A Dynamical Model of Strictness and its Effect on Church Growth

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First Draft

Abstract

In his 1972 book "Why Conservative Churches are Growing" Dean Kelley proposed the thesis that strict churches are "strong" and hence grow. In an attempt to explore quantitatively the dynamical consequences of Kelley's thesis an earlier systems dynamics model of church growth is extended to include the strictness of the church and its effect on recruitment. The model uses a concept of strength based on the church's purity measured by the proportion of members who hold to the purity of the faith. The model explores the effect strictness has on the recruitment of pure and impure church members, the purity of the church, and the recruitment potential of the the enthusiasts who drive the growth of the church

Results show that a church can only reach a fixed proportion of society. Further growth is possible if restrictions on the purity of new members are relaxed. Although this accelerates the growth for a period, eventually this lenient church will peak and subsequently decline as the church membership becomes increasingly impure. The impure church either stabilises at a low level of membership or becomes extinct, in contrast to the strict church which remains at a high level. A causal loop diagram of the situations shows that the lenient church becomes increasingly dependent on lowering its barriers to aid its growth while destroying the missionary zeal of its enthusiasts who are the real cause of its growth.

Introduction

Dynamical Systems and Church Growth

A dynamical system is any system, which has quantities that change over time according to the laws of cause and effect. Dynamical systems are found in the areas of physics and engineering where their construction is very precise coming out of the fundamental laws of physics. Such systems are often modeled and analyzed with high-powered mathematics. However there are also many examples of dynamical systems in the social arena: the growth of a population, the spread of a disease, or evolution of political ideas. In the social case the laws on which the models are based are less clear than the physical sciences nevertheless much success has been achieved in the application of such models, especially in the areas of ecology and epidemiology.

A church is also an example of a dynamical system. The numbers of people who attend, or are in membership, changes over time, according to the mechanisms of births, deaths and conversion etc. As such it is possible to analyze the growth and decline of a church using a dynamical model. Hayward (1999) described a simple mathematical model of church growth based on the assumption that only some of the church members were involved in the conversion of unbelievers – the enthusiasts. The model showed that in the short term the growth of a church is similar to an epidemic with the result that not all of the population gets converted. Growth depends on the ability of the enthusiasts to reproduce themselves by making more enthusiasts.

Systems Dynamics

However powerful mathematics is as a tool for such modeling it is difficult to relate the equations of the model to the laws of cause and effect. An alternative modeling approach is provided by System Dynamics, invented by JW Forrester, and pursued by many practitioners over the world, especially in the areas of Business Dynamics. The Systems Dynamics Society gives information on the background and applications of the methodology.

Models are built in a diagrammatic form with the variables and parameters clearly identified. Variables are quantities like population number. Parameters are quantities like birth rate. As such the model is understood in terms of the real quantities that can be measured in the real world.

There are further advantages in this approach as such models may be investigated by computer simulation and by causal loops. The latter is a very conceptual way of explaining behaviour without having to resort to particular numbers or equations. As such the consequences of the assumptions made can be clearly demonstrated and, if the behaviour is not seen the assumptions can be dismissed and changed.

Hayward (2000, 2002) re-expressed the model of church growth into the systems format and has applied it to a range of revival type behaviour in the Christian church including the Toronto Blessing and the Alpha course. Hayward (2000) extended the model to include the effects of births and deaths. The construction and consequences of this model are outlined again in this report. An application of this model to church attendance and membership data is given as another talk at the annual meeting of the Religious Research Association 2002.

Strictness and Church Growth

In 1972 Dean Kelley published the book "Why Conservative Churches are Growing", setting out the thesis that strict church are strong and hence they grow, or at least are more robust against decline. The thesis is well attested in church attendance and membership figures both from the time of Kelley's book and since. However discussion of the thesis is inevitably clouded by the definitions of the terms "strict" and "strong", and how they may be measured

Another advantage of systems dynamics is its ability to handle variables that are not easily quantified, of which strictness and strength are examples. This report, based on the talk given at the 2002 meeting of the Religious Research Association, attempts to extend the church growth model to include strictness and strength

Kelley gives a number of traits of strictness in a church (p84), absolutism, conformity and fanaticism. In order to clearly investigate the effects of the assumptions made this report will consider a very specific definition of strictness. A strict church is one whose that has a strict entry policy, a policy that prevents a number of people from joining the church who would have otherwise wished to join. Conformity is expressed through the recruitment policy. Thus a strict church will pure in the sense that people are filtered out by some set criteria

Likewise Kelley gives a number of evidences of social strength: commitment, discipline and missionary zeal. Again this report only uses one, the missionary zeal, as this has a direct influence on recruitment into the church.

Firstly the church growth model is described using causal loops, with the growth and decline mechanisms identified. (See the report of the other talk "Revival or Extinction" for discussion of these mechanisms in terms of the behaviour of actual church numbers.) Then the model is extended to include the effects of strictness in the church's recruitment policy, and strength, as measured by its purity.

Analysis show that churches with a lenient policy to recruitment will have much higher growth in the short term but eventually collapse as they lose their base of enthusiasts required to drive the church growth. Further, if a church, which starts strict implements a policy of relaxing its strictness on entry to the church in order to boost numbers, the short-term gain is at the expense of the long-term decline of the church. The church becomes increasingly dependent on the short-term recruitment policy further destroying the enthusiasm of their enthusiasts. There comes a point where the enthusiasm is so low that not only is the church declining but it is also heading for extinction.

What Causes Church Growth?

- **Conversions**

  Through contact between believers and unbelievers

- **Reinforcing Feedback Loop**

  Spirals upward

  Spirals downward

Believers

+

R

+

Conversions

+ means
"change the same way"
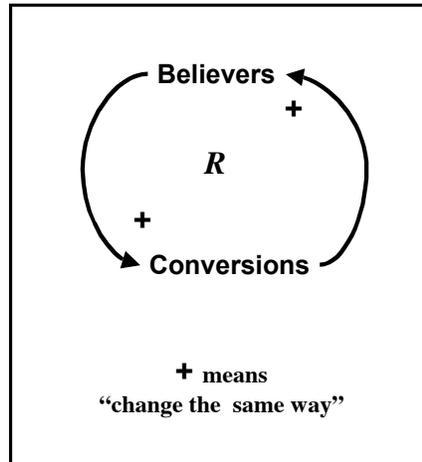
The primary mechanism for the growth of a church is through the conversion of those who are outside the church. It is assumed that the conversion takes place because there is a contact between a believer and an unbeliever. Thus the more believers there are the more evangelistic contacts can take place.

This mechanism is an example of a reinforcing loop (*R* in the diagram). The more believers there are the more conversions will take place. This is the + in the diagram, the number of conversions changes in the same way as the number of believers. More conversions in turn lead to more believers. Such growth is exponential and is quite typical of dynamic churches in their early stages of growth. Growth can be given a doubling time. For example the doubling time of the Latter Day Saints worldwide in the latter part of the 20th century was around 18 years.

Reinforcing loops can be described as an increasing spiral, as when inflation in wages and prices affect each other and spiral out of control. The mechanism is sometimes called a vicious circle (or cycle).

This loop can also work in reverse. If the numbers of believers are declining through death or people leaving then less believers will mean less conversions to replenish the losses, which could lead to the churches decline.

What Limits Church Growth?

- **Shrinking Pool of Unbelievers**

- **Balancing Feedback Loop**
  Stable limit

Unbelievers

B

+

Conversions

− means
"change the opposite way"
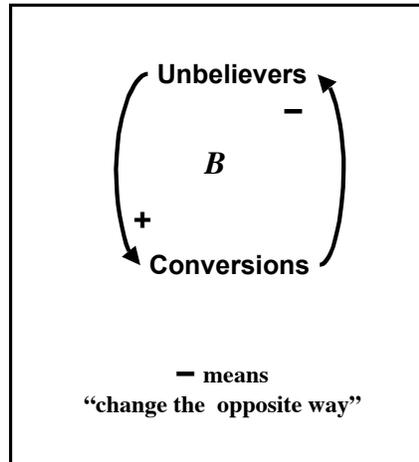
The most obvious limit to the growth is that the church cannot convert more than the total population. This is an example of a balancing loop (*B* in the diagram). The <u>more</u> conversions that take place the <u>less</u> unbelievers there are. That is the minus sign on the diagram, the number of unbelievers changes in the opposite direction to changes in conversion. Eventually the church would tend to a stable limit with everyone converted.

A further result of this mechanism is that it gets increasingly harder to find unbelievers as the church grows. The exponential growth of the initial phase now slows down as the limit is approached. That slowing down is noticed well before half the population is converted.

Enthusiasts

Only Some Believers Active in Conversions
- Limited recruitment period
- New converts are main source of enthusiasts

Growth Limited by their Reproduction Potential
- How many new enthusiasts one enthusiast can make before they lose their enthusiasm
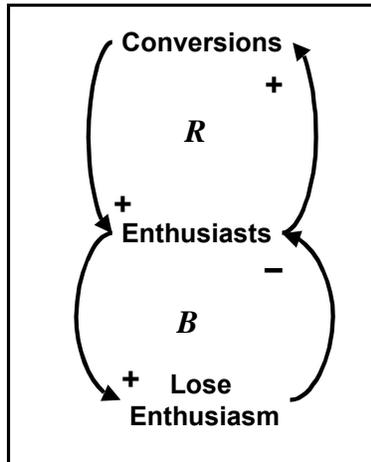
No church sees the entire population converted. Church growth is further limited because only a subset of the church are involved in making the contacts that lead to conversion. These are the enthusiasts. Further still the enthusiasts only retain their potential for conversion for a limited time. For most it is within a short time after their conversion.

After they have become more integrated into the church the enthusiasts run out of their network of unbelieving friends and have found other work to do within the church. Perhaps even their initial enthusiasm for the faith has faded. This limited enthusiastic period is an examples of Wesley's Law: "taking up religion has produced benefits that makes missionary zeal too costly"

This model assumes that new converts are main source of new enthusiasts to replace the old enthusiasts. The growth in the number of enthusiasts is again a reinforcing loop (R). Their loss of enthusiasm is a balancing loop which slows the production of enthusiast amd limits the growth of the church (B). The key parameter in the church's growth is the Reproduction Potential of the enthusiasts: *How many new enthusiasts one enthusiast can make before they lose their enthusiasm.* Typical values vary from 0.7 - 1.3. If this potential is less than 1 a church cannot sustain its number of enthusiasts or its growth.

What Causes Church Decline?

- **People Leaving the Church**

- **Church Not Retaining its Children**

However recycling helps sustain a church

Diagram labels: Believers, Leave Church, Unbelievers, Converts, *B*, *R*
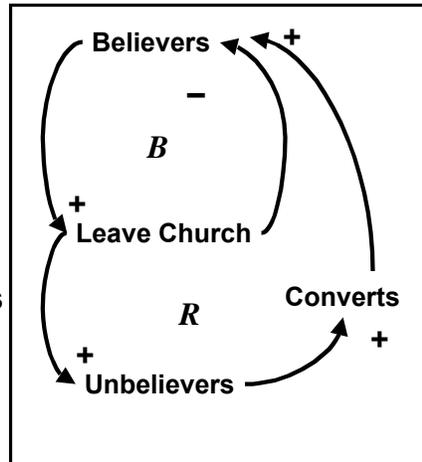
The main mechanism of church decline is that people leave the church, for whatever reason. A typical value of adult reversion is 6% per annum. This is a another balancing loop (*B*). The more people in the church the more who will leave if the percentage remains fixed.

However churches also lose the children brought up in the faith who leave before making an adult commitment and joining the church. These don't reduce the churches numbers but fail to be added in the first place. In the UK this loss at least 50% of the children of believers

If these loses are greater than the number of conversion the church will decline until they balance or it becomes extinct.

However there is a recycling effect as those who leave, and the lost children, swelling the unbelieving pool. This is the reinforcing loop in the diagram (*R*) The more who leave the more unbelievers there are, thus the more conversions occur! This can help sustain the number of enthusiasts and restrict the decline of the church in the long term.

Revival Threshold

- **Enthusiasts increase if Reproduction Potential is above revival threshold**

–> **rapid growth**

- **Threshold depends on losses and pool of unbelievers**

Reproduction Potential

Limited enthusiasm

Losses

Re-cycle

Church Numbers

0.65

0.33

0.00

0.00   22.50   45.00   67.50   90.00

3.20

Revival

2.05

0.90

Extinction   *Thresholds*

0.00   22.50   45.00   67.50   90.00

Years
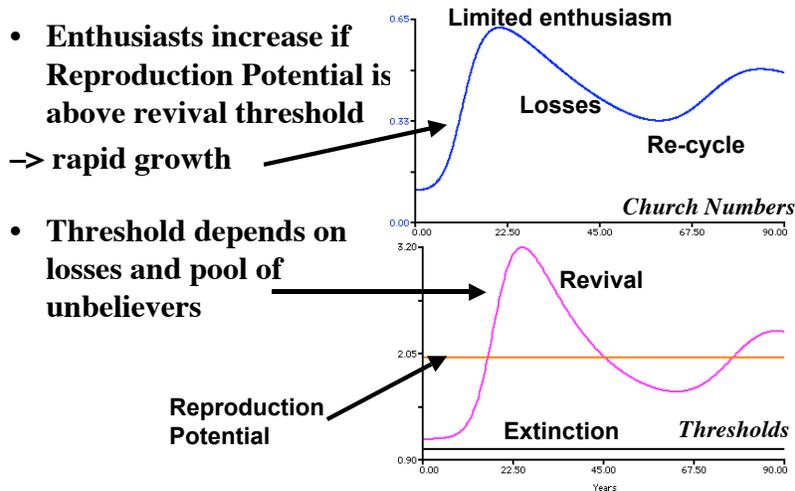
The number of enthusiasts (revival growth) increases if their reproduction potential is above a revival threshold. The results is a rapid increase in the growth of the church as there are more and more believers involved in the conversion process. The increase in the church resembles the spread of a disease which also spreads via person to person contact.

This threshold depends on losses from the church. The higher the losses the higher the threshold and the larger the reproduction potential needs to be for revival growth to take place.

The threshold also depends on the size of the pool of unbelievers, rising as the church grows and the pool shrinks. As the bottom graph shows a church in revival growth eventually finds its reproduction potential below the revival threshold because the threshold has risen. The number of enthusiasts starts to decline and the growth of the church slows, and maybe starts declining.

The church eventually settles on a limit determined by the value of the reproduction potential, the losses, recycling and the length of the enthusiastic period. In a growing population it is the proportion the church occupies that levels out.

Extinction Threshold

- **Church declines if Reproduction Potential is below extinction threshold**

- **Threshold depends on losses**

Church Numbers

Thresholds

Revival

Extinction

Reproduction Potential
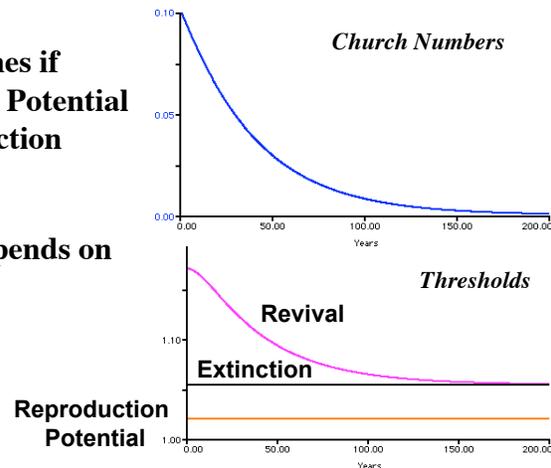
There is also an extinction threshold. If the reproduction potential of the enthusiasts is below this threshold then the church will decline without recovery and become extinct.

The extinction threshold also depends on the losses. The higher the losses the higher the threshold. If the reproduction potential is below this threshold then extinction can only be avoided by reducing the losses or increasing the reproduction potential. In some churches (e.g. the Methodists in England) the reproduction potential is so low, less than 1, that any losses, however small, would lead to the extinction of the church.

Of course a church that converts no-one will not decline if it keeps all its people and the children of its believers. It will survive on biological growth alone. However it cannot grow (unless the believers birth rate is higher than the surrounding population!) and it must decline if any losses start taking place.

Strictness Effect on Recruitment

Strictness Assumption
- **Reducing entry barrier (strictness) increases growth**

Hidden Assumption
- **Production of enthusiasts has increased**

Church Numbers

Lenient

Moderate
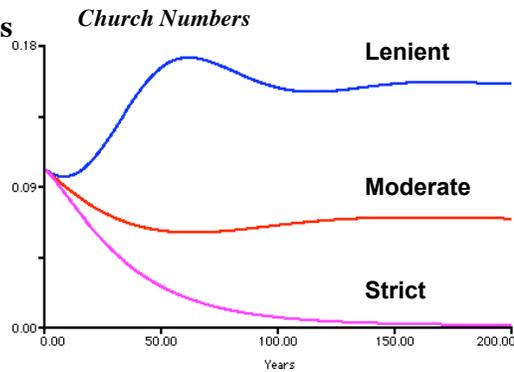
Strict

In order to investigate the effect of strictness on recruitment it is assumed that in a strict church some of the people contacted, who then wish to join the church are rejected. The reason for the rejection is not important at this stage. Thus if a church becomes more moderate more people are actually converted in the sense that they are allowed to join the church.

The graph above (from the simulation of the system dynamics model) shows a church so strict that not enough people are being converted for it to survive. The effective reproduction potential is below the extinction threshold. The moderate church relaxes the entry requirements so more people are admitted, enough to survive. The lenient church, with no restrictions at all, is even able to see some moderate revival growth.

However a big assumption has been made that the extra converts which the strict church would have rejected are the sort of people who can become enthusiasts making more enthusiasts. Thus they are not just adding themselves to the congregation but are able to bring in others.

Reduce Recruitment Barrier

Intended Effect
- **Recruitment Barrier is lowered to combat decline**

Church Numbers

Hidden Assumption
- **New recruits of leniency are enthusiasts**
- **Thus the reproduction potential is increased**

Reproduction Potential

Revival

Extinction

Thresholds
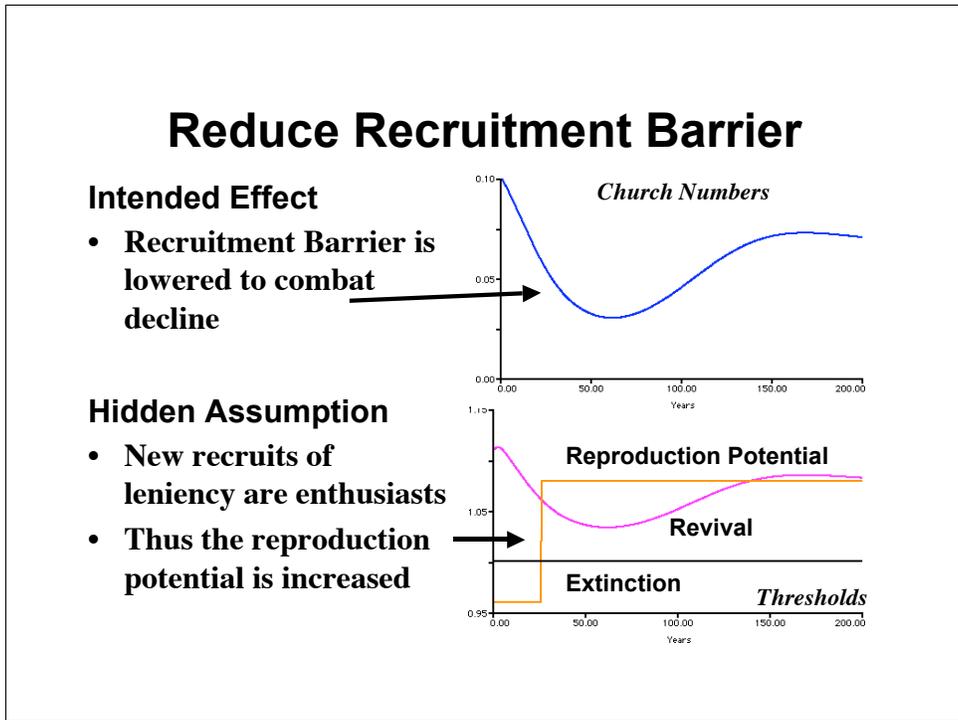
The intention behind lowering the recruitment barrier is that more people join the church. However the hidden assumption is that the people the strict church rejected can also be enthusiasts and are thus able to make new converts themselves. Thus the *effective* reproduction potential for each enthusiast has been increased. This is because each enthusiast is not just bringing more *people* into membership but more *enthusiasts*.

In the bottom diagram the reproduction potential rises above both thresholds when the most lenient policy is introduced. Thus revival growth takes place.

The question has to be asked, if the strict church rejected a class of people who the lenient church accepted would these people have been the sort of people of whom enthusiasts were made? At present nothing has been said about these people.

Leniency & Enthusiasts

- **New converts let in by lenient policy are not enthusiasts**
- **Reproduction potential unchanged**
- **Church grows in short term - long term unchanged**
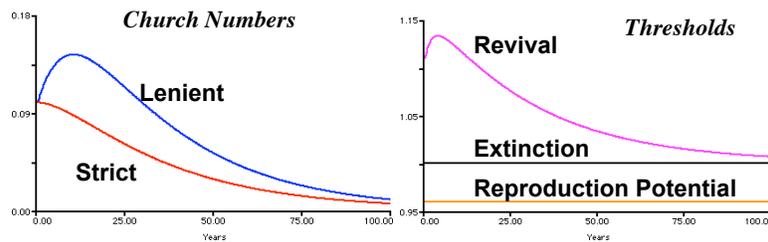
The worst case scenario is is that none of the people that the strict church rejected would have been enthusiasts involved in recruitment. Modifying the systems dynamics model with this assumption shows that the lenient church grows fast in the short term, about 10 - 20 years depending on the duration of the enthusiastic period. However decline sets in and although it remains larger than the strict church in the long term extinction has not been avoided.

The reproduction potential of the enthusiasts has not been changed in the lenient church as none of the extra converts are enthusiasts. Thus although more people are added no extra enthusiasts are added. As it is is the reproduction of enthusiasts that governs the ultimate dynamics of the church, lowering the entry barrier has not changed its ultimate fate.

Strictness Effect on Church Purity

Purity Assumption
- **New converts let in by the lenient policy do not hold to purity of faith**

Result
- **Strict churches are strong (pure)**
- **Lenient churches are weak (impure)**
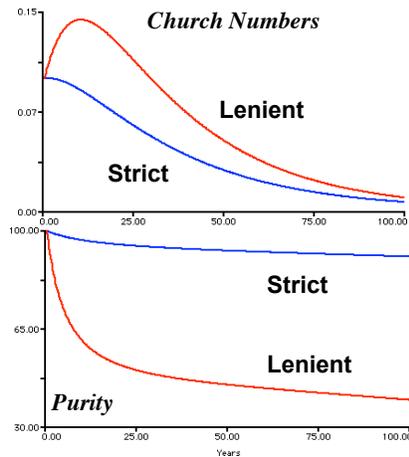
The question now has to be asked, why did the strict church reject these potential converts in the first place? It is assumed that there is something about them that would not have fitted into the ethos of the church. In keeping with Kelley there is some lack of conformity to the demands of the strict church. In some sense they are not pure in the faith.

The issue over which they are impure is secondary but it is likely that they would tolerate things that the pure members would not. They would be "yeast that spreads through and spoils the whole dough". As such the church would become impure. Disagreements would result undermining the cohesiveness or strength of the church.

Thus a strict church rejects these people in order to remain strong, where "strong" is interpreted as "pure" in whatever the issues of faith or behavior are involved. By contrast the churches with lenient recruitment will become impure, more diverse and thus weaker in their stand over these issues.

The result from the simulation (shown in the graphs above) is that the lenient church loses its purity faster, where the purity of the church is measured by the percentage of pure members in the church.

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Purity Effect on Missionary Zeal

Zeal Assumption
- **Impurity in the church reduces zeal of enthusiasts**
- **Weak churches have low zeal**

Result
- **Less strict church grows faster**
- **It becomes impure (weak)**
- **Missionary zeal (reproduction potential) drops**
- **Fast decline as church runs out of enthusiasts**
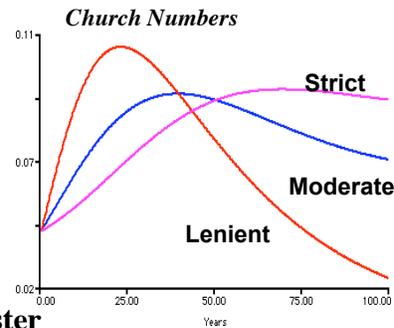
How does impurity affect the enthusiast's ability to recruit and in particular to make more enthusiasts? If the enthusiasts are only pure themselves the zeal assumption is that it is harder for enthusiasts to make more enthusiasts in an impure church . The impurity in the church reduces the reproduction potential (zeal) of enthusiasts.

It may be because it is now much harder for enthusiasts to attract those who want to be pure in the faith. Perhaps it is no longer politically correct in an impure church for them to engage in the particular form of evangelism they found effective. Maybe they now have less enthusiasm to seek converts as they become disenchanted with a church becoming increasingly impure. If a person is not enthusiastic for compromise they will not be enthusiastic to recruit.

Thus the weak (impure) church has a lower missionary zeal than the stronger one, as stated by Kelley. As the church becomes more impure, due to the lenient recruitment policy, the reproduction potential falls.

Thus the less strict church grows faster initially due to extra converts. It becomes impure or weaker due to the impure converts. The recruitment potential fall as enthusiast lose their missionary zeal. The final result is fast decline as the church runs out of enthusiasts. There are now very few converts.

Two Opposing Effects of Leniency
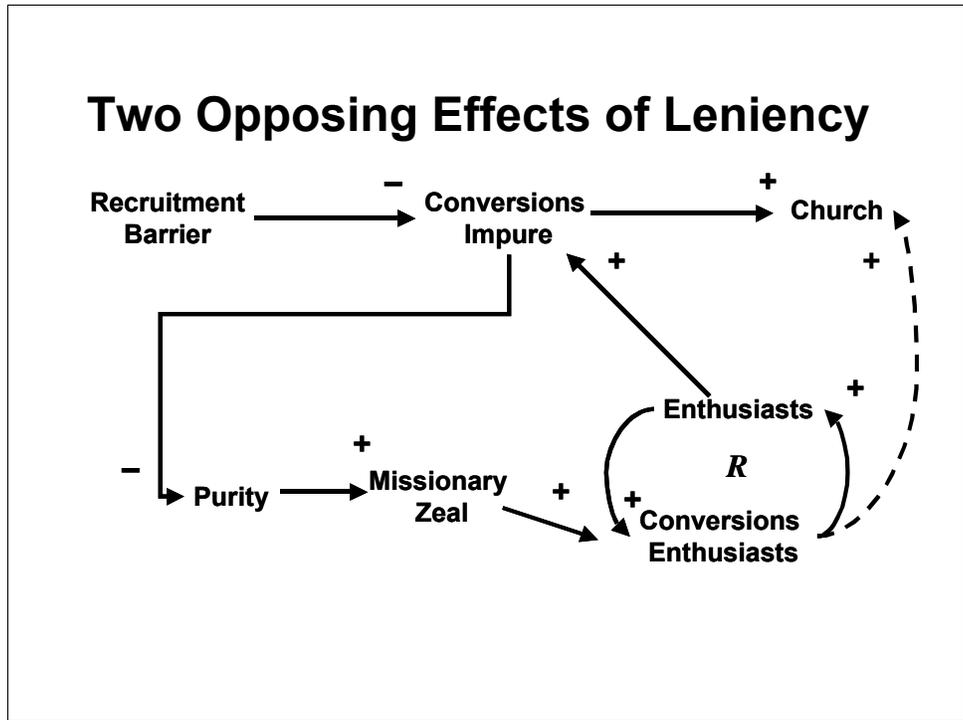
Although on the previous page this was demonstrated by a systems dynamics simulation it can also be demonstrated by a causal diagram.

There are two opposing effects of leniency. Following the top of the diagram, if the recruitment barrier is lowered the number of conversions of impure rises (- changes the opposite way). If these conversions rise the church rises (+ changes the same way). This effect is immediate so the church sees growth, maybe revival-type growth.

Following the lower link. As the conversion of the impure goes up the purity of the church goes down. Now all the links are the same way. The missionary zeal, as measured by the reproduction potential goes down. There are less conversions of enthusiasts, less enthusiasts, and thus less conversions of impure leading to the church growing down. This effect is delayed as it works through the various components of the system.

Of course as the conversion of the impure goes down again purity could go back up. However the conversions of the pure are also going down, so the purity ratio may never recover unless the impure leave at a much faster rate than the pure.

Leniency Gives Shift in Dynamics

First Growth
- **Barrier comes down**
- **Growth through impure**
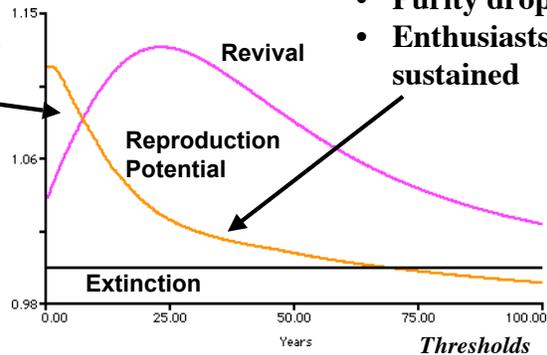
Second Decline
- **Purity drops**
- **Enthusiasts not sustained**

Revival

Reproduction Potential

Extinction

Thresholds

Years

In the graph two pages back both the strict and the lenient church started with the reproduction potential above the revival threshold. However in the case of the lenient church the entry barrier was also relaxed in order to enhance the growth above the limit which the strict church had faced.

Looking at thresholds of the lenient church above, the immediate effect of this policy is to enhance the growth of the church as mirrored in the rising revival threshold. However the side-effect is to lower the purity and hence lower the reproduction potential of the enthusiasts. That potential quickly drops below the revival-growth threshold, thus the growth of the church is now slowed. However this effect is delayed. By the time the church starts declining (as seen in the declining revival threshold) the production potential is well below the revival threshold and enthusiasts are hardly reproducing themselves at all. The reproduction potential then drops below the extinction threshold and only a new policy to increase the reproduction potential can possibly save the church from extinction.

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Leniency Policy

If you see decline over the previous 10 years then lower the recruitment barrier

Church Numbers

Strict

Lenient

Thresholds

Revival

Reproduction Potential

Extinction

Purity

Strict

Lenient
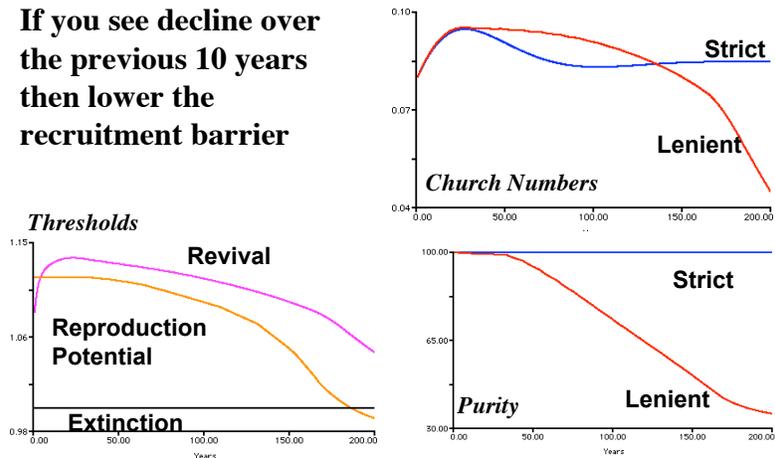
Consider a church that has a policy of lowering the entry barrier in order to enhance its growth. The systems dynamic model shows how it will evolve into a weak, impure church and eventually become extinct

For example let a church introduce a policy such that if it sees decline over the previous 10 year period then it will lower the entry, or recruitment, barrier. This adjustment downward is only small at any one time. The graphs from the simulation of the systems dynamics model are shown above in comparison to the strict church which introduced no such policy.

For about 70 years the policy of the lenient church is successful with the it avoiding the decline of the strict church. However during that time its purity is dropping. Not only is it becoming more lenient to survive but it is also becoming weaker as it becomes more impure.

Eventually the church numbers collapse as the lenient entry policy has less and less effect on growth due to its effect on reducing enthusiasts. No matter what the lenient church tries to do to attract people it is too impure to inspire the remaining enthusiasts to recruit.

Leniency
Treating the Symptoms not the Cause
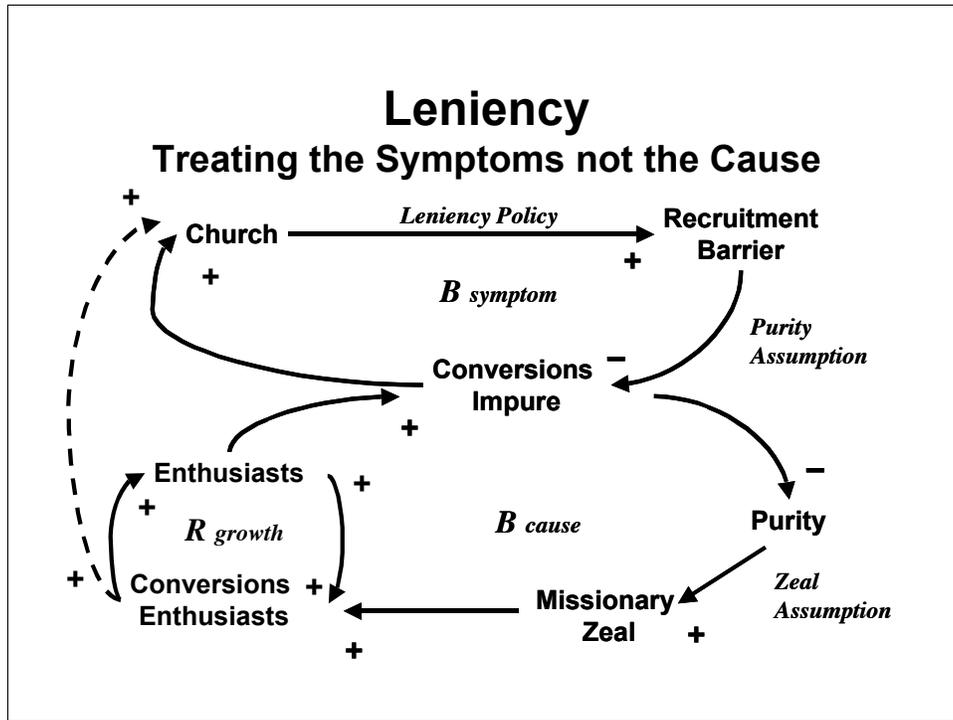
In summary lowering the entry barrier is treating the symptom - the declining church, instead of treating the real problem - the reproduction potential of the enthusiasts. In fact the policy is making that potential even worse by destroying the purity of the church.

The policy is the top balancing loop *B symptom*. On its own it should balance. The unintended effect is to reduce the purity of the church and the missionary zeal of the enthusiasts *B cause*.

Putting both loops together there is one large reinforcing loop. Church goes down, the barrier is lowered. More conversions of impure result and the church becomes more impure. The zeal goes down, there are less enthusiasts, less conversions of enthusiasts and impure. The church goes down - thus lower the barrier again. And so it goes on. A vicious circle - a reinforcing loop.

The loop R growth also goes into reverse accelerating the effect of the declining enthusiasts.

Thus the church's emphasis is moved more and more onto treating the symptom - church decline, rather than treating the cause - declining reproduction potential. This is called the "Shifting the Burden" scenario, common in the area of addiction.

Addiction- Shifting the Burden

Alcohol Consumption

Policy

B *symptom*

$+$

$-$

Problem's pain

$+$

B *cause*

$+$

$-$

Desire to solve problems
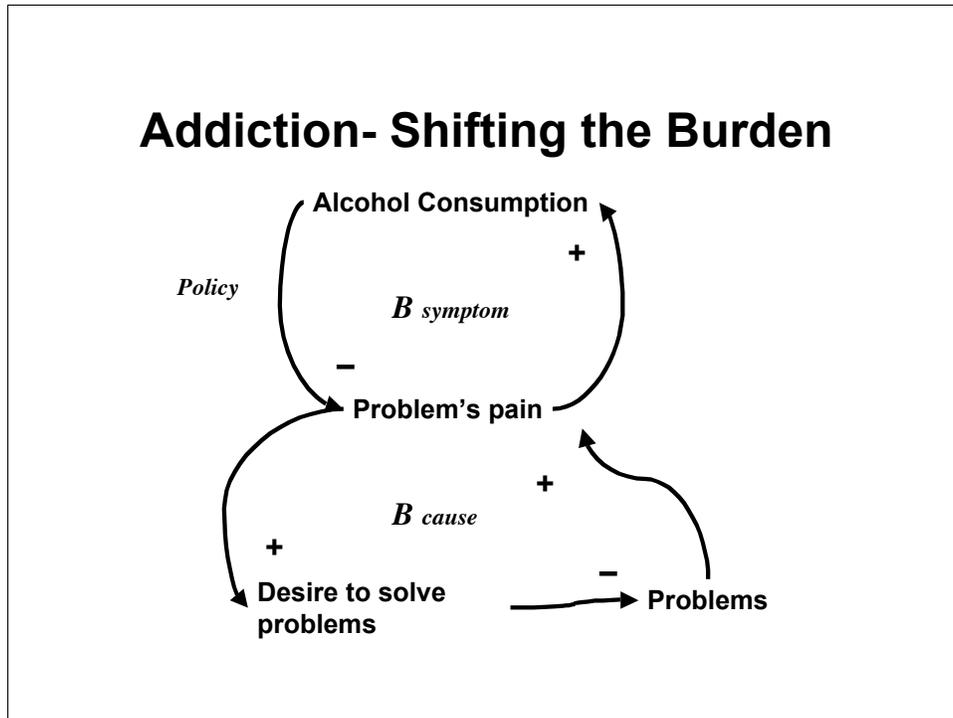
Problems

A similar situation exists when someone becomes increasingly dependent on a drug or alcohol. Consider the person who takes alcohol to make them feel better in face of life's problems. They are treating the symptom (top loop) instead of treating the cause - the problem's of life. The pain of their problems is meant to make them treat the problems, rather than run away and dull the pain!

Increasingly the burden is shifted from treating the cause to treating the symptom. Less pain means less desire to solve problems, thus more problems and so more pain. Their only policy is take more alcohol to dull the pain. They become addicted to alcohol.

The church in its desperate attempt to grow is addicted to making things easier for people to join. This is at the expense of making the enthusiasts less enthusiastic in their mission, thus the real cause of the growth of the church is destroyed. The church gets addicted to recruitment rather than increasing the enthusiasm and reproduction of enthusiasts.

Conclusion

Churches stop growing or decline because of limits: people leaving the church, child loss, the value of the reproduction potential of enthusiasts, percentage size of the pool of potential converts. Further growth, or the avoidance of decline, is only achieved through tackling these limits. The most leverage for change lies in increasing reproduction potential and/or increasing pool of potential converts.

Reducing recruitment, or entry, barrier gives short-term growth but at the expense of long-term decline. Although the more lenient policy lets more people into the church, the resulting impurity reduces the missionary zeal – the reproduction potential – of the enthusiasts responsible for the conversions. As such the church loses the real cause of its growth and is at the mercy of the loss mechanisms.

In the model in this report/talk no attempt has been made to model the effect of purity on the leaving rates of the different types of believers. Another interesting area to investigate would be the lowering of the purity of the church because the children of believers are allowed a lower standard of entry than converts.

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