**
- **Applied Business and Social Modelling**
 - **Supply chains, business cycles**
 - **World model**
- **Key Features**
 - **Model Structure**
 - **Causal connections between variables**
 - **Hypothesis -> Structure -> Behaviour**
 - **Feedback**

Stock



Church



Variable

No of People

Unless something changes

What is there today

Will be there tomorrow

Stock



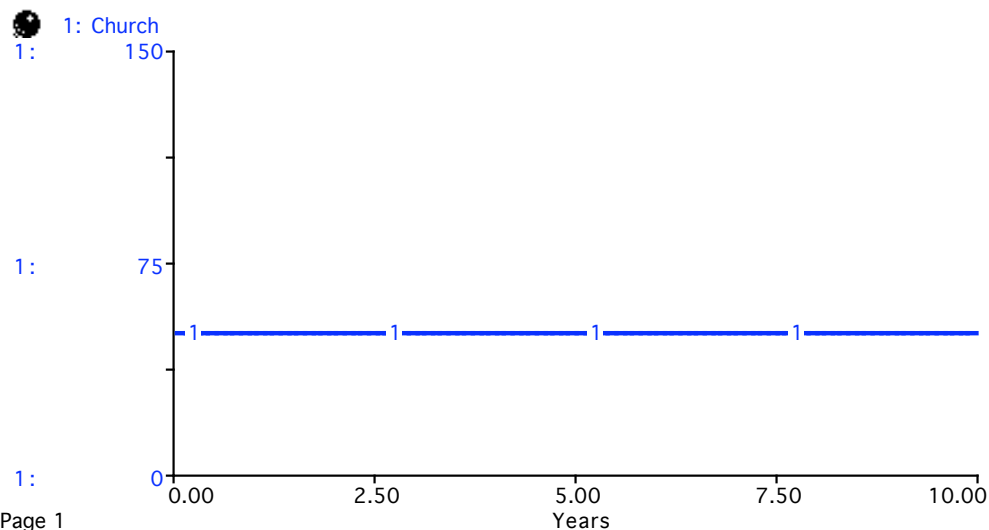
Church



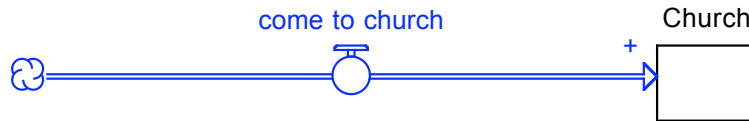
Variable

**Unless something changes
What is there today
Will be there tomorrow**

50 today – 50 tomorrow



Causal Material Link

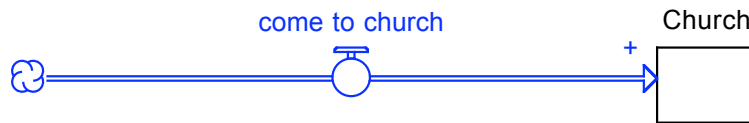


Adds to stock
“per year”

Hypothesis:

10 new people come
To church each year

Hypothesis -> Structure -> Behaviour



Hypothesis:

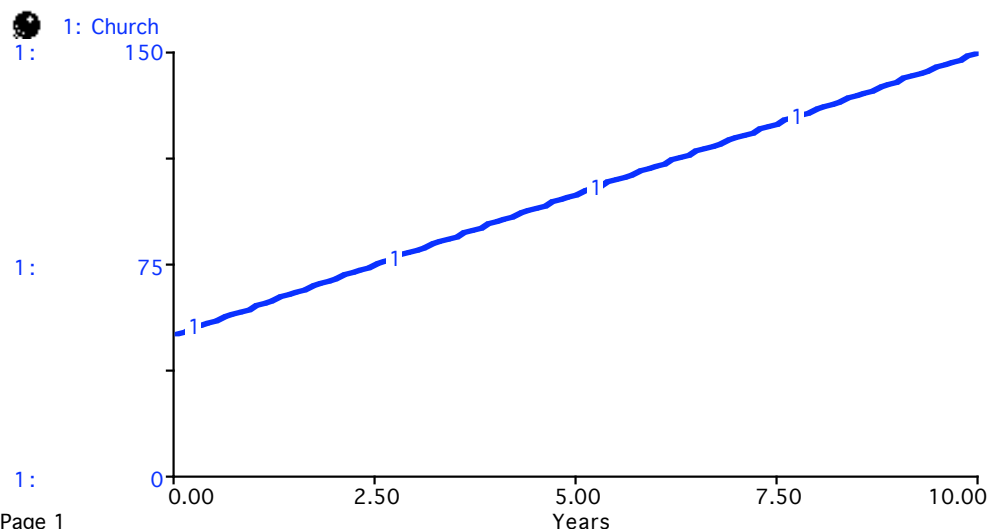
**10 new people come
To church each year**

Structure:

Constant recruitment

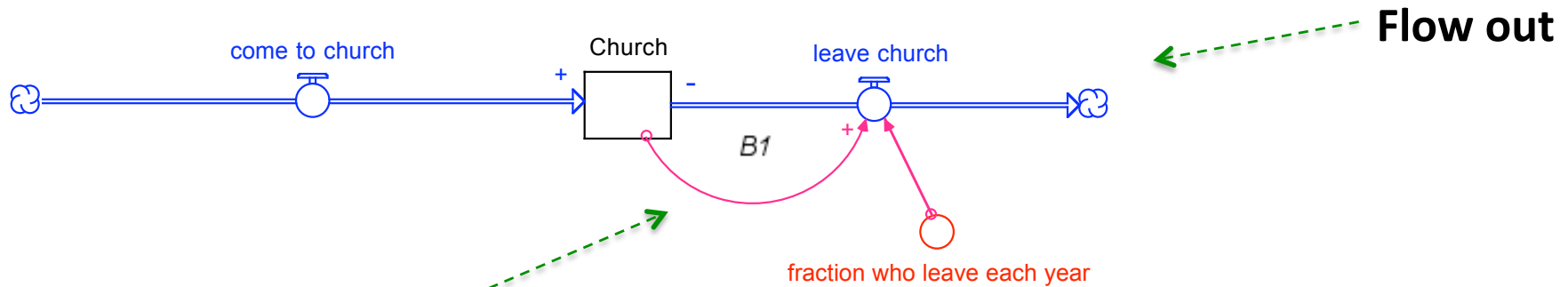
Behaviour:

Straight line growth



Connector

Causal Information Link



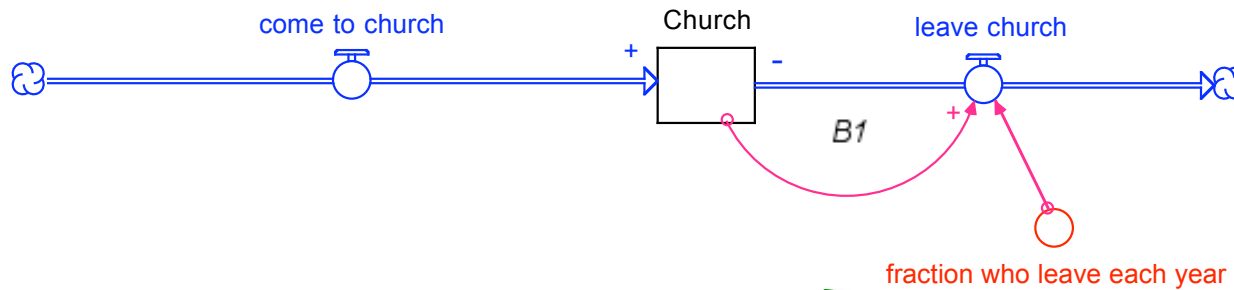
Connector

More in church more leave

Hypothesis:

**Fixed fraction of
people leave each year**

Converter



Converter

Parameter

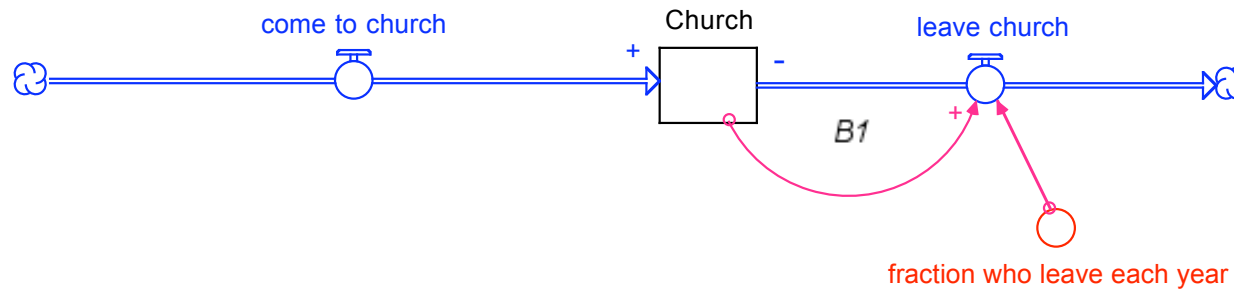
Determined outside system

Hypothesis:

**Fixed fraction of
people leave each year**

Balancing Feedback Loop

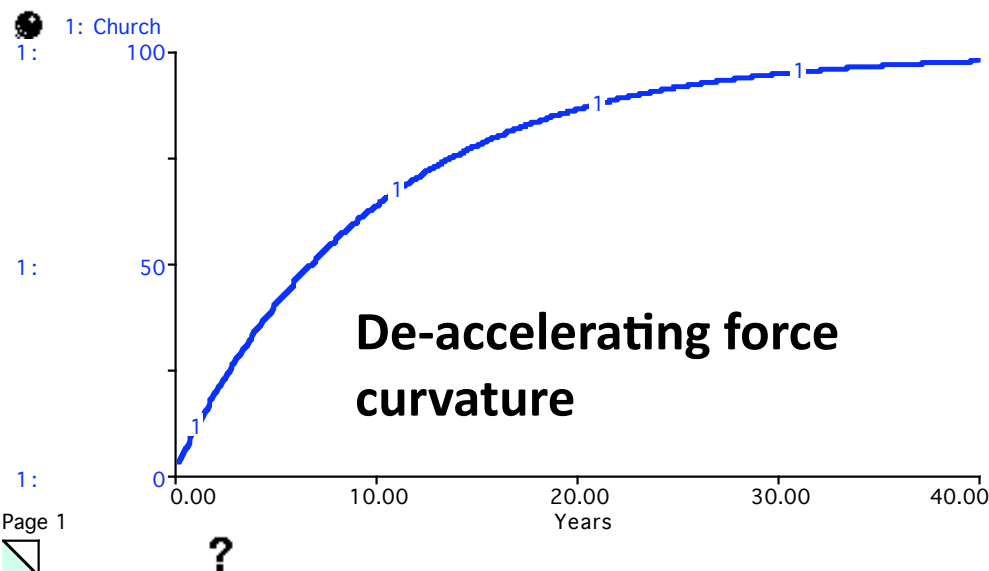
Hypothesis -> Structure -> Behaviour



Hypothesis:
Fixed fraction of
people leave each year

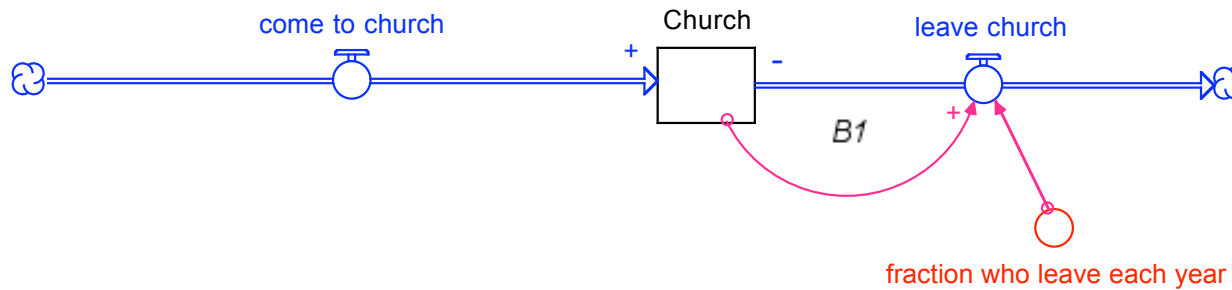
Structure:
balancing loop *B1*

Behaviour:
slowing growth



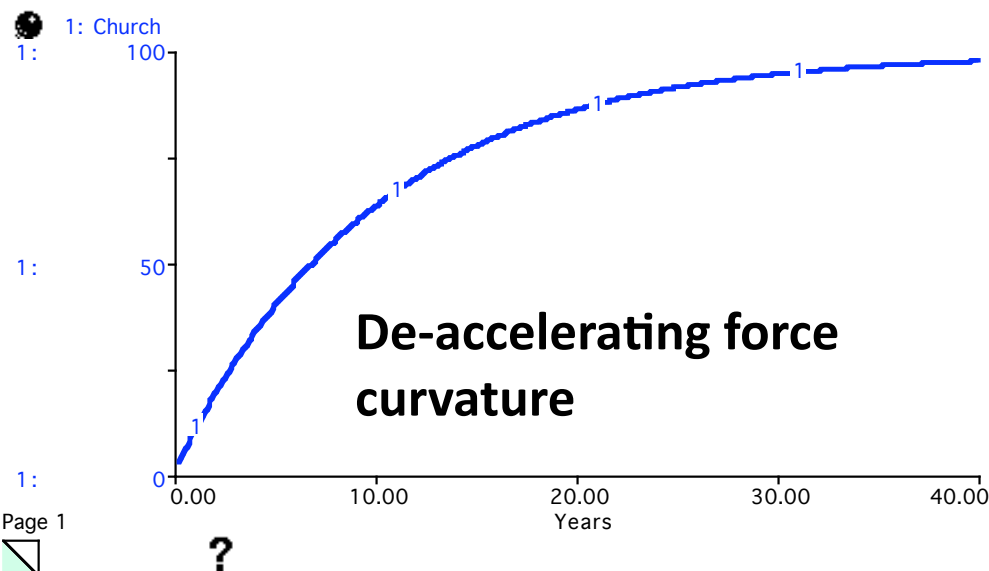
Balancing Feedback Loop

Hypothesis -> Structure -> Behaviour

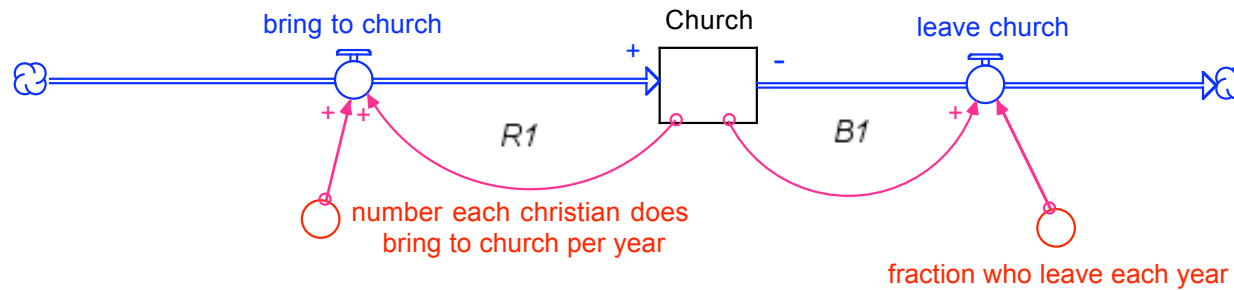


Hypothesis:
Fixed fraction of
people leave each year

Conclusion:
For continual
church growth
recruitment must
increase with size



Reinforcing Feedback Loop



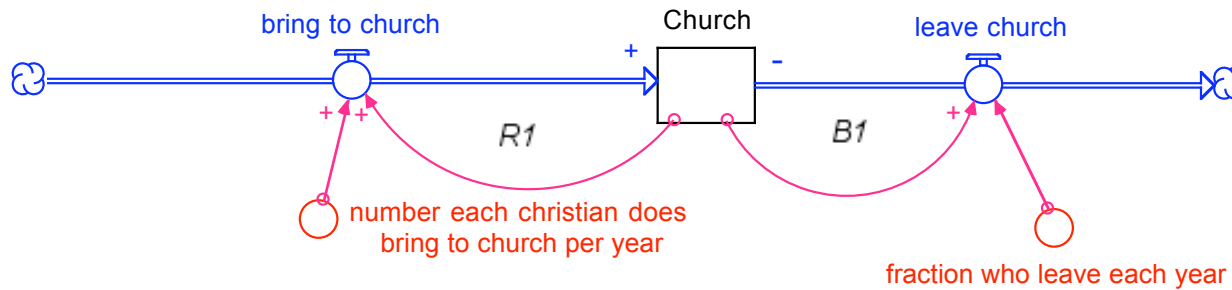
More in church more recruited

Hypothesis:
Each Person in church
recruits
Infinite Demand

Reinforcing Feedback Loop



Hypothesis -> Structure -> Behaviour



Hypothesis:

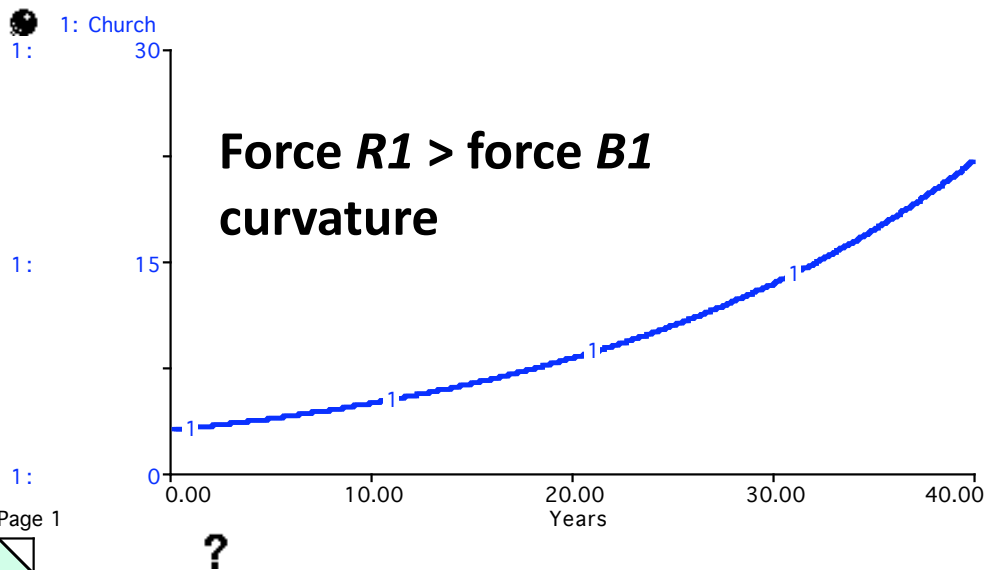
Each Person in church recruits
Infinite Demand

Structure:

reinforcing loop *R1*

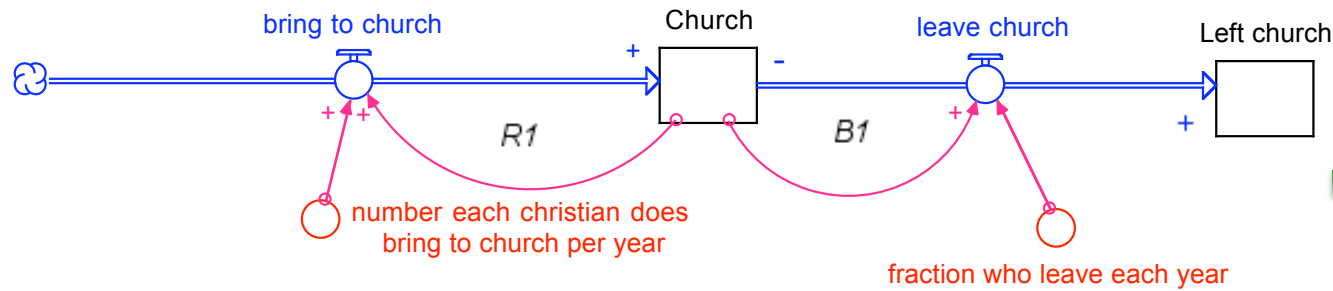
Behaviour:

increasing growth



Extend Model Boundaries

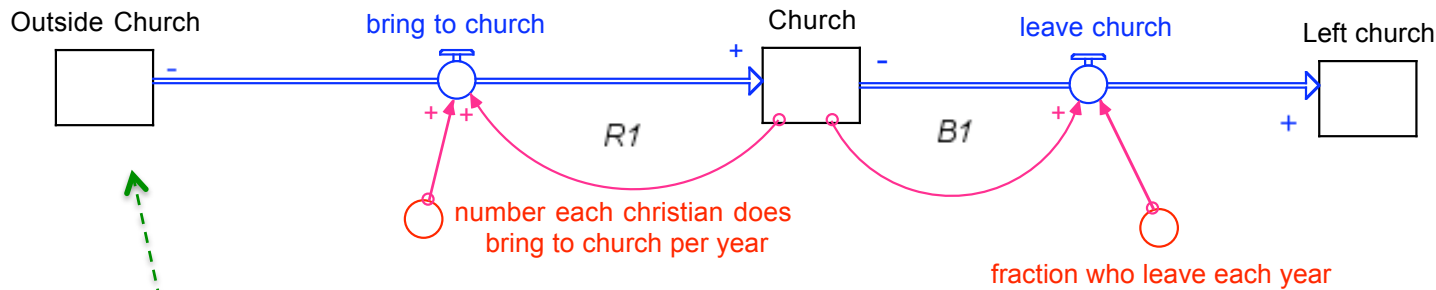
Where do church leavers go?



New stock

**Structure same
Behaviour same**

Where do new recruits come from?



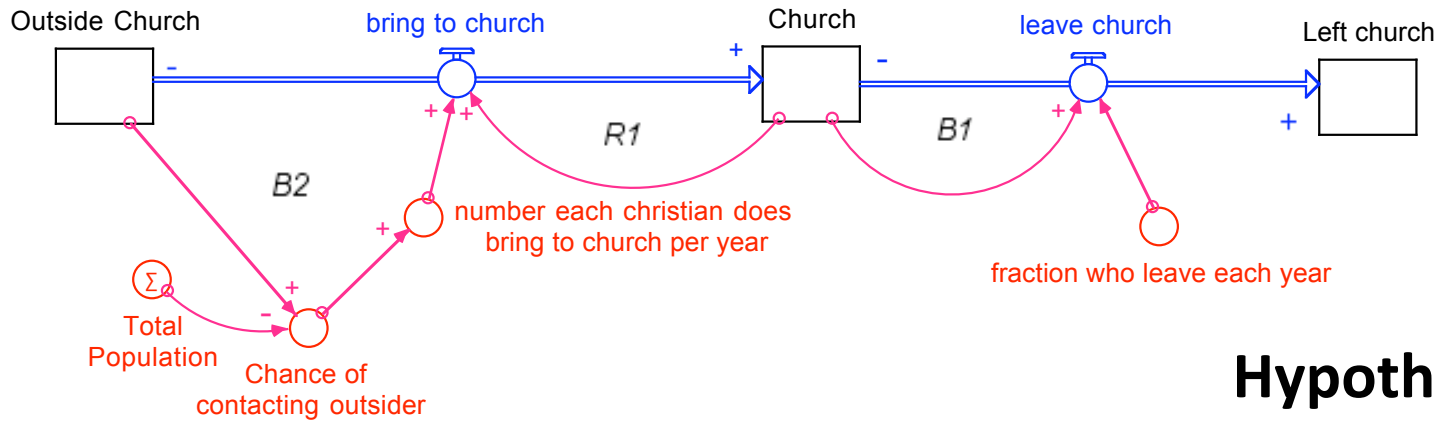
**Hypothesis:
Fixed demand**

New stock

Structure changed – limited recruitment base

Behaviour changed

How does church interact with those outside?

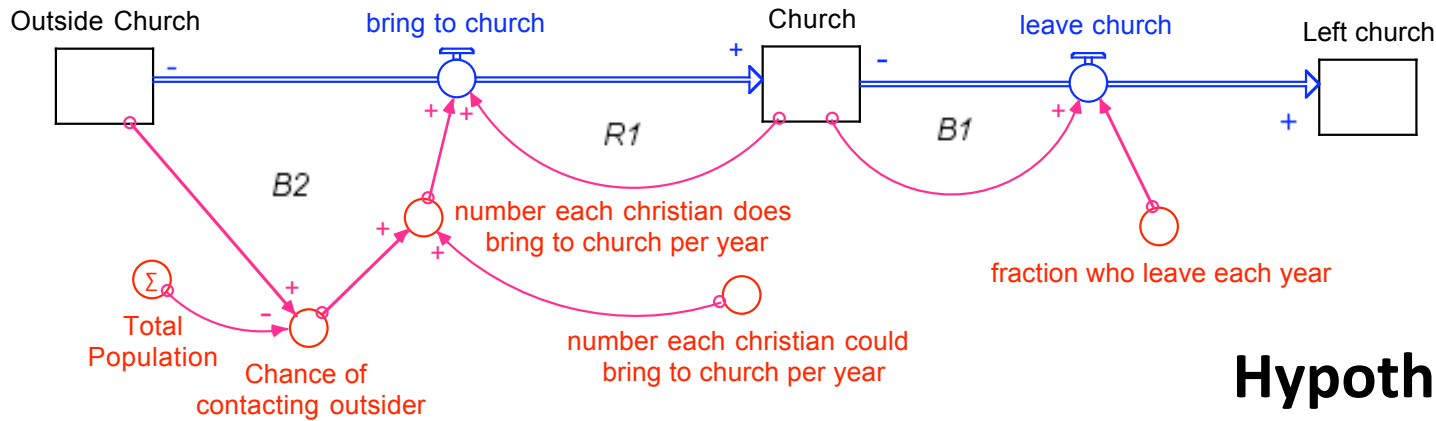


Hypothesis:
Fixed demand
homogeneous mix

New balancing loop

Reduce recruitment

Social Diffusion

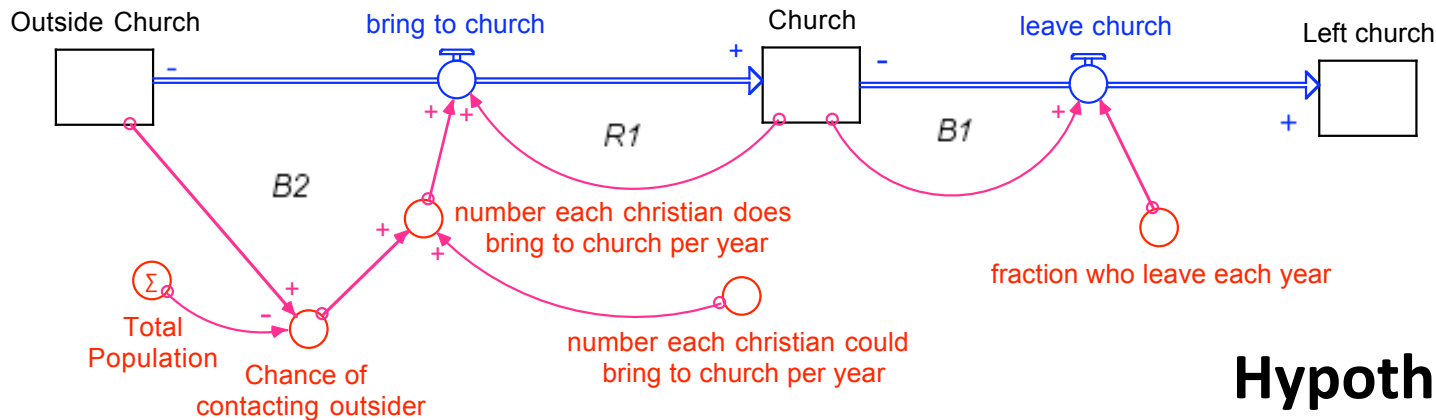


Hypothesis:
Fixed demand
homogeneous mix

Parameter

Assume all population is open to joining church

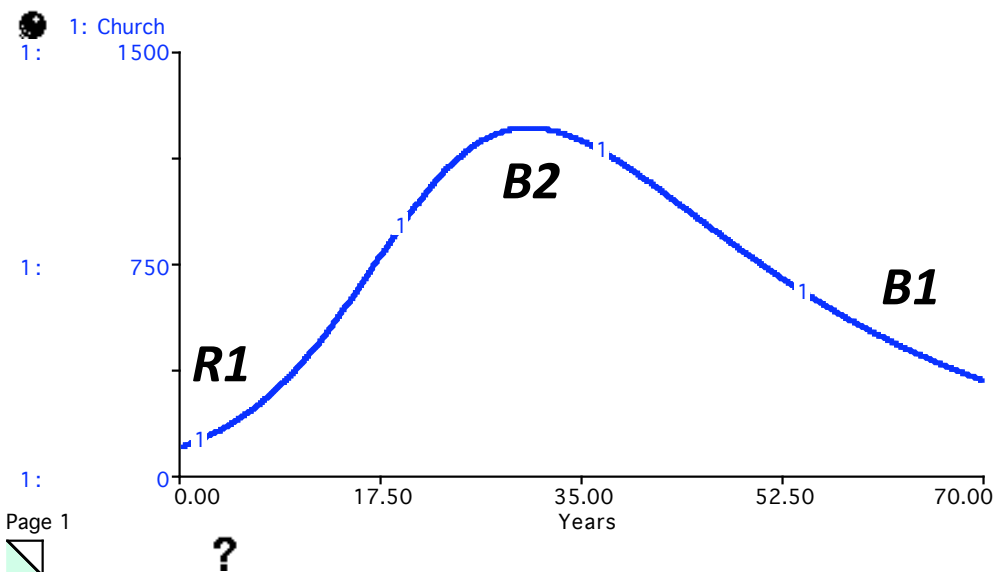
Dominant Feedback Loops



Hypothesis:
Fixed demand
Homogeneous mix

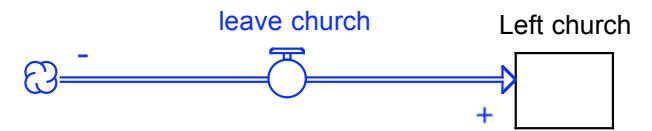
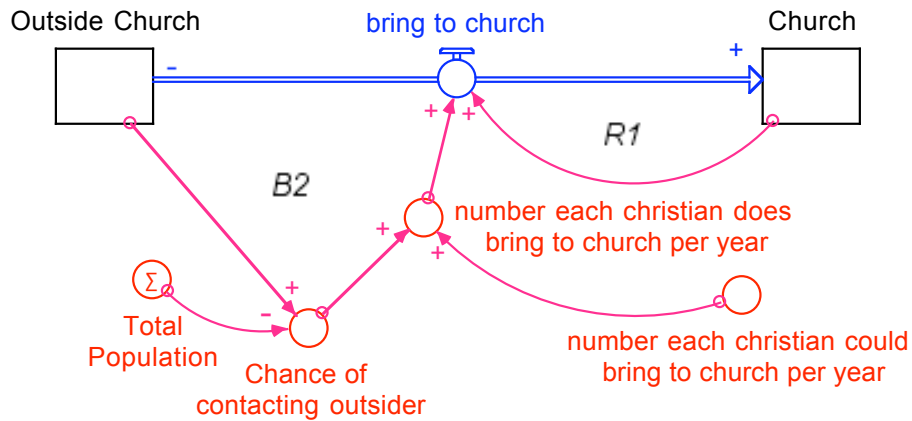
Structure:
R1, B1, B2

Behaviour:
Growth limited



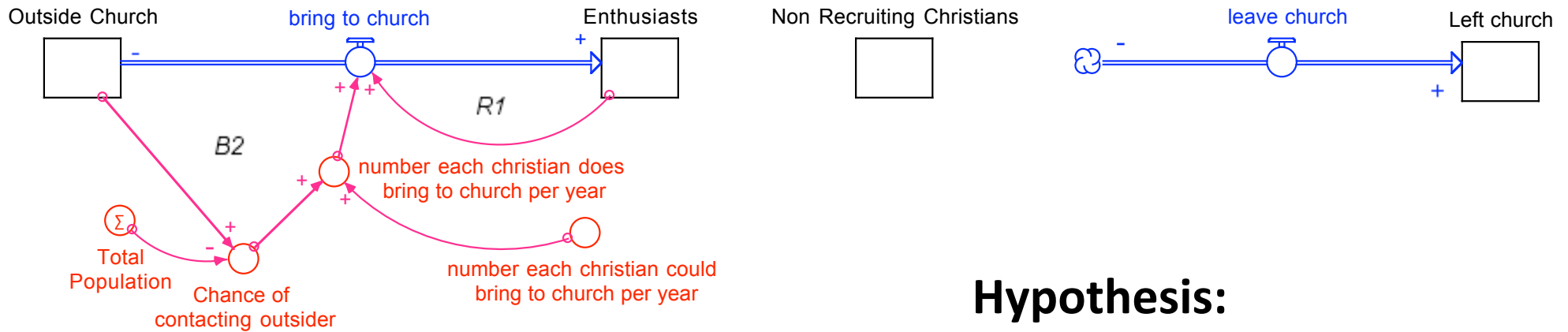
Disaggregate

Who in church recruits?



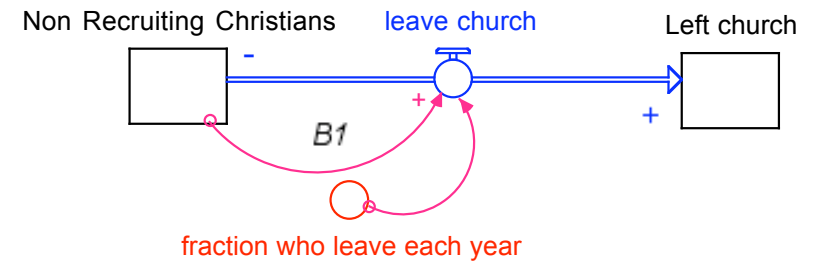
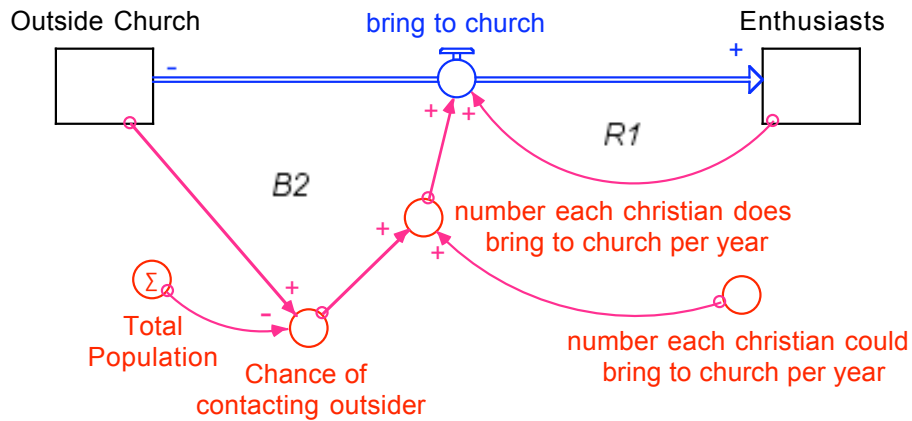
Hypothesis:
Not all church members recruit

Enthusiasts



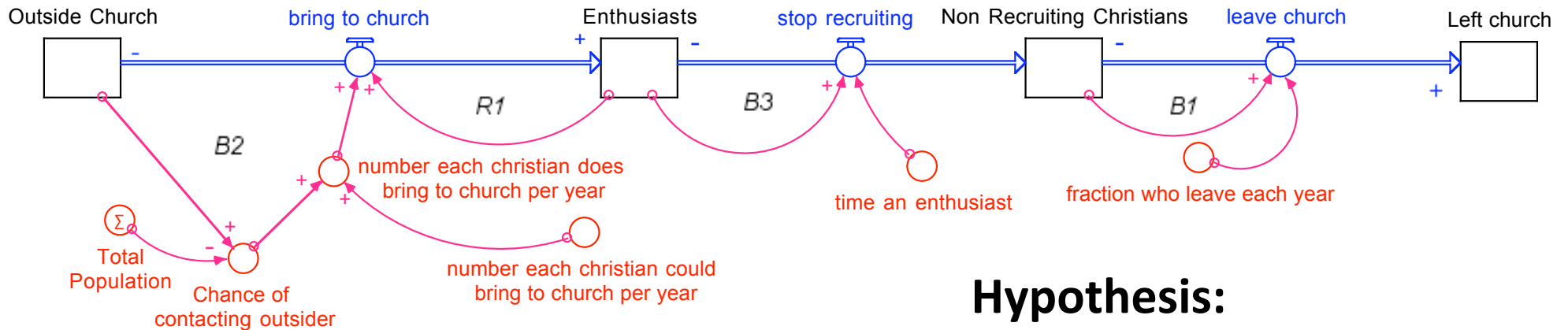
Hypothesis:
Enthusiasts recruit
sub group of church

Enthusiasts



Hypothesis:
Enthusiasts cease potential to recruit when established

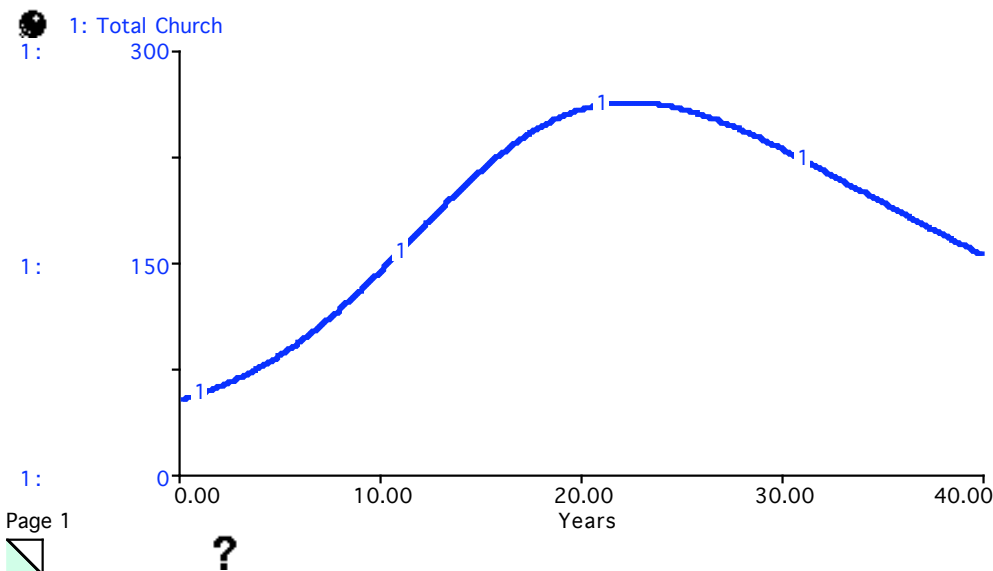
Limited Enthusiasm Model



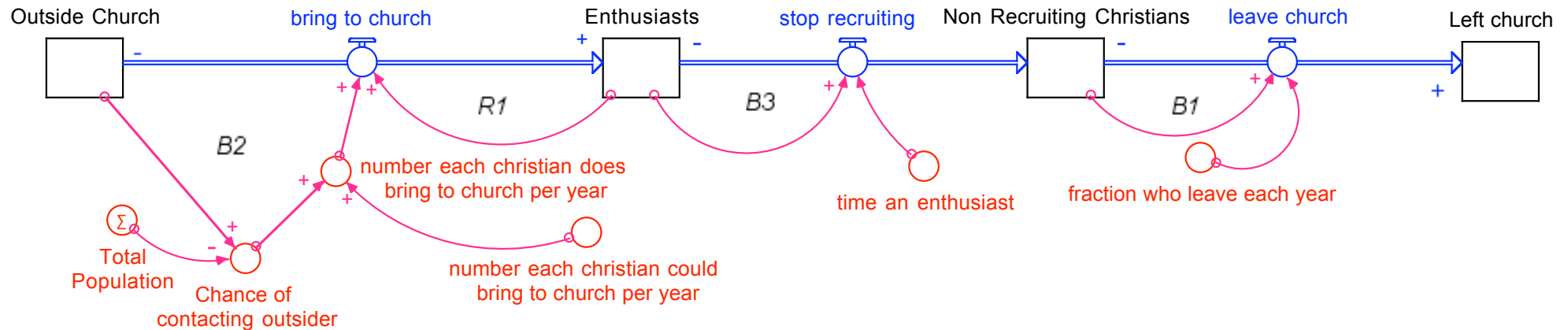
Hypothesis:
Limited enthusiasm

Structure:
R1, B1, B2, B3

Behaviour:
growth lower over quicker



Limited Enthusiasm Model



- **Growth through *enthusiasts***
- **Some converts non-recruiting**
- ***Left Church* eventually recycled to Outside Church**
- **Births and Deaths – all categories**

Thresholds

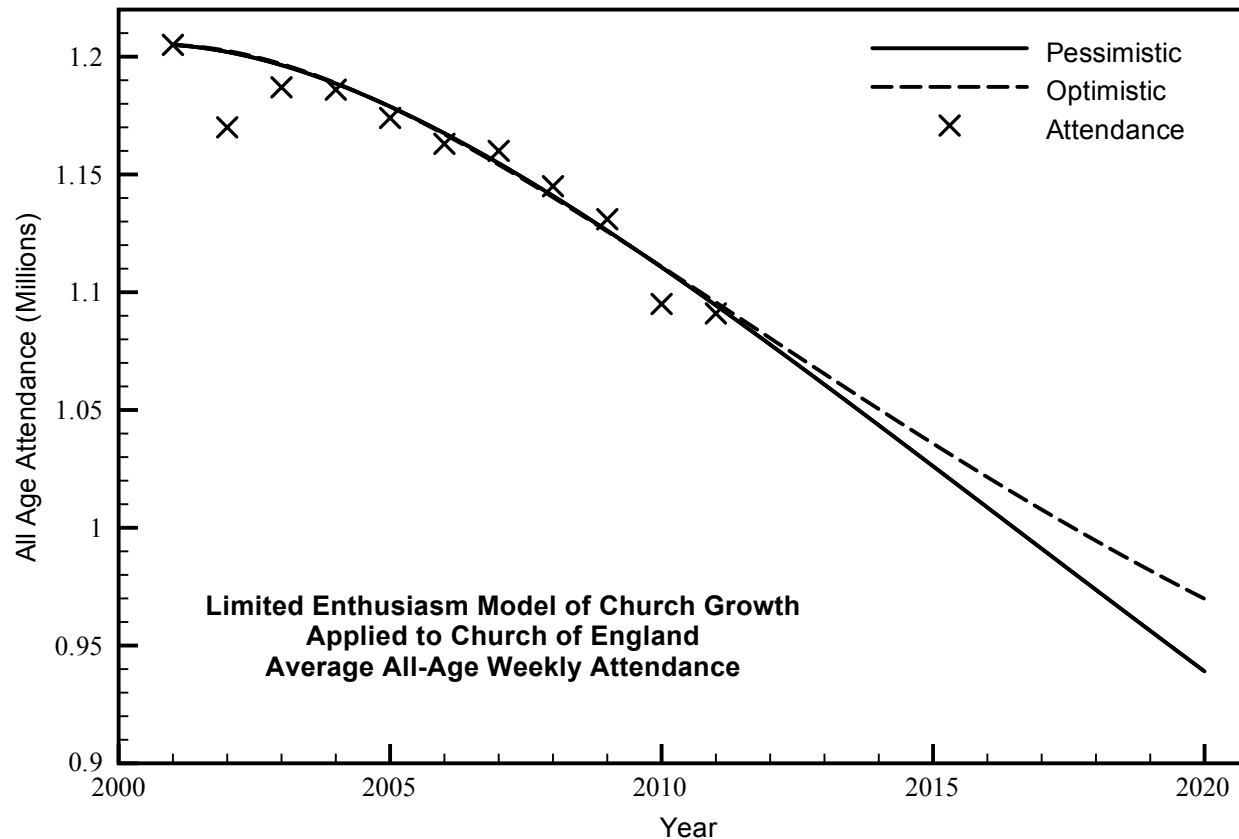
- Potential enthusiasts to reproduce
- Extinction threshold
- Revival-growth threshold

Denomination	Condition	Comments
UK		
Pentecostal	Revival Growth	
Charismatic/New paradigm	Survival	Was revival growth - slowed
Baptist	Survival	Fairly Flat
Anglican	Survival	Significant decline to come
Catholic	Extinction	
Methodist	Extinction	
USA		
Pentecostal	Revival Growth	
Southern Baptist	Survival	Decline does not fit model
Episcopal	Extinction	

Church of England 2001-2011



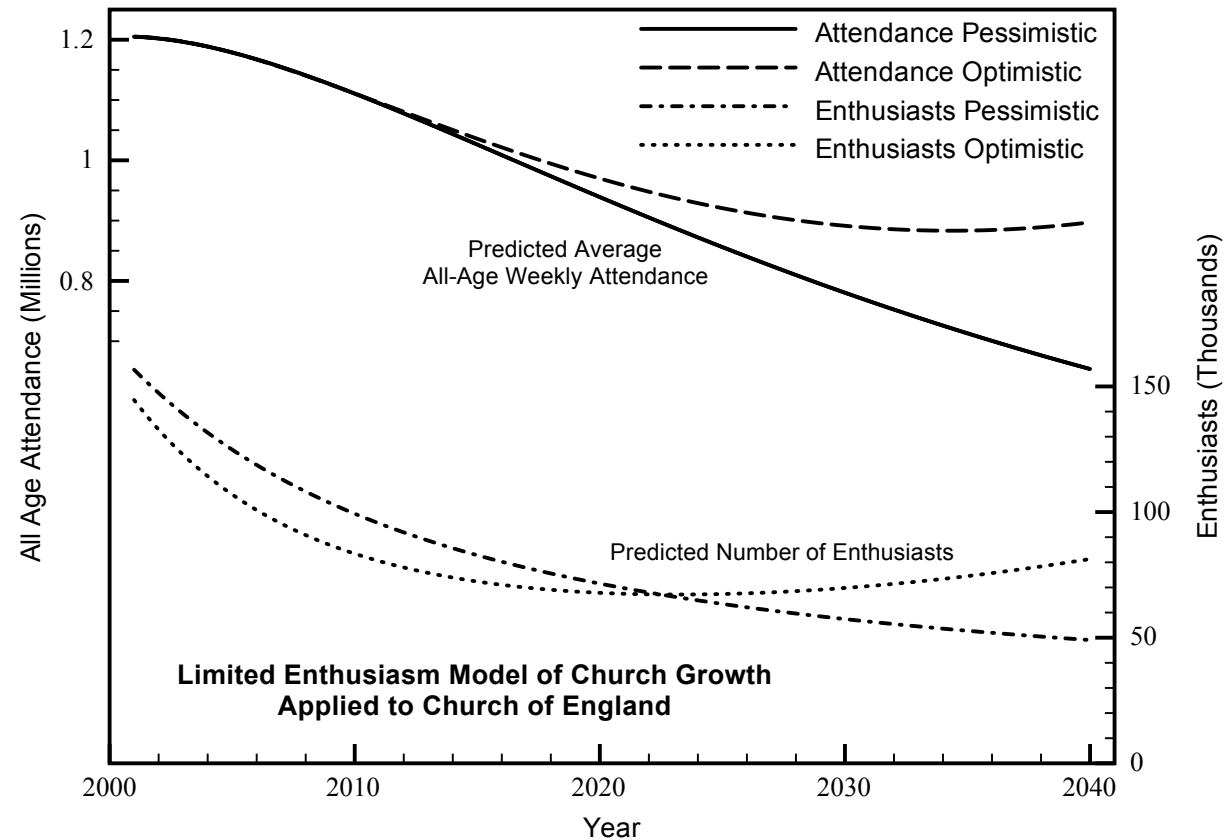
- Most fits above extinction (optimistic)
- Some below (pessimistic)
- Change of curvature



Church of England 2001-2011



Optimistic fit - enthusiasts start to reproduce again

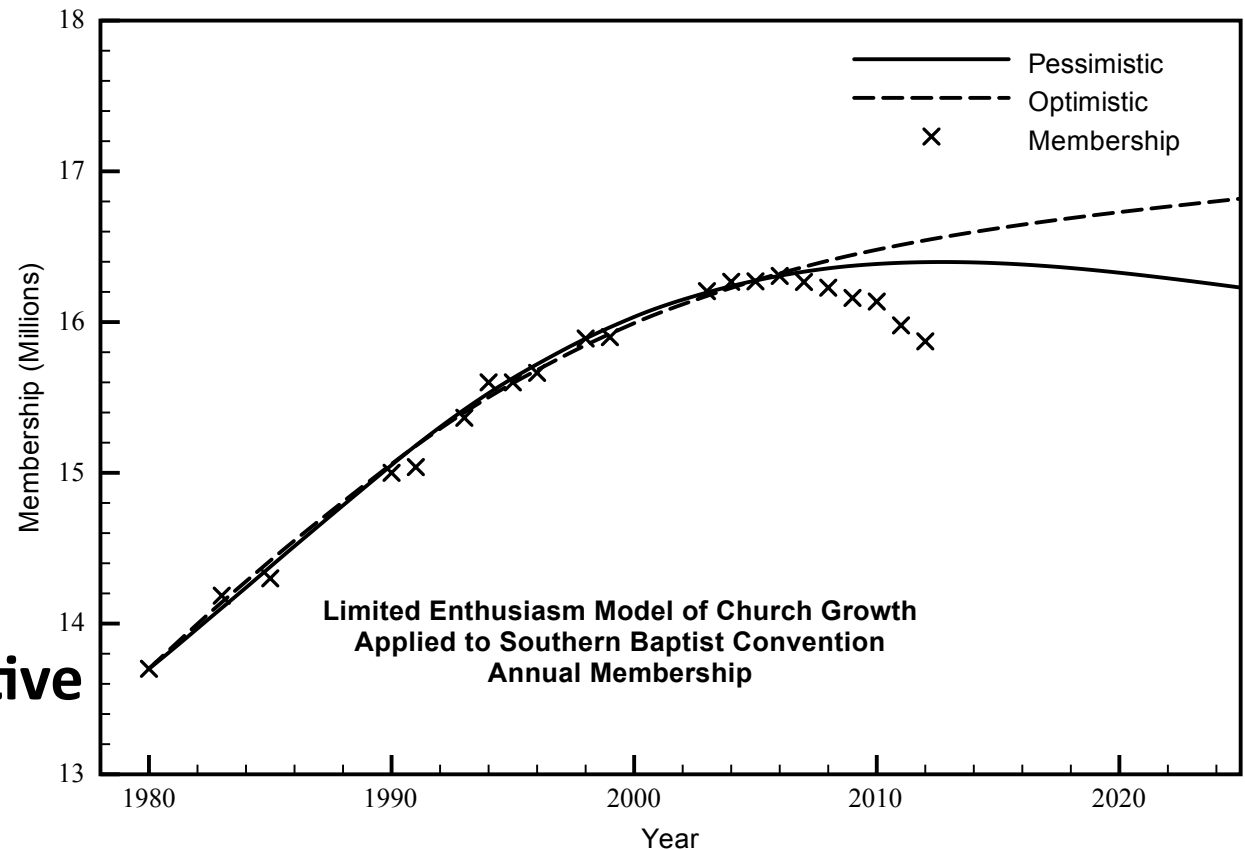


Southern Baptist Convention

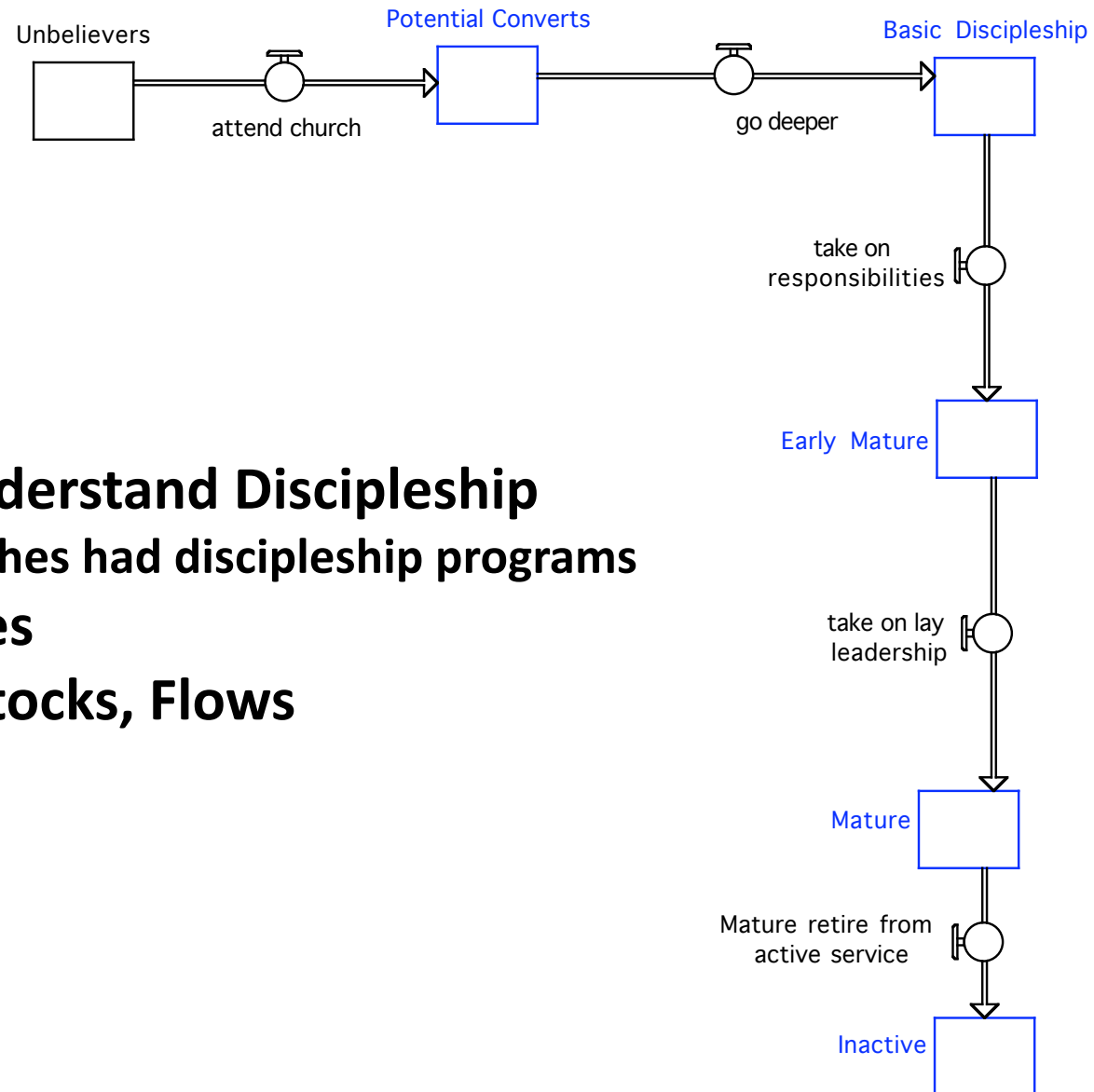


- **Does not fit after 2006**
 - Decline too rapid – why?
 - Extra loop/force

- **Too fast for aging**
- **Fall in birth rate**
 - Not worked through
 - In simulation
- **Leaving/Switching**
- **Enthusiasts less effective**
 - Internal confidence
 - External legitimacy



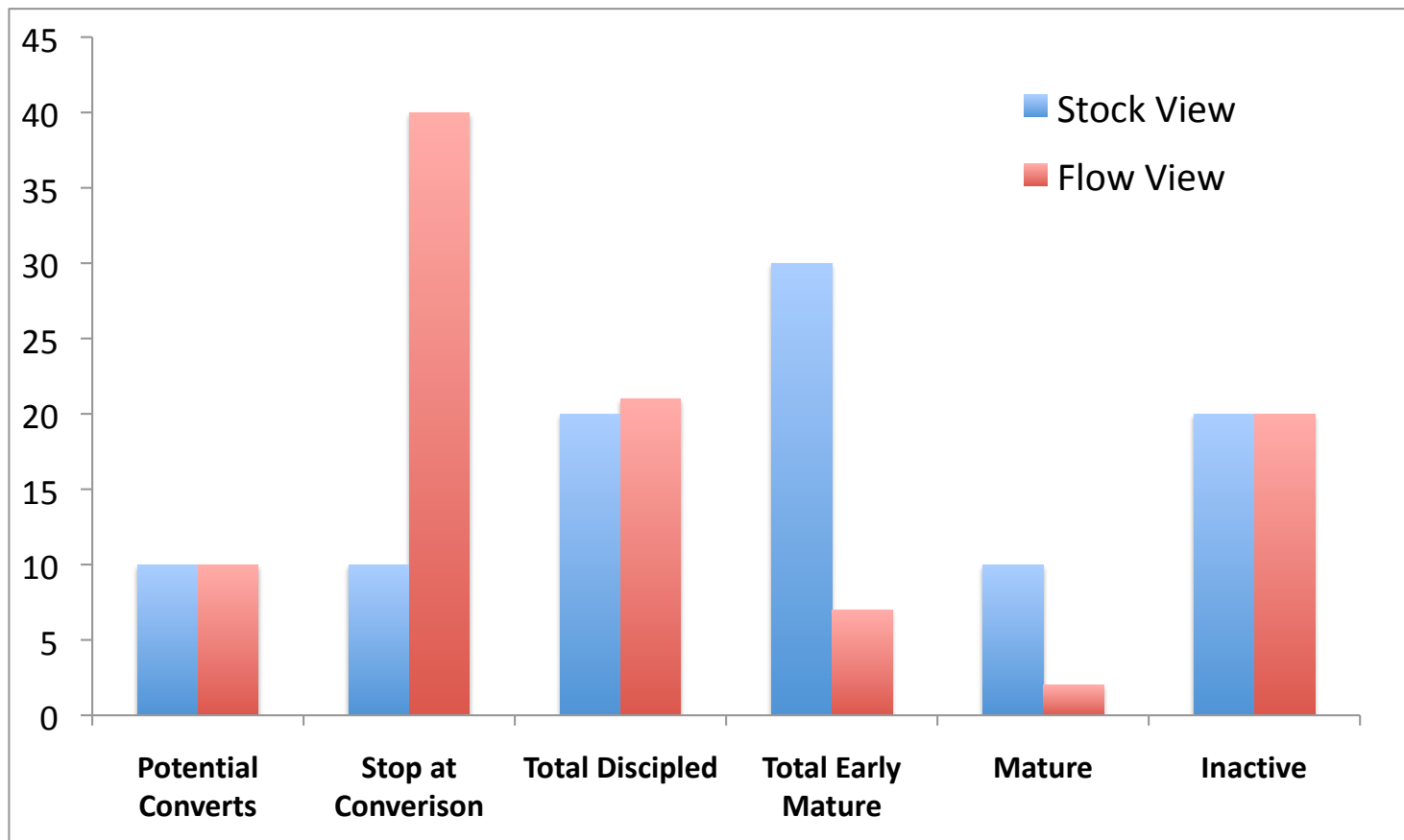
Discipleship Model

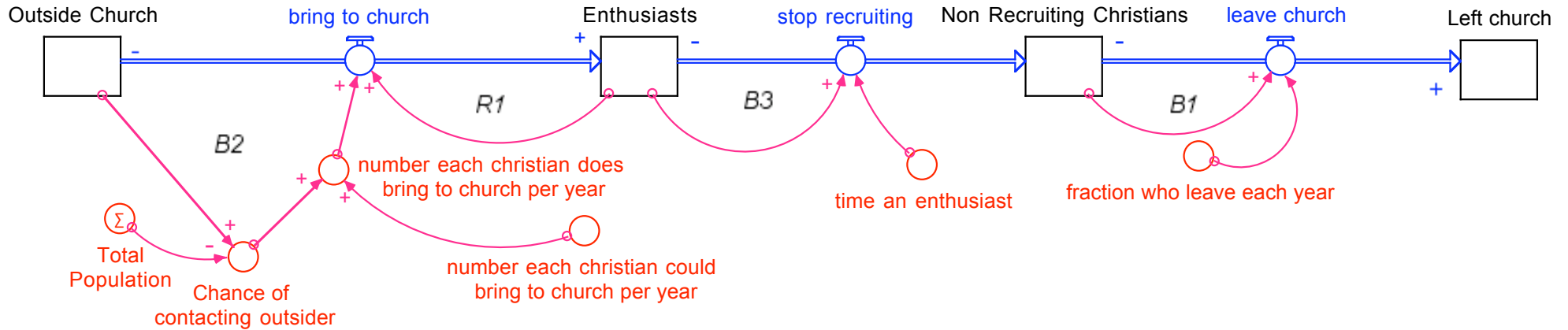


- **Pastors Understand Discipleship**
 - All churches had discipleship programs
- **5 Categories**
- **Estimate Stocks, Flows**

Challenge Perceptions

- **Stock Estimates – optimistic**
- **Flow Estimates – pessimistic**
- **Transfer in of mature missing**

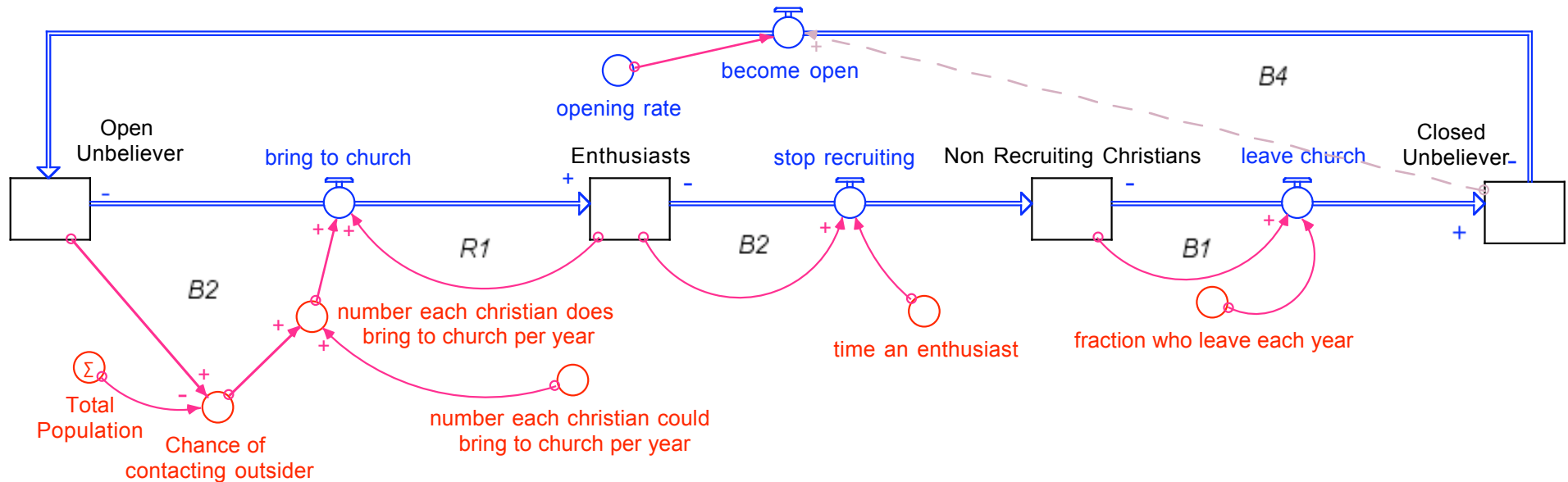




How can sociological theory be added to SD model?

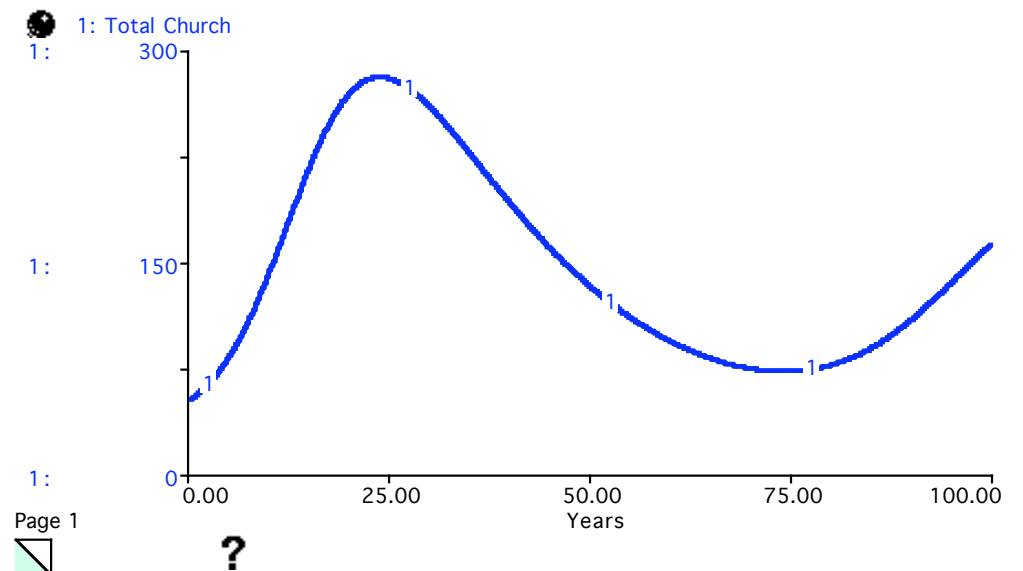
Secularisation

Sociological Theory

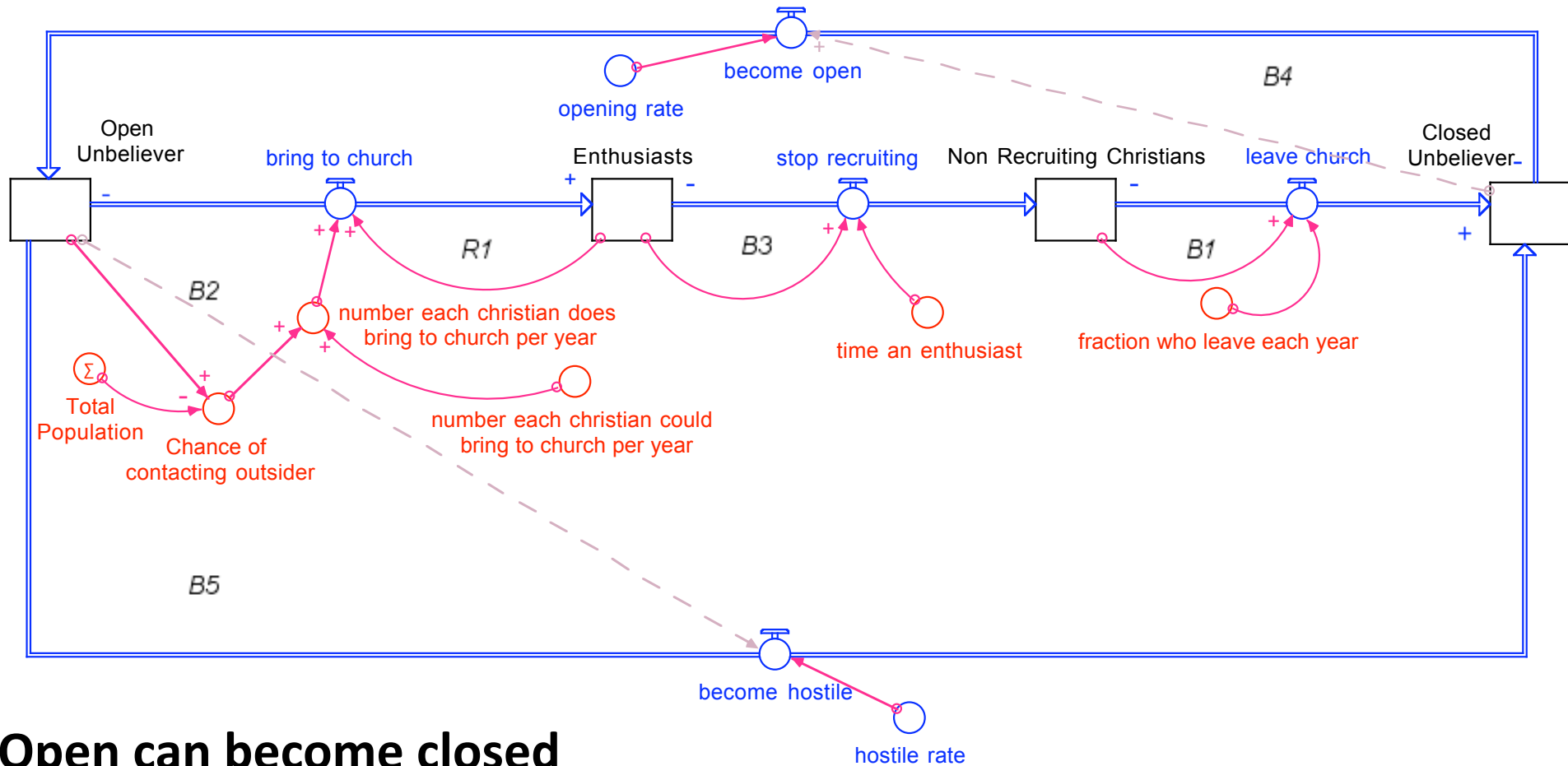


Dynamics Outside Church

- Recycle
- Overshoot
- Re-growth possible

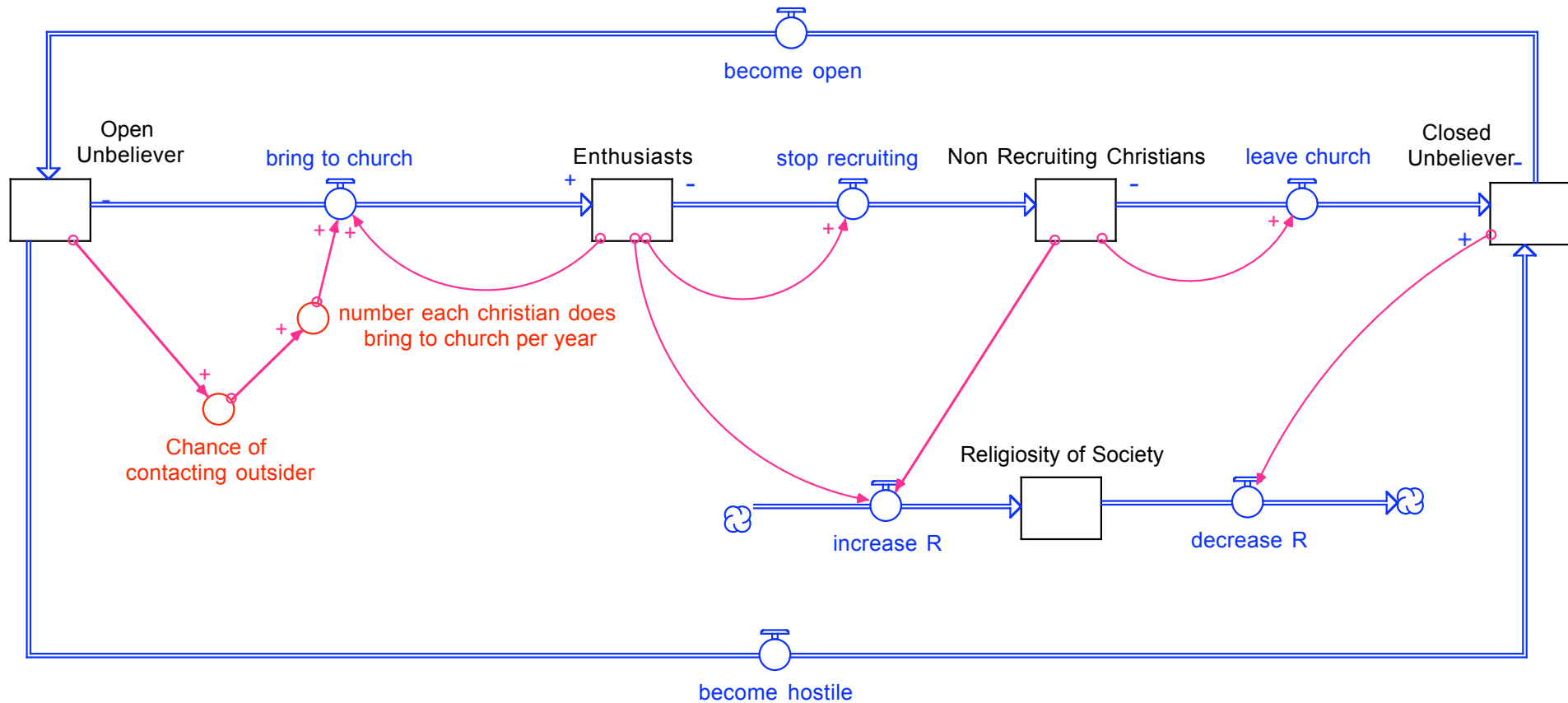


Sociological Theory



Open can become closed

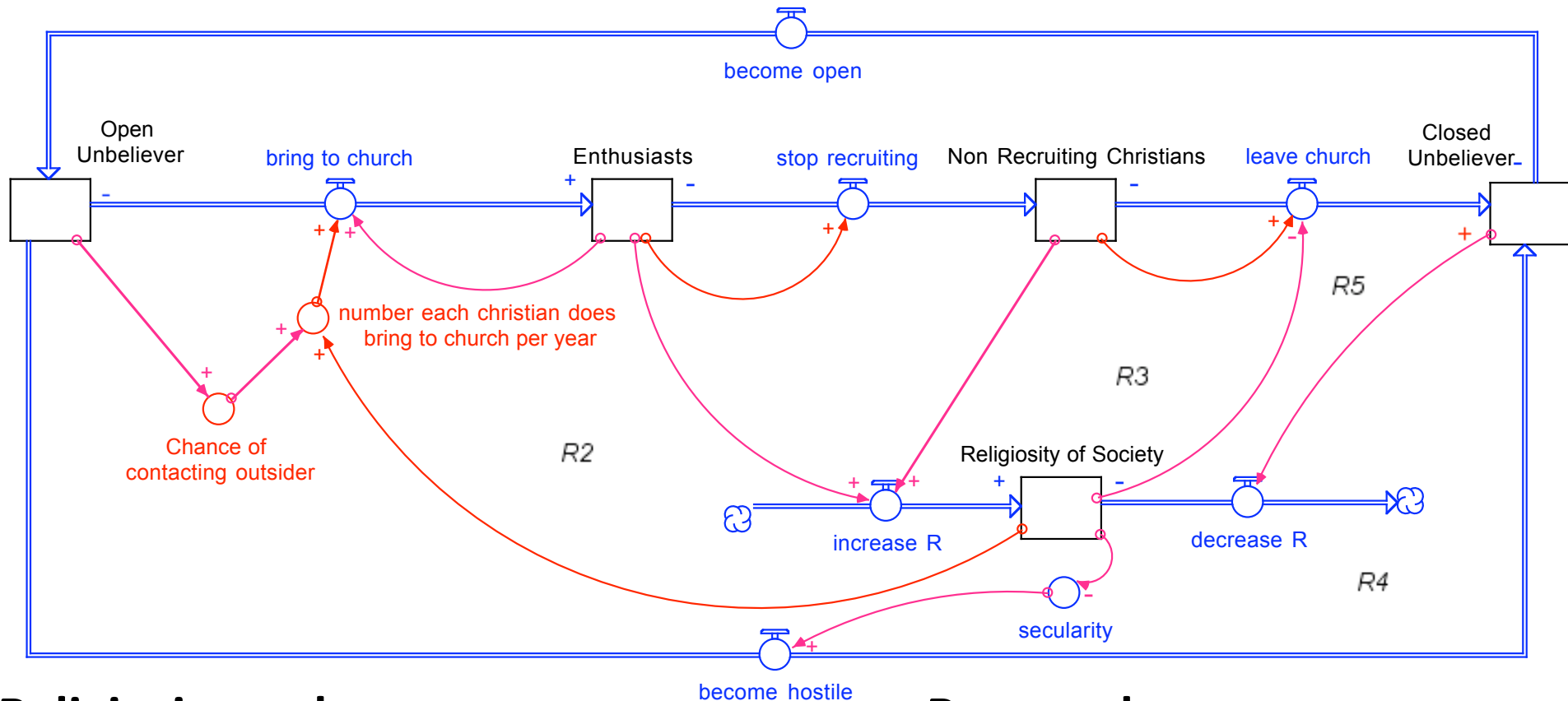
- Effect of secularisation
- Constant hostility rate



Religiosity a variable

- Increase as church increases
- Decrease as closed unbelievers increases

Sociological Theory



Religiosity makes

- Enthusiasts more effective
- Church more attractive
- Open stay open

Reversed

- 4 new feedback loops
- All R

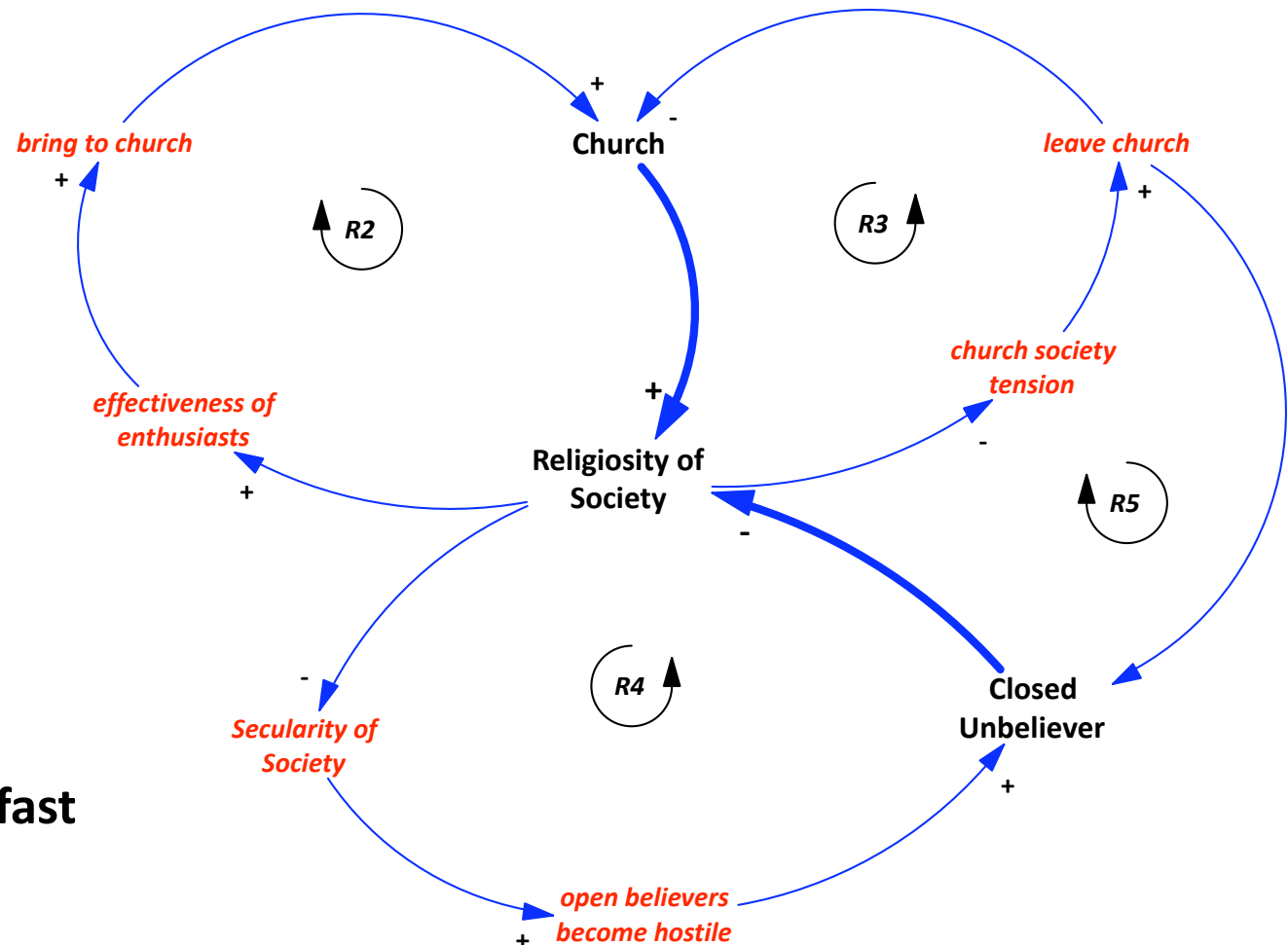
Extract the New Feedback Loops

Competing Forces

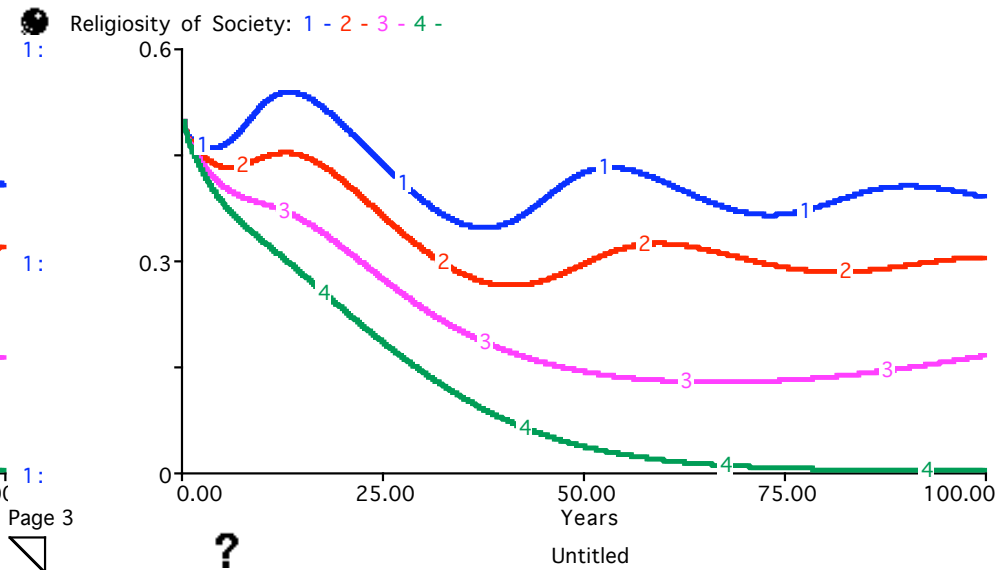
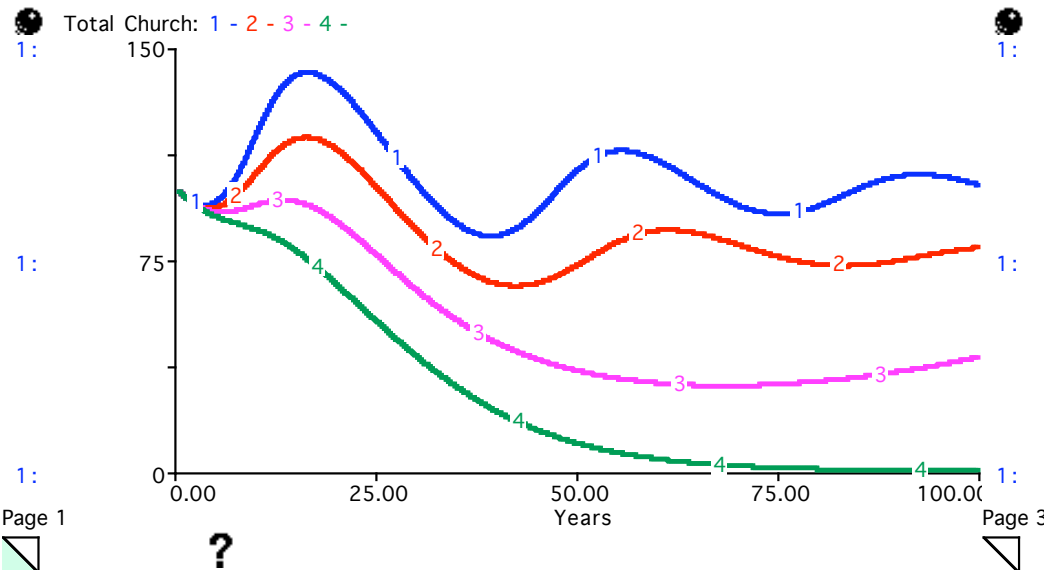
- **R2, R3** religiosity
- **R4, R5** secularity

Reinforcing Loops

- **Unstable**
- **Can change very fast**



Effect of Secularisation on Unbelievers



1-4 increasing effect

- Stability possible
- Too much and church pushed to extinction

Conclusion



- **Congregational Dynamics**
 - Understandable church to pastors
 - Evaluate policies
 - Challenge perceptions
- **Theories of Growth**
 - Develop principles
 - Tested against data
- **Potential for Sociological Theory**
- **SD Software**
 - SD Courses
 - SD Society

John Hayward