

# **The detrimental effect of low political truth literacy on democratic systems**

## **Appendix**

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**NOTE: This is a copy of the submitted appendix for discussion purposes.  
It is NOT the final version, if accepted.**

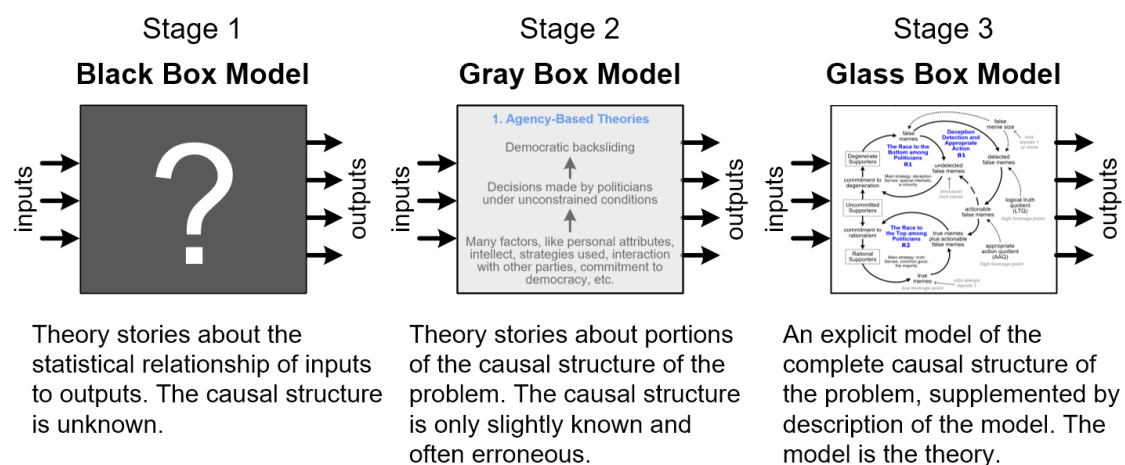
## Comparison of the analysis to contemporary theories

### *The three stages of analysis model maturity*

Social system problems are analytically solved by building a sufficiently correct analysis of the root causes of the problem, and then designing and implementing solution elements to resolve the root causes. This occurs whether root cause terminology is used or not, since all causal problems arise from their root causes.

Before we compare our analysis theory to other theories, it is important to review the types of models of understanding these theories are based on.

A model of understanding can be at any of three general stages of maturity (Figure 1). Each stage is the result of the process and tools used to build the model. Third stage models are required to design effective solutions to difficult problems.



**Figure 1.** The three stages of model of understanding maturity.

**Stage 1. Black box model** – Commonly used problem-solving approaches like comparative analysis of datasets allow only a *black box model* of the problem system. All that's understood is the relation of inputs to outputs, so solutions meet with little success on difficult problems. In black-box models, "the computations are hidden and relationships between the variables of the system can only be inferred."<sup>1</sup> The model consists of theory stories about the statistical relationship of inputs to outputs. The causal structure is unknown.

**Stage 2. Grey box model** – Building a theory based on comparative analysis plus experimentation and/or case study changes a black box model to a *grey box model*. However, the model is so incomplete that its explanatory power is limited to the superficial layer of the problem. Because so much of the model is hidden, variable relationships can still mostly only be inferred. How the system works remains largely a mystery. The seven theories in Figure 2 (in the next section) are grey box models. These

consist of theory stories loosely describing small portions of the causal structure of the problem. The rest of the structure is unknown.

*Stage 3. Glass box model* – By contrast, a system dynamics modeling approach driven by root cause analysis allows construction of a *glass box model*, “which overtly displays all [relevant] mechanisms and functions of the system being modelled.”<sup>2</sup> A sufficiently complete explicit model is the goal from the start. Stories are used to describe the explicit model inside the glass box, instead of substituting for the explicit model as in grey box models. In a glass box model, *the model is the theory*.

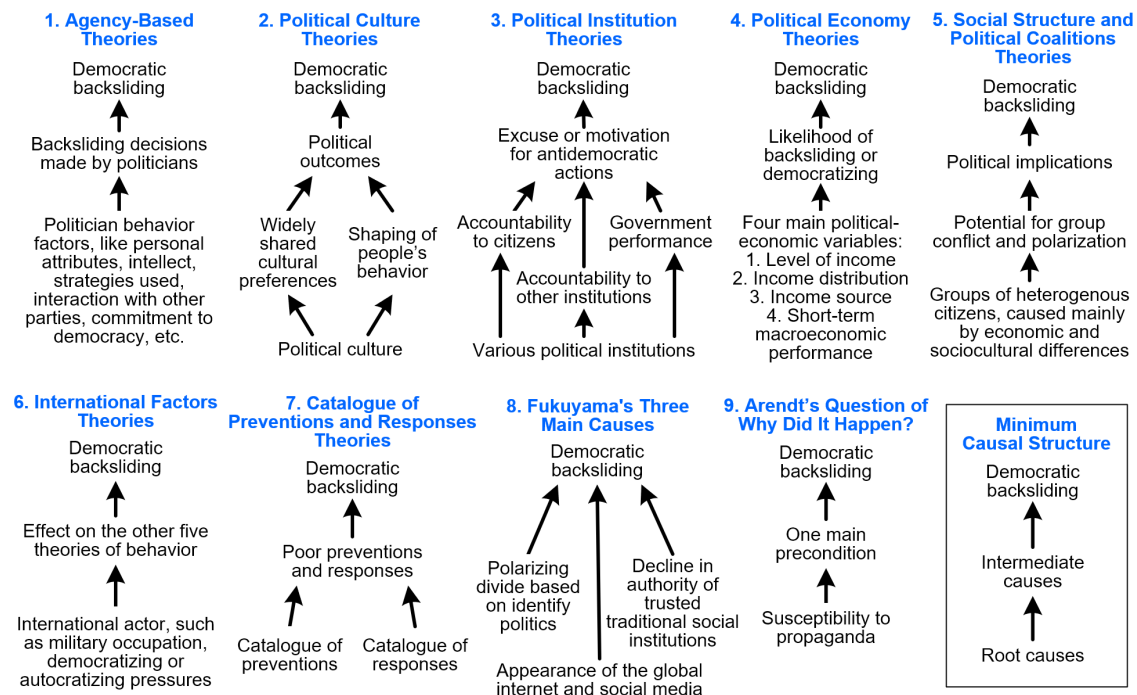
The end result is a glass box model allows the analyst to clearly see the system’s feedback loop structure, simulate the model’s behaviour, validate the model with measurement, case examination, and experimentation as needed, and *clearly and confidently see* why root cause forces cause problem symptoms and how the root causes can be resolved. This is possible because for complex social system problems, “system dynamics is the one method that will allow [making] all assumptions explicit and integrate them in a logical and testable way.”<sup>3</sup>

The fundamental principle of system dynamics states that:<sup>4</sup>

The behaviour of a system arises from its structure. That structure consists of the feedback loops, stocks and flows, and nonlinearities created by the interaction of the physical and institutional structure of the system with the decision-making processes of the agents acting within it.

It follows that if problem solvers don’t understand a system’s feedback loop structure, then they don’t understand the system. Solution of difficult problems will be impossible, except through long trial and error, and occasional luck.

## Examination of the theory families and two works



**Figure 2.** Cause-and-effect diagrams for Waldner and Lust's<sup>5</sup> six theory families, one additional theory family, two works, and minimum causal structure.

This section compares the analysis to the theories and works diagrammed in Figure 2. The first seven are grey box models. Each explains only a portion of what our much more complete glass box model found.

**1. Agency-Based Theories** – This theory has three links in its causal chain:

- (1) Democratic backsliding
- (2) Backsliding decisions made by politicians
- (3) Politician behavior factors, like personal attributes, intellect, strategies used, interaction with other parties, commitment to democracy, etc.

The cause of backsliding is link 2, which is assumed to be the root cause. Link 3 is behavior factors that cause bad decisions. Changing these factors would solve the problem.

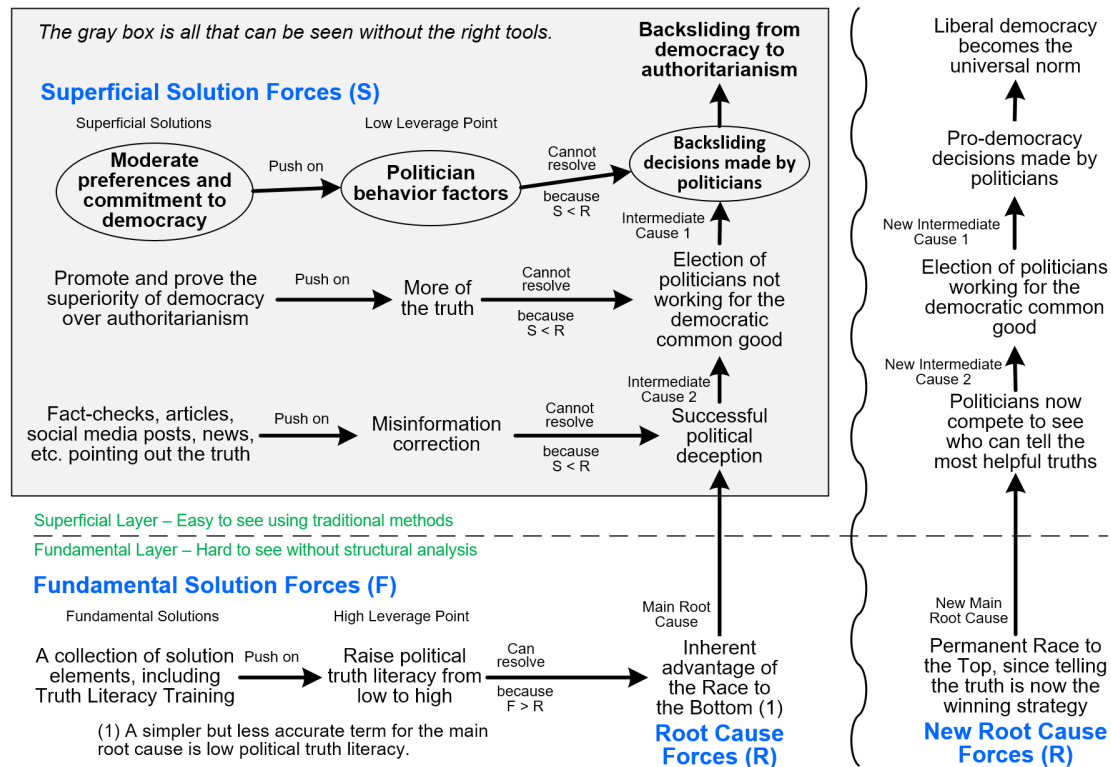
Per Waldner and Lust, one “state of the art” line of solution research involves strengthening the factors of *moderate preferences and commitment to democracy*. This is a superficial solution and can be added to our social force diagram, as shown in Figure 3. The four bolded nodes are all this theory sees. The rest of the problem’s structure remains hidden, due to lack of the right tools.

Agency-Based Theories can neither fully explain the problem or solve it because they are superficial. Improving *politician behavior factors* is a low leverage point, because the root cause force exerts a greater force on the *backsliding decisions made by*

*politicians* node. Pleading with politicians and encouraging them to be more moderate and more committed to democracy has not and will not work, no matter how well done.

### Democratic Backsliding Problem

Social Force Diagram – With analysis of Somer, McCoy, and Luke added and circled



**Figure 3.** Social force diagram from our analysis, with Agency-Based Theories added and circled. Note the clarity use of a social force diagram allows. Here it shows precisely why Agency-Based Theories have not and will not work. The key insight is *backsliding decisions made by politicians* is not the root cause. It is an intermediate cause.

**2. Political Culture Theories** – This theory never answers the question of what causes *political culture* to be the way it is. Why do those leaning toward authoritarianism appear? The Dueling Loops model shows how, if political truth literacy is low, the dominant loop will be The Race to the Bottom, where a *political culture* of lying, corruption, elitism, destruction of democratic institutions, “the end justifies the means,” and so on is endemic. This leads to undesirable *political outcomes*.

**3. Political Institution Theories** – Waldner and Lust explain how this theory faces a glaring weakness: Institutions are objects of manipulation by powerful actors, who are the source of backsliding rather than the institutions themselves. This theory is thus a form of the first theory.

**4. Political Economy Theories** – These are heavily based on datasets and comparative analysis. Correlation is not cause. Waldner and Lust note these studies have not solved “the problem of reverse causality.” The hypothesis that the four variables cause backsliding or democratization could just as easily run the other way.

**5. Social Structure and Political Coalitions Theories** – The Dueling Loops model incorporates this theory. The two opposing loops, the left and right, are mega coalitions. Each is in turn composed of many smaller coalitions. Loop competition for the same uncommitted supporters explains why polarization is so common and can run to extremes, due to large *false meme size*. This theory is discussed further below.

**6. International Factors Theories** – Here the primary agent of change on a democracy is an external international actor. Our analysis shows any agent can be the source of political deception. The ease of doing this encourages international actor invention, as widely seen in cases like the use of external propaganda by authoritarian states to sway elections, to enhance a nation's image abroad, and to promote the acceptability and spread of authoritarianism.<sup>6</sup> The error in this theory is its incompleteness. It explains so little it cannot be used to find high leverage point solutions.

**7. Catalogues of Prevention and Response Theories** – The research pattern in these theories uses two main process steps: (1) Describe the problem. (2) Develop solutions by identifying solution gaps and filling them. Missing is step 1.5, diagnosis. This is best performed by a suitable form of root cause analysis.

If the root causes are unknown, solutions will invariably be superficial. For example, the long list of 77 specific policies in the latest Brookings Institution Democracy Playbook are not based on root cause analysis. None address the main root cause of low political truth literacy. The closest they come appears to be Commitment 3. Depoliticize the Democratic Processes, A. Commitments for State Actors, 2.<sup>7</sup> “Political parties... should limit leaders who espouse anti-democratic sentiment or positions....” Referring to our social force diagram, this is a form of misinformation correction, a low leverage point. It is naïve to assume that a right-wing political party will or even can follow this policy. Deceptive populist authoritarian appeals are far too powerful for policies like this to overcome.

As a resilience example, the introduction<sup>8</sup> to a recent Democratization special issue on resilience of democracies states that:

From a functionalist point of view, one can distinguish three possible reactions of political regimes to internal and external challenges:

- (1) The first stresses the ability to withstand without (major) changes.
- (2) The second emphasizes the ability to adapt through internal changes.
- (3) The third adds the ability to recover after initial damage and disorder.

Each of these three reactions is a leverage point to be pushed on with specific solutions, which are the gaps to fill. The leverage points have much intuitive appeal. However, because identification of these leverage points is not based on root cause analysis, they are low leverage points and will lead to superficial solutions.

For example, consider the first contribution in the special issue. This contains “the very new finding that a strong legislature is important for safeguarding democracy

and providing onset resilience....” Rephrasing, the solution is the legislature must consist of mostly politicians working for the common good. In our social force diagram, this solution pushes on the low leverage point of *more of the truth* in an attempt to revolve the intermediate cause of *election of politicians not working for the common good*. This will fail since it’s a superficial solution.

Catalogues of Prevention and Response Theories describe what democratic systems SHOULD be doing. That is the behaviour goal. Absence of this behaviour could be considered problem symptoms. To solve the problem using root cause analysis, the first question would be WHY doesn’t the system naturally “want” to create a complex catalogue of interacting solution behaviours and evolve them as necessary? Because politicians don’t want to do that. Instead, they are making backsliding decisions, which is the first intermediate cause in Figure 3. Redefining the problem as the absence of desired behaviour thus leads to the same root cause.

Highly complex smoothly running social systems cannot be designed in detail. Their details evolve incrementally, due to the way social agents are unpredictable and adapt to change. Once the main root cause of the democratic backsliding problem is resolved and the mode change occurs, the new root cause force will keep the problem solved and evolve the system as necessary. This will include building the equivalent of the “three possible reactions” listed above, and much more. In the solved mode, the democratic system will automatically “want” to resist backsliding.

**8. Fukuyama’s three main causes of backsliding** – The first cause, an ideological divide of the left and right, corresponds to the two dueling loops. The second cause, use of the internet and social media by the right to amplify falsehoods, corresponds to a mechanism for exploiting the inherent advantage of the Race to the Bottom. Social media conversations and platform “news” algorithms can spread and amplify falsehoods in a vicious “echo chamber” feedback loop, unfettered by the balancing influence of traditional media and the opinions of others with different and more truthful viewpoints. “...democracy [is] in crisis, buckling under the pressure of technological processes that [have] overwhelmed our collective capacity to tell truth from falsehood...”<sup>9</sup> Deliberately introduced “computational propaganda” and “manipulative disinformation campaigns” via social media channels by politicians, parties, and states is undermining democracy.<sup>10</sup> The third cause, erosion of reliable sources of political information, is a standard strategy used by authoritarians to lower a population’s potential truth literacy. This has been greatly facilitated by technology evolution, as over time the internet has allowed (less reliable) social media to displace (more reliable) traditional media.

**9. Arendt’s question of Why did it happen?** – Arendt found the main precondition for totalitarianism to be susceptibility to propaganda: “The masses have to be won by propaganda.”<sup>11</sup> ... The ideal subject of totalitarian rule is not the convinced Nazi or the convinced Communist, but people for whom the distinction between fact and fiction (i.e., the reality of experience) and the distinction between true and false (i.e., the standards of thought) no longer exist.”<sup>12</sup> Inability to distinguish between fact

and fiction, true and false, in political decisions is the same as low political truth literacy, which we found to be the main root cause of democratic backsliding. Once this root cause is resolved, the “ideal subject of totalitarian rule” would no longer exist in sufficient quantity for totalitarianism propaganda to work.

### *Where polarization theory fits in the analysis*

The chief characteristic of the fifth theory family, Social Structure and Political Coalitions, is polarization. The Dueling Loops model shows how the unresolved root cause of low political truth literacy causes voters to polarize into the left and right. The winning strategy is an optimum *false meme size* of much greater than one in order to attract the most supporters. Democratic systems are currently easily polarized by authoritarians using deception.

Examining polarization scores for 53 countries across 170 national elections, Orhan<sup>13</sup> found that affective polarization correlates highly with backsliding and concluded polarization is a primary factor driving backsliding. Reviewing the literature for explanatory factors of backsliding, Orhan identified six groups of factors at the macro level and six groups at the micro level. One of the latter is ideological polarization.

Analyzing the backsliding data, Svolik<sup>14</sup> found that after 2000, 80% of democratic breakdowns resulted from executive takeovers. This raised the question of “Why do voters support politicians who undermine democracy?” Svolik reasons the cause lies in *an inherent vulnerability*. Voters are often faced with a choice between two valid but conflicting concerns, democratic principles and partisan appeals. Autocrats like Chavez, Orban, Erdogan, and Putin “excel at exploiting precisely this dilemma.” Experiment results found that voters “are indeed willing to trade off democratic principles for partisan interests.”

Our analysis found that this inherent vulnerability arises from the inherent advantage of the Race to the Bottom. The attractive power of *false memes* exceeds the attractive power of *true memes*. If political truth literacy is low, this allows aspiring autocrats to use deceptive appeals based on populism, nationalism, racism, and so on to gain not just more supporters, but highly partisan supporters. Competition to gain the most supporters and give ruling elites the most power leads to extreme polarization.

How then can extreme polarization be curtailed? Somer, McCoy, and Luke<sup>15</sup> addressed this question. From a social force diagram point of view, they identified the “cause” of the problem as *pernicious polarization of voters*, since V-Dem data shows polarization correlates with backsliding. Pernicious polarization, a form of identity politics, is “the division of society into mutually distrustful Us versus Them camps in which political identity becomes a social identity. [This] fosters autocratization by incentivizing citizens and political actors alike to endorse nondemocratic action.”

The leverage point to resolve the cause is *capacities to prevent or reverse pernicious polarization*. The general solution is *goals and strategies actors opposing*



*backsliding can use.* This consists of “two broad opposition goals and four different strategies.” Finally, Somer, McCoy, and Luke conclude that:

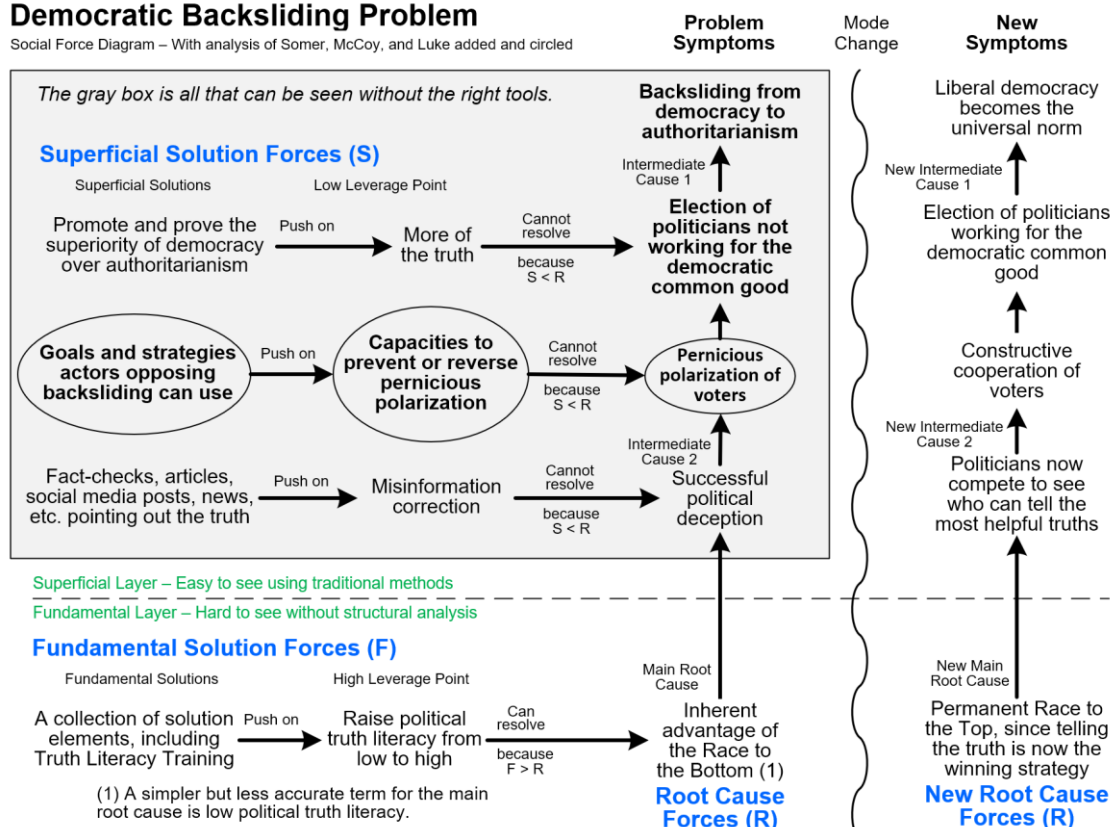
We expect these strategies to more effectively reduce pernicious polarization and reverse autocratization trends, particularly if the opposition actors use innovation in their strategies and practices, [by] creating new electoral coalitions and crafting messages that.... Examples such as the 2019 municipal elections in Istanbul and Budapest suggest [these strategies can work].

We respectfully doubt these strategies (as well as those proposed by others to directly reduce polarization) will have anything more than a modest effect, because they do not resolve the backsliding problem’s root cause.

Using the social force diagram from our paper, the analysis of Somer, McCoy, and Luke is diagramed in Figure 4. Three nodes from their analysis have been added and circled. *The purpose is to illustrate how easy it is to remain trapped on the superficial layer of the problem, even if the level of scholarship is high.*

### Democratic Backsliding Problem

Social Force Diagram – With analysis of Somer, McCoy, and Luke added and circled



**Figure 4.** Social force diagram from our analysis, with the analysis of Somer, McCoy, and Luke added and circled. Similar diagrams could be created from the work of other scholars on polarization. The key insight is polarization is an intermediate cause. It is not the root cause.

From the viewpoint of rigorous root cause analysis, the causal structure of Somer, McCoy, and Luke’s analysis is represented by the five bolded nodes on the diagram.

What they and many other polarization researchers cannot see is anything except the five bolded nodes. Further analysis using root cause analysis would lead to asking “WHY does extreme polarization appear?” rather than the common question of “HOW can extreme polarization be solved?” The WHY question would lead to something like the second intermediate cause of *successful political deception*. From there they could ask more WHY questions, penetrate to the fundamental layer, and find the elusive root cause.

Figure 4 explains why the *goals and strategies actors opposing backsliding can use* is a superficial solution. It pushes on the low leverage point of *capacities to prevent or reverse pernicious polarization*. That cannot resolve the “cause” of *pernicious polarization of voters* because that’s not the root cause. It’s an intermediate cause. Voters become polarized by clever political deception.

## System dynamics model description

### A small insight model

The Dueling Loops of the Political Powerplace model follows the long tradition of using small system dynamics models to find and communicate powerful insights (often counterintuitive) to the public and policy makers,<sup>16</sup> such as Jay Forrester’s iconic World2 model (56 variables).<sup>17</sup> Because the Dueling Loops model (41 variables) is easily understood and exhibits clear behaviour, “important insights regarding the source of policy failures can be uncovered.”<sup>18</sup> The ultimate source is the unresolved root cause.

Small insight models entail estimated parameters for archetypical/exploratory use or as many measured parameters as feasible for actual cases. The Dueling Loops of model was based almost entirely on estimates. After the Truth Literacy Training study was complete, we were able to calibrate the LTQ and AAQ nodes. The values used are described later along with the simulation runs. Using modeler judgement based on system observation plus calibrating the high leverage points with study results, the Dueling Loops model was tuned to give realistic behaviour over the full range of the high leverage points, *false meme size*, and *influence per degenerate or rationalist*.

A model is calibrated by measuring factors in the real world, using those values in the model, and running the model to compare its dynamic behaviour to that in the real world. Model structure is then improved as needed to narrow the gap between model and real-world behaviour to an acceptable level.

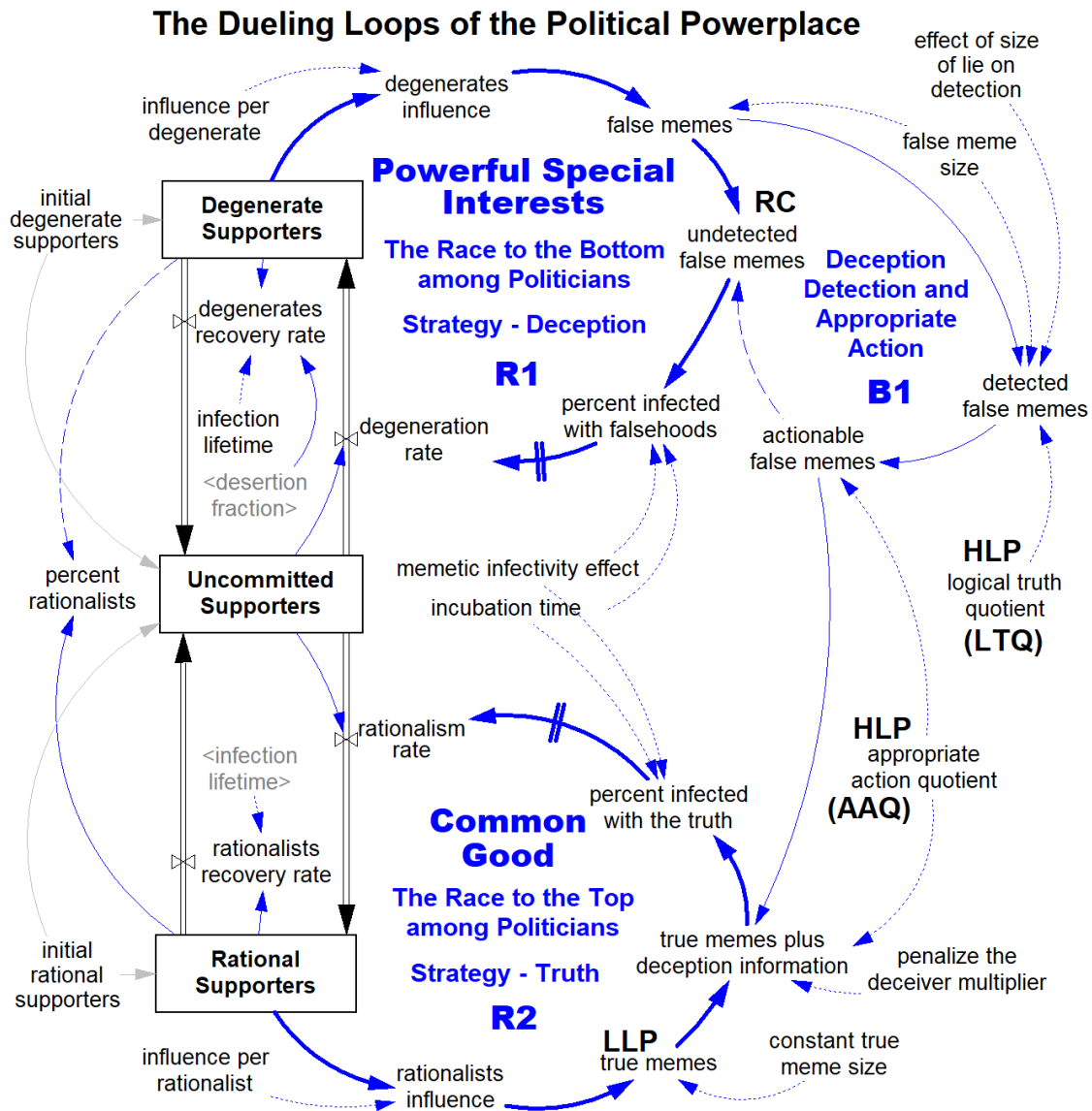
System dynamics modeling approximates a problem’s behaviour, by comparing graphs of model behaviour to graphs of collected data in the real world and refining the model until graph agreement is good enough. However, the main purpose is to generate useful insights by understanding the problem’s feedback loop structure, so that the analyst knows WHY various problem behaviour occurs. If a model’s general behaviour resembles problem behaviour, and model structure makes complete sense and

corresponds to the real world, then it is a useful model, whether its variables are fully calibrated or not.

Models with high calibration are said to be quantitative models. Those with low calibration are qualitative models, as is ours. The 1971 World2 model used a mixture of estimated and measured parameters. It's successor, World3 in 1972, was fully calibrated, which increased the total number of variables from 56 to about 320.<sup>19</sup>

IN SUBMISSION

## How the model works



**Figure 5.** System dynamics model of the democratic backsliding problem. Unit conversion nodes like *one dollar* and *one year* are not shown, as these have no effect on model behavior. Legend: As in the causal loop diagram in the paper, an arrow from node X to node Y means X causes change in Y. Solid arrows are a direct relationship, meaning as X increases so does Y, or as X decreases so does Y. Dashed arrows are an inverse relationship, meaning as X increases Y decreases and vice versa. Dotted or gray arrows are constants, indicating X remains constant. R and B signify reinforcing and balancing loops.

The paper explained how the causal loop diagram worked. That diagram was a high-level summary of the system dynamics simulation model (Figure 5). The model contains many more nodes (variables) in order to simulate the model.

System dynamics is a simulation modeling language that models the structure of a system in terms of its feedback loops and stocks, and how that structure causes behaviour change over time. The goal of system dynamics is “to enhance learning in

complex systems... to understand the source of policy resistance, and design more effective policies.”<sup>20</sup>

The three boxes are what system dynamics calls “stocks.” Stocks represent the most important factors whose behaviour you are trying to understand and usually correspond to physical objects, such as people, money, and pollution. Stocks form the backbone of a system dynamics model. Objects flow between stocks according to “rates.” The model uses four rates to move supporters from one stock to another.

The model uses Dawkins’ concept of memes and memetic replication.<sup>21</sup> A meme is copied information capable of affecting behaviour. All memes are learned from others, either directly from other people or indirectly through a transmission medium such as books, television, or social media. Replication is also called memetic infection. A person is infected by a meme when it enters and is accepted by their mind. In the model a meme is a statement that is true or false.

The model uses the concept of memetic infection to determine the *degeneration rate* and the *rationalism rate*. Looking at the Race to the Bottom, *undetected false memes* is used to calculate *percent infected with falsehoods*. After a delay of 1 year,<sup>22</sup> which is *incubation time*, the infection matures enough to cause the *degeneration rate*. This causes *Uncommitted Supporters* to move to the *Degenerate Supporters* stock. The Race to the Top works in the same manner.

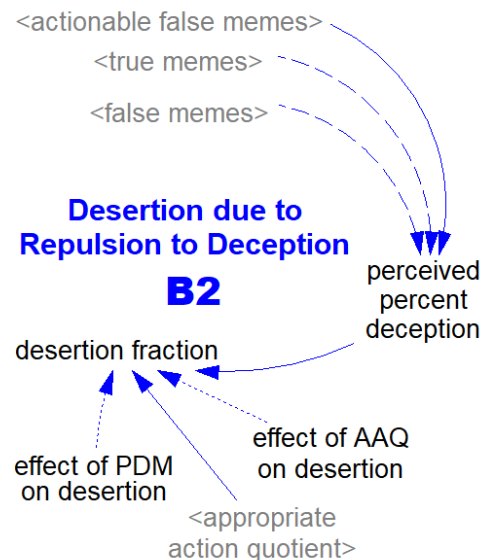
People don’t stay infected forever. Some eventually recover. The model handles this with the two *recovery rate* nodes. Average length of infection is 30 years,<sup>23</sup> which is *infection lifetime*. This causes 3.3% ( $1/30 = .033$ ) of those in the *Degenerate Supporters* and *Rational Supporters* stocks to recover each year and move back to the *Uncommitted Supporters* stock.

All this mimics what we see in the real world. People are exposed to a mixture of *true* and *false memes* via TV, social media, articles, books, conversations, etc. Depending on their LTQ and AAQ, some of the *false memes* become *actionable false memes (AFM)*. This causes three things:

- (1) AFM is subtracted from *false memes* to calculate *undetected false memes*.
- (2) AFM is added to *true memes* to calculate *true memes plus actionable false memes*.
- (3) AFM causes some degenerates to see the truth and desert. AFM is used to calculate *desertion fraction* (Figure 6). This and *infection lifetime* are then used to calculate the *degenerates recovery rate*. If the *desertion fraction* is greater than zero, this increases the recovery rate.

Two constants define the difference between the two main loops, which otherwise are equal in their attractive power. In the Race to the Top, *constant true meme size* is always one. It can never change, because the attractiveness of the truth cannot be inflated. But in the Race to the Bottom, *false meme size* ranges from one and up, because the attractive power of a meme can be inflated with deception. This constant is

changed to different values in the simulation runs. Each change represents an optimum deception strategy: “How much lying can I get away with to maximize the number of my supporters?”



**Figure 6.** Variables used to calculate the *desertion fraction*. This forms part of a fourth important feedback loop that’s not on the main model.

The ability to inflate the attractiveness of a meme gives the Race to the Bottom an inherent advantage, represented by *undetected false memes*. The Race to the Top has no corresponding node, like *undetected true meme*, since there is no deception to detect in the truth. This advantage is the main root cause of why the Race to the Bottom is dominant most of the time, since LTQ and AAQ are presently low.

For simplicity, we usually say the main root cause is low political truth literacy. Political truth literacy is DTQ. DTQ equals LTQ times AAQ.

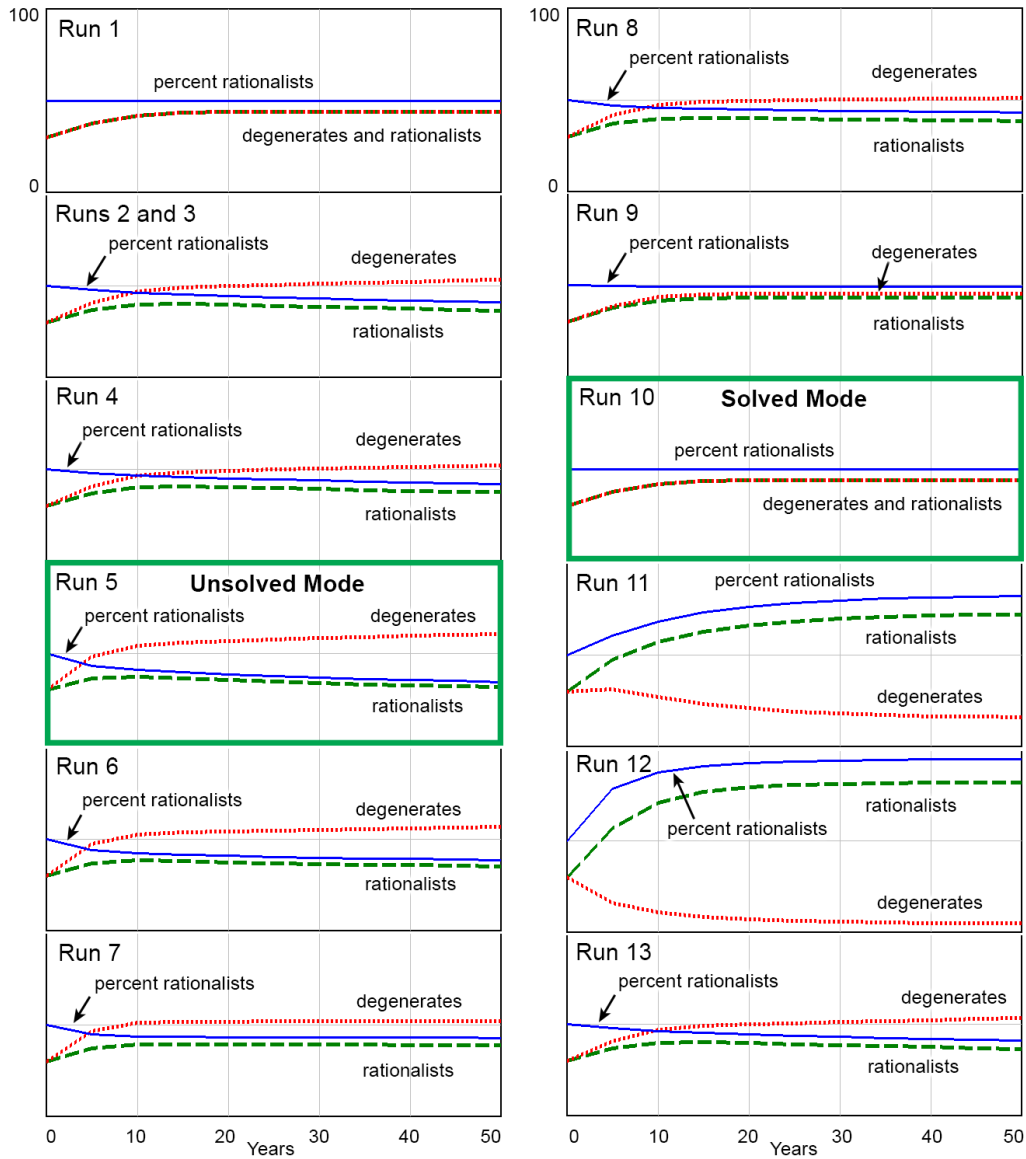
For further detail, the model considers influence. In the Race to the Bottom loop, *influence per degenerate* times the number of *Degenerate Supporters* equals *degenerates influence*. For simplicity, one unit of influence equal one *false meme*. The Race to the Top has corresponding nodes.

The simulation model is a reasonable approximation of how the root cause, low leverage point, and high leverage point in the social force diagram work. Without the simulation model, it would have been *impossible* to correctly explain the superficial and fundamental layers of the social force diagram. We would have never found what appears to be the main root cause and its two high leverage points.

As simple as the Dueling Loops model looks, construction of the first version took about three years. When we began, we had no idea what would be found on the fundamental layer of the problem. Fortunately, we had the guiding hand of root cause analysis, and eventually identified the basic feedback loop structure that appears to exist in all large political systems.

## Simulation runs

This section shows how the model behaves using a series of simulation runs.



Model Settings	Simulation Runs												
	Run 5 is the problem to solve. Run 10 is the solved mode.												
	1	2	3	4	5	6	7	8	9	10	11	12	13
False meme size	1	1.5	1.5	1.5	4.9	4.8	3.4	2	1.3	1	4.9	4.9	1
LTQ – Logical truth quotient	0	0	NA	20%	20%	30%	20%	30%	40%	50%	50%	70%	50%
AAQ – Appropriate action quotient	0	NA	0	20%	20%	20%	30%	30%	40%	50%	50%	70%	50%
DTQ – Democratic truth quotient	0	0	0	4%	4%	6%	6%	9%	16%	25%	25%	49%	25%
Influence per degenerate	200	200	200	200	200	200	200	200	200	200	200	200	300
Results													
Percent rationalists at end of run	50%	41%	41%	42%	34%	38%	42%	43%	49%	50%	82%	94%	41%

**Figure 7.** Simulation run graphs, settings, and results. Before a run, the four settings are set to the values shown. The model is then simulated. Results are then measured.

Each model simulation run is a logical experiment. The result tells us how certain things in the real world can be expected to behave, given particular starting conditions. This form of experimentation is orders of magnitude faster and cheaper than real-world experimentation. This explains why system dynamics modeling is so useful, not just on business problems (where the tool was born), but in the social sciences where real-world experimentation is slow, expensive, or impossible.

Experiment inputs are the constants changed. These are *false meme size*, LTQ and AAQ. While listed as a model setting, DTQ is not on the model but is calculated in the table for greater understanding. DTQ equals LTQ times AAQ. The output of interest is *percent rationalists*, calculated by:

$$\text{percent rationalists} = \frac{\text{Rational Supporters}}{(\text{Rational Supporters} + \text{Degenerate Supporters})}$$

*Percent rationalists* measures dominance of the Race to the Top loop. The higher the percent, the lower democratic backsliding is because fewer people have degenerated.

Figure 7 shows 13 simulation runs. All begin with 40 *Degenerate Supporters*, 40 *Rational Supporters*, and 20 *Uncommitted Supporters*. This gives a total of 100 supporters. In all runs *influence per degenerate* or *rationalist* are equal and never changed. When a simulation run begins, neither side has an advantage except that provided by the model settings.

**Run 1.** The first run shows how when neither side (rationalists and degenerates) has an advantage, *percent rationalists* stays unchanged at 50%. The number of rationalists and degenerates rise evenly as some neutralists move to the other two stocks. Neither side has an advantage since *false meme size* = 1 and *logical truth quotient* (LTQ) or *appropriate action quotient* (AAQ) equals zero, causing DTQ to be zero.

**Run 2.** *False meme size* is raised from 1 to 1.5. While telling small lies offers only a small advantage, over time it accumulates into a large one. After 50 years, *percent rationalists* falls to 41%. This is enough for degenerates to win most elections.

In this run LTQ equals zero, so AAQ doesn't matter. If no *false memes* are detected, there can never be any *actionable false memes*, since *false memes* minus *detected false memes* equals *actionable false memes*.

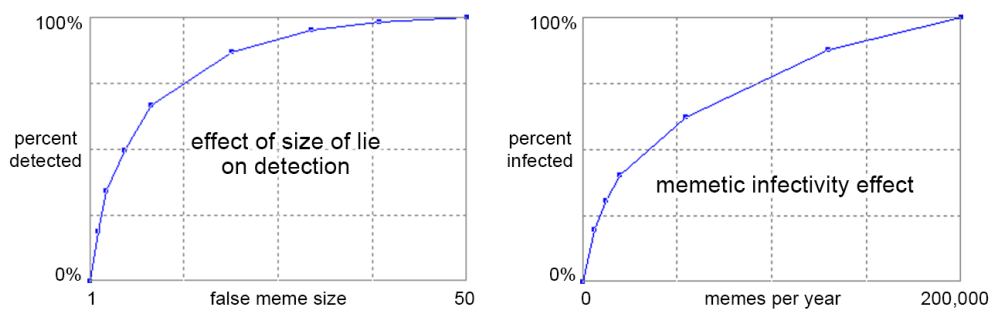
**Run 3.** This run keeps *false meme size* at 1.5, and instead has AAQ equal to zero. Because of this, LTQ doesn't matter, since AAQ times *detected false memes* equals *actionable false memes*.

As in run 2, DTQ is effectively zero and graph behaviour is identical to run 2. Runs 2 and 3 demonstrate that *both* high leverage points must be pushed on for political truth literacy solutions to work. Let's do that in the next run.



**Run 4.** Like runs 2 and 3, this run keeps false meme size at 1.5. However, both LTQ and AAQ are set to 20%, causing DTQ to equal 4%. While DTQ is quite low, this is enough to make a small difference. At the end of the run, *percent rationalists* has risen from 41% to 42%.

**Run 5 – Unsolved Mode.** Social agents are adaptive. Degenerate politicians are clever enough to adjust the size of lies to the optimum size: not too big and not too small. The *effect of size of lie on detection* is a lookup table (Figure 8) whose curve reflects how as the size of a lie grows, it's more easily detected and diminishing returns begin. As size rises from 1 to 50, the percent detected rises from zero to 100%. The second curve, *memetic infectivity effect*, is used to calculate *percent infected with falsehoods* and the *truth*.



**Figure 8.** Lookup table values for two curves. Input is the x axis; output is the y axis. Both are non-threshold model curves (non-S curves), very similar to those observed in respiratory disease infection.<sup>24</sup> The disease curves use probability of infection instead of percent detected or percent infected.

Visual experimentation with the running model shows the optimum *false meme size* is 4.9. Compared to the prior run this gives the degenerates a much larger advantage of 34% *percent rationalists*, which is 66% degenerates.

Based on the Truth Literacy Training study and system observation, we hypothesize that in most political systems both high leverage points (LTQ and AAQ) are low, at about 20%. Run 5 thus reflects approximate real-world behavior and is what system dynamics calls the reference mode. It is the problem to solve, the run we keep referring back to as we iterate the model and design the other runs.

In run 5 the system is in the unsolved mode. Powerful feedback loop forces are locking the system into a usually dominant Race to the Bottom among Politicians. What's driving these forces is the unresolved main root cause. This is force R in the social force diagram.

The values of 20% for LTQ and AAQ are calibrated from group 1 (control group) in the study. Group 1 LTQ was 8% in the first study, 22% before the follow up refresh training, and 20% after the refresh training. These average roughly 20%. The AAQ scores were 25%, 59%, and 20%. The 59% is an aberration due to the large

confidence intervals and the (accidentally) easier follow up statements. Thus, these also average about 20%.

Using the World Values Survey, Noel and Therien<sup>25</sup> report that 24.7% of respondents place themselves on the left, 30.3% on the center, and 45.2% on the right. This gives a *percent rationalists* of  $24.7\% / (24.7\% + 45.2\%) = 35\%$ , which compares favorably to the 34% rationalists in run 5. This is another form of model calibration.

Because political truth literacy is low, the Race to the Bottom is the dominant loop most of the time, where “Special interests now take precedence over the common good. ...we now live in a diminished democracy ...with ordinary citizens squeezed out of the public sphere by partisan ideologues and professional propagandists”.<sup>26</sup> The Race to the Bottom is not dominant all the time, because loop dominance changes back and forth due to a variety of reasons beyond the scope of this paper.

**Runs 6 and 7.** The question arises, which of the two high leverage points (LTQ and AAQ) has the highest leverage? Runs 6 and 7 allow experimentation to answer this question.

Run 6 raises LTQ from 20% to 30% and leaves AAQ at 20%. The result is an optimum *false meme size* of 4.8 and 38% *percent rationalists*. Run 7 sets LTQ back to 20% and raises AAQ from 20% to 30%. The result is an optimum *false meme size* of 3.4 and 42% *percent rationalists*.

Comparing the two runs, results show that pushing on the LTQ high leverage point raised *percent rationalists* 4 percentage points. But pushing on the AAQ point raised it 8 points. AAQ has roughly twice the leverage of LTQ. This is fortunate, since AAQ training is much easier than LTQ training. Let's review why.

AAQ training (aka vote training) consists of learning two simple rules:

- (1) *Penalize the Deceiver* – If you discover a politician has attempted to deceive you, then when you vote or take action you should strongly oppose the politician or the source of the deception. This will have the effect of reducing attempted deception.
- (2) *Support the Truth Teller* – If you discover a politician has told the truth, then when you vote or take action you should strongly support the politician or the source of the truth. In this manner we encourage more truth tellers.

LTQ training in the study consists of learning how to spot 6 fallacies and flawed application of the Strong Evidence Rule. This requires learning dozens of rules and the procedure of how to apply the Personal Truth Test, which is a much larger task than the two rules of AAQ training.

**Runs 8, 9, and 10.** These simulation runs push on the two high leverage points equally to determine how much LTQ and AAQ must be raised to solve the problem.

The pattern is as LTQ and AAQ rise, more lies are detected and acted upon. This causes optimum *false meme size* to fall. Politicians are adaptive. Here they adapt by

reducing the size of their lies to reduce chance of detection. They are trying to slip smaller lies through people's defenses, and it works. But it works only up to a certain point:

- **Run8.** As LTQ and AAQ rise from 20% in run 5 to 30% in this run, optimum *false meme size* falls from 4.9 to 2. *Percent rationalists* rises from 34% to 43%.
- **Run 9.** As LTQ and AAQ rise still further to 40%, optimum *false meme size* falls to 1.3. *Percent rationalists* rises to 49%.
- **Run 10.** Finally, as LTQ and AAQ rise to 50%, optimum *false meme size* falls to 1, its lower limit. *Percent rationalists* rises to 50%, its upper limit. Raising LTQ and AAQ further has no effect, since *false meme size* cannot be less than one.

Run 10 represents the solved mode and was a counterintuitive discovery offering deep insight, a frequent occurrence when using system dynamics modeling to reveal a problem's feedback loop structure. We expected that as LTQ and AAQ rose, more degenerates would move to the Race to the Top and that loop would become dominant because it contained the most supporters.

But that's not what the model predicts will happen. *The model shows the two loops will end their perpetual duel and effectively merge into one loop, because now both loops compete for supporters by telling the truth.* The two feedback loops behave as one, because they have the same meme size of one.

Optimum *false meme size* falls from 4.9 in run 5 to 1 in run 10. This corresponds to the right moving from an extreme far-right false ideology to a truth-based moderate position, one so moderate that like the rationalists, they too pursue the common good. They are now moderates, not degenerates. There will be differences of opinion among political parties and politicians. Interpretations of what common good goals are paramount and how to achieve them will persist. But if LTQ and AAQ are high enough, citizens will elect politicians who can now work together in harmony.

Movement from partisan extremes to the moderate centre eliminates support of authoritarianism. In his examination of the left and right in political systems, Bobbio<sup>27</sup> explains why.

.... the modern political universe is made up of two entirely separate axes: left/right and liberty /authoritarianism. ...the two axes in politics combine to produce four categories: the extreme right, the moderate right, the moderate left, and the extreme left. The extremists are authoritarian, and do not accept the rules of democracy, and although the moderate left and moderate right disagree over the question of equality, they accept the same rules for the political game.

The Dueling Loops model employs a single axis, consisting of Bobbio's "the extreme right, the moderate right, the moderate left, and the extreme left." When supporters move from extreme to moderate positions, "they accept the same rules for the political game," and reject authoritarian pressure to backslide. In Bobbio's words,

when the “inclusive middle” dominates, “left and right cease to be two mutually exclusive totalities like two sides of a coin which cannot both be seen at the same time; they become two parts of a whole, a dialectic totality.”<sup>28</sup>

**Runs 11 and 12.** Some Race to the Bottom factions will adapt to rising DTQ by moderating toward the political centre. But we expect others will not. They will continue to promote their deception-based far-right ideology. How would the model behave if instead of moderating, the right chooses to continue a strategy of deception?

Run 11 shows what happens when instead of choosing an optimum *false meme size* of one that maximizes the number of their supporters, a group feels so locked into their own false ideology that they do not adapt at all from run 5. Even though LTQ and AAQ have risen to 50%, the degenerates stick with the same level of lies used in run 5. The result is 82% rationalists, which means 18% degenerates.

In run 12, LTQ and AAQ are raised still further to 70%. The result is 6% degenerates. If LTQ and AAQ were raised still more to 80% (not shown), only 3% degenerates would remain.

We feel anything over about 80% is not realistic in the immediate future. Even though the study was able to raise LTQ and AAQ to about 80% and 90%, raising political truth literacy to that high a level in a large population will probably take generations. However, we do expect that raising it to medium level of about 50% for swing voters and the young is quite practical in the short term, in less than ten years, if a state is strongly committed to preserving democracy.

Runs 11 and 12 deal with the problem of far-right minorities who despite their small percentage of the population, have a significant effect on the political system. In a democracy the rights and desires of minorities must be respected and addressed. If 18% of voters (run 11) promote a far-right ideology, a nation will be too distracted to focus efficiently on highly demanding problems. This may be seen in the disproportionate influence far-right groups can have, such as the authoritarian populist wave in Europe of Le Pen in France, the Austrian Freedom Party in Austria, the Sweden Democrats in Sweden (who emerged from violent neo-Nazi groups in the late 1980s), and the mis-named Center Party and Forum for Democracy parties in the Netherlands. In Germany, Denny<sup>29</sup> found that the far-right Alternative for Germany (AfD), even though national polls show only 10% support,

...poses a significant and complex threat to the German constitutional order. Highly organized and openly hostile to the rules binding other political actors, the German far right has outperformed its electoral support in shaping German society. In 2020, [one of Germany's intelligence agencies] reported that the number of right-wing extremists in Germany has increased to 33,300, of whom 13,300 are thought to be willing to commit violence.

The vote share for populist parties in 32 European democracies with a lower or single house of parliament rose from 5.3% in the 1950s to 12.4% in the 2010s.<sup>30</sup>

Historically, the far right is where authoritarian support begins. But it cannot begin if political truth literacy is medium or high.

**Run 13.** The paper stated that: “The effect of social media false meme amplification has become quite large and continues to grow.<sup>31</sup> However, this amplification only gives the Race to the Bottom a further advantage because of the unresolved root cause of low political truth literacy. Once the root cause is resolved, amplification no longer works.”

Run 13 models this amplification by increasing *influence per degenerate* from 200 to 300. *Influence per rationalist* remains at 200. This approximates the amplification effect, since it causes the Race to the Bottom to inherently have 50% more memes than the Race to the Top. That’s a huge advantage.

The result is that optimum *false meme size* is still one. *Percent rationalists* falls from 50% in run 10 to 41%. But this doesn’t matter, because degenerate politicians are now telling the truth. In the real world, run 13 corresponds to a democracy that has swung to the right due to amplification, but is not dysfunctional. Healthy cooperative political debate among moderates about differences of opinion prevails, rather than dysfunctional polarization.

Experimentation shows that starting with run 13, if *false meme size* is raised from 1 to 4.9 and LTQ and AAQ are raised to 70%, the result is about the same as run 12.

### **Far-right behaviour**

While much further research is required, the analysis and model tell us that by raising LTQ and AAQ from low to medium, the main root cause of democratic backsliding can theoretically be resolved. As that occurs, most on the right will move the centre, where healthy political discourse will prevail instead of debilitating polarization. The rest of the right (the far right) will cling to their false beliefs due to the deceptive power of motivated reasoning, a well-established theory explaining how biased decision-making works.<sup>32</sup> The theory explains why once a person is fooled into strong false political beliefs, the person becomes highly partisan and their false beliefs are unshakable.

The far-right’s beliefs are so immune to truth-based arguments that they mostly cannot be changed. However, raising a nation’s LTQ and AAQ reduces the ability of the far-right to recruit new members via deception. In theory, over the long term the far right will gradually diminish to such a low percentage that they will have little political impact. This is speculation, however. How various right-wing groups can best be moved to the center or eliminated altogether is an important area for further research.

### **Additional solution elements**

The paper found the main root cause of democratic backsliding was *low political truth literacy*. The high leverage point for resolving the root cause is *raise political truth*

*literacy from low to high.* The paper described a key solution element for doing that: Truth Literacy Training. That element is part of a larger body of work which designed a comprehensive collection of six solution elements, for the purpose of illustrating how democratic systems can effectively push on the high leverage point.

The solution elements described below should be seen as rough sketches of what is possible, rather than well-researched proposals. While rough sketches, the elements are described in some depth to illustrate their feasibility. The solution elements are:

### ***Solution element 1. Freedom from Falsehood***

This serves as the foundation for rest of the solution elements by passing a new law: *Citizens now have the legal right to freedom from falsehood from sources they must be able to trust.* These sources include all “servants” of the people, including politicians, public employees, and corporations. A servant is an agent employed or created by a political system to do something useful for humanity. All servants must remain subservient to *Homo sapiens* and keep the interests of humans above their own.

What is not prohibited by law is permitted by implication. Therefore, if people do not have the legal right to Freedom from Falsehood, then by implication it’s okay for those seeking power or in positions of power to manipulate citizens by the use of spin, lies, fallacies, soothing half-truths, the sin of omission, and all the forms of propaganda available. This manipulation has become such a large problem that Jacques Ellul, one of the greatest French philosophers of the 20<sup>th</sup> century, concluded that:

...propaganda is today a greater danger to mankind than any of the other more grandly advertised threats hanging over the human race. Propaganda is the expression of opinions or actions carried out deliberately by individuals or groups with a view to influencing the opinions or actions of other individuals or groups for predetermined ends and through psychological manipulation. The strength of propaganda reveals, of course, one of the most dangerous flaws of democracy. ... [successful] propaganda renders the true exercise of [democracy] almost impossible.<sup>33</sup>

People are intuitively coming to the conclusion that Freedom from Falsehood is essential, especially for politicians. For example, in in 2007 Julian Burnside, a prominent Australian barrister, advocated exactly that:<sup>34</sup> (*italics added*)

The Future Summit, being held in Melbourne this week, is a hotbed of ideas, solutions and attempts to imagine a better world. Global warming, reliance on fossil fuels, the growing gap between rich and poor, all have been debated by academics, captains of industry, religious, community and political leaders.

But one solution — put forward yesterday by the top silk Julian Burnside, QC — met with more acclaim than any other, and received rapturous applause. “If we really want to make things better, *I suggest we introduce a law that makes it an offence for politicians to lie,*” he told the conference.

Burnside intuitively senses what our analytical approach found: that political deception is so damaging to democracy it should be illegal. As long as the democratic model lacks the fundamental right of Freedom from Falsehood, it is an incomplete and too easily compromised model.

Freedom from Falsehood creates a new explicit goal for democratic systems. Implementing this goal requires the other solution elements.

### ***Solution element 2. No Competitive Servant Secrets***

Secrecy is a form of deception. This solution element, also a new law, *prevents public servants from using any form of secrecy to their own advantage.*

A public servant is any entity that exists to serve the people, such as politicians and publicly created artificial life forms like corporations and governmental agencies. Ensuring the accountability, integrity, and equity of public servants must be possible at all times. If public servants can keep certain information secret, then Freedom from Falsehood cannot be implemented, because in too many cases there would be no way to discern the truth.

### ***The importance of politician ratings***

Before describing the next two solution elements, Politician Truth Ratings and Politician Corruption Ratings, we need to examine the importance of politician ratings.

A rating is a (hopefully) reliable, objective measure of the quality of something. Industrialized societies thrive on ratings because they allow people to make better decisions more efficiently. People love to compare things using one simple number.

Ratings are everywhere. There are wine ratings, new car quality ratings, bond ratings, stock ratings, chess ranking ratings, school quality ratings, credit ratings, car safety ratings, hospital quality-of-care ratings, hiking trail ratings, film ratings, and many more. In the US, Consumer Reports alone rates thousands of products a year for quality, using 63 testing labs, 130 researchers, and a 327-acre automotive test track.<sup>35</sup> Credit ratings are so essential to a smoothly running global financial system that corporate and sovereign credit rating agencies employed 6,000 analysts and supervisors to produce 2.1 million different ratings in 2019.<sup>36</sup>

But when it comes to the ratings citizens need the most, there aren't any. There are many niche ratings,<sup>37</sup> but none of proper focus.

The most important repeated decision the average citizen makes is not which wine or car to buy. It's who to elect to run their government. That decision determines everything in a democratic system: its quality of management, its goals, its laws, its services for citizens, and all the little things that affect a population's quality of life.

Ratings provide the objective truth about the quality of something. They provide crucial information that would be too expensive and time consuming for citizens to collect themselves. Given that the most important decision the average citizen makes is who to vote for, *the most important ratings in a democracy are politician ratings that*



*focus on how much a politician can be trusted to work for The People instead of themselves and powerful special interests.* This level of trust can be measured with Politician Truth Ratings and Politician Corruption Ratings. Voters now have answers to two questions: “How much can I trust this politician to tell me the truth? How much can I trust this politician to work for the common good, rather than powerful special interests due to corruption?”

High personal political truth literacy alone is not enough. What matters is *effective* political truth literacy. That can be achieved by personal political truth literacy (via Truth Literacy Training) supplemented by relevant, reliable information. The most crucial part of that information can be provided in the form of two solution elements: Politician Truth Ratings and Politician Corruption Ratings. Additional information, in a non-ratings form, can be provided with two additional solution elements: Quality of Life Index and Sustainability Index.

### ***Solution element 3. Political Truth Ratings***

This measures *the average level of truth in a politician’s important statements* to create a rating of a politician’s trustworthiness in terms of telling the truth. All important politicians would receive Politician Truth Ratings, though it would take some time to ramp up the program.

Creation of rating scores follows this process for a politician: The claims in campaign speeches, ads, articles, speeches once in office, and so on are identified. Inconsequential claims are removed, such as remarks about the weather. A statistically valid random sample of the remaining claims is taken. Each claim is then rated for truth. The average becomes the truth rating. This may seem like an expensive burden, but most important claims are repeated, especially during campaigns. Only the first occurrence requires new work.

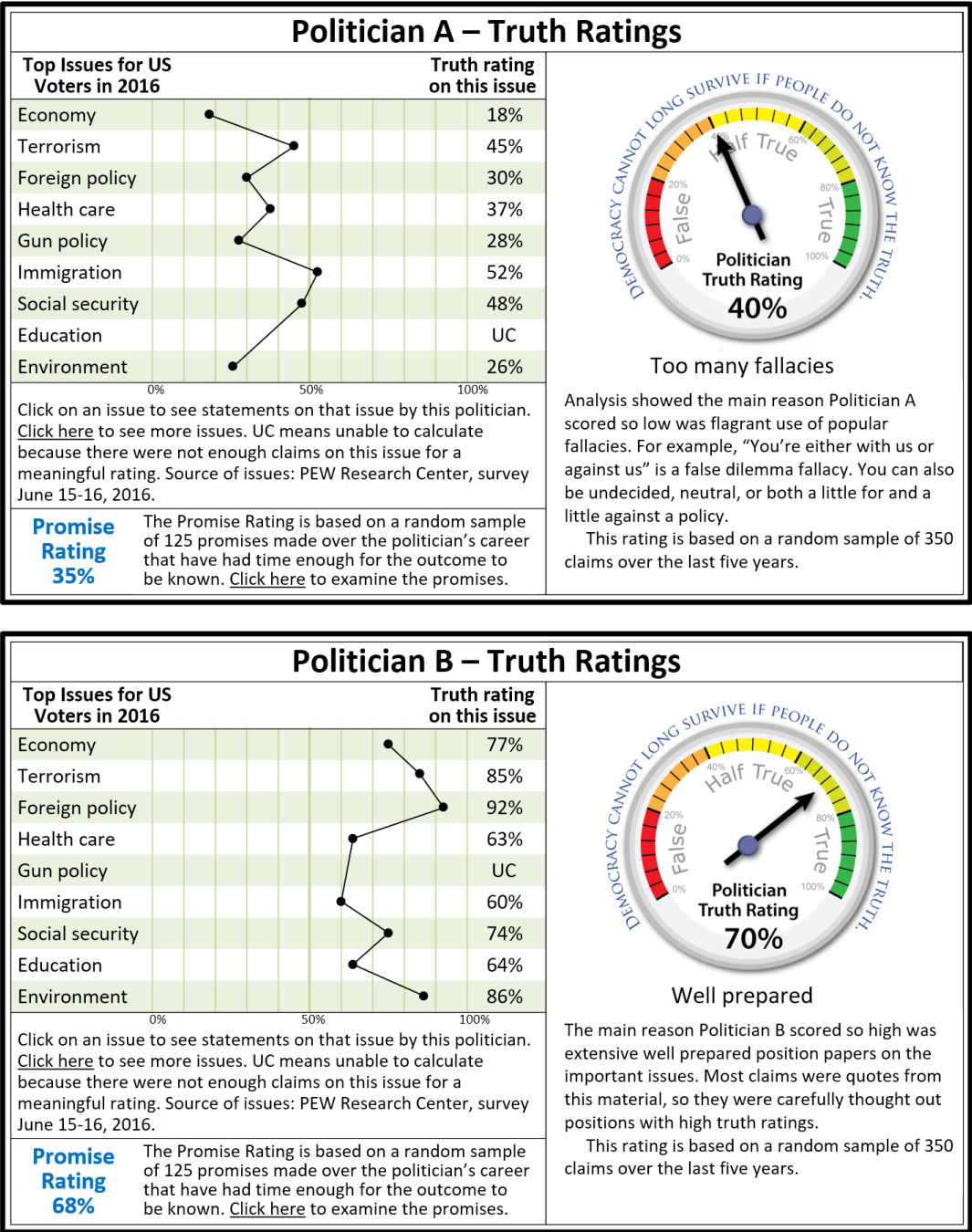
It’s possible that fines for excessive lying by politicians will be required. However, the most efficient penalty is not a fine. It is public knowledge a politician broke trust with the citizens of his or her country and lied.

A truth rating is the probability a politician’s important arguments are true. For example, during a political campaign between two leading candidates, their updated Truth Ratings would come out. They might say that candidate A averaged 40% true, while candidate B averaged 70%, as in Figure 9. Unless extremely high deception-based polarization was present, guess which candidate would probably win the election at that point in the public’s mind? Or suppose the two candidates averaged only a five-point difference in ratings. Then issue differences would determine who won.

Or suppose one candidate said she had a plan for accomplishing something and the opposing candidate claimed the plan was faulty and would not work. The truth raters would examine the plan, rate it for probable effectiveness, and use that in calculating the ratings. Voters could look up the details behind the ratings if interested, and find out why the plan would or would not work, or why a particular statement was false. This



further investigation would also have the effect of raising their personal truth literacy, since the fallacies involved would be identified and discussed.



**Figure 9.** Example of how published Politician Truth Ratings for two politicians competing in an election could look. The graphic might appear in a newspaper article or be used in a TV news show.

Those doing the ratings would be certified rating organizations, ones with no conflict of interest and therefore non-profit. If an organization doing a series of ratings was credible and the public trusted the ratings, **The Drive for Rating Excellence** feedback

loop (shown later) would begin. Politicians would compete to see who could be the most trustworthy and therefore the most helpful. While things would not be perfect, campaigns would become based on reason and truth rather than deception. As politicians began competing on the basis of the truth about what they can do for the common good, the **Race to the Top Among Politicians** feedback loop would go dominant and the health of democracy would be restored.

The equivalent of Politician Truth Ratings is slowly appearing in fact-check journalism. The best example we found is the work of PolitiFact. Claims to be checked are not randomly selected, which PolitiFact acknowledges: “We don’t check absolutely everything a candidate says, but focus on what catches our eye as significant, newsworthy or potentially influential. Our ratings are also not intended to be statistically representative but to show trends over time.”<sup>38</sup>

How close PolitiFact’s work is to truth ratings may be seen in Table 1. The data is from a New York Times article<sup>39</sup> using data from PolitiFact. The table is based on statements from 2007 to 2015 by presidential candidates and some current and former officeholders. The table is sorted from most to least dishonest using the Mostly False of Worse column. R signifies a member of the Republican party. D signifies the Democrat party.

**Table 1.** Fact-check results for 17 US politicians.

Candidate	Party	Mostly False or Worse	Mostly True or True
Ben Carson	R	84%	4%
Donald Trump	R	76%	7%
Ted Cruz	R	66%	22%
Dick Cheney	R	59%	30%
Rick Santorum	R	55%	22%
Carly Fiorina	R	50%	28%
Marco Rubio	R	40%	38%
Lindsey Graham	R	34%	34%
Chris Christie	R	32%	41%
Rand Paul	R	32%	47%
Joseph Biden	D	32%	39%
Jeb Bush	R	32%	48%
Bernie Sanders	D	28%	54%
Hillary Clinton	D	28%	51%
Barack Obama	D	26%	48%
Martin O’Malley	D	25%	19%
Bill Clinton	D	24%	50%

The candidates are sorted by the Mostly False or Worse column. This column approximates Politician Truth Ratings, though the values in the column measure percent false rather than percent true, as in Figure 9. The strong pattern is Republicans lie much more than Democrats. Except for Jeb Bush, all Republicans are above the horizontal

line and all Democrats are below it. Republicans average 51% Mostly False or Worse, while democrats average 27%. This data is one more confirmation of the presence of the Dueling Loops structure.

#### ***Solution element 4. Politician Corruption Ratings***

This measures *how corrupt a politician is*, in a similar manner to Politician Truth Ratings. Corruption excludes voter deception, since Politician Truth Ratings measures that. Corruption ratings would need to be done regularly, perhaps every two years. The running average of the last ten years or so would be a politician's rating. Corruption ratings would become as routine and cost about as much as a high-level security check.

Ratings of government corruption exist, such as Transparency International's Corruption Perceptions Index<sup>40</sup> and the World Bank's Control of Corruption indicator<sup>41</sup>. Politician Corruption Ratings, however, measure a specific politician's level of corruption. This requires defining "politician corruption" in terms of application use and determining how to measure it.

For use in a rating, we define politician corruption as actions by a politician that unduly favour narrow special interests or the politician themselves, in the opinion of the electorate. This aligns with what Farrales<sup>42</sup> found to be the emerging consensus when the corruption definition debates ended in the 1970s: "Corrupt acts were viewed as carefully calculated decisions [based on individual choice] that maximized benefits for the parties involved, but which ultimately came at a cost to society."

Cultures vary. Each political system would need its own list of corrupt actions, such as bribery, large campaign donations, dark money, embezzlement, favouritism, coercion, criminal activity, and so on. A particular action need not be explicitly illegal, as the law is often behind the times. Narrow special interests include corporations, industries, organizations, other nations, other politicians, friends, family, etc.

### ***Solution element 5. Sustainable Quality of Life Index***

The purpose of this index is to provide the correct explicit democratic system goal. The topmost goal of a democracy is to promote the general welfare of its entire population (as opposed to the welfare of a small autocratic ruling group) in a stable manner into the far future.<sup>43</sup> This goal can be more rigorously articulated as *to optimize long-term quality of life for all*. The goal has two components: long-term and quality of life.

- (1) The long-term component rests on the concept of sustainability, which we define as the ability to continue a defined behaviour indefinitely. For a society to be sustainable, all three pillars of sustainability (environmental, social, and economic) must be sustainable.<sup>44</sup>
- (2) The “quality of life for all” component consists of those factors deemed important to a particular population, such as physical health, happiness, and lifespan. “Quality of life for all” is synonymous with the common good.

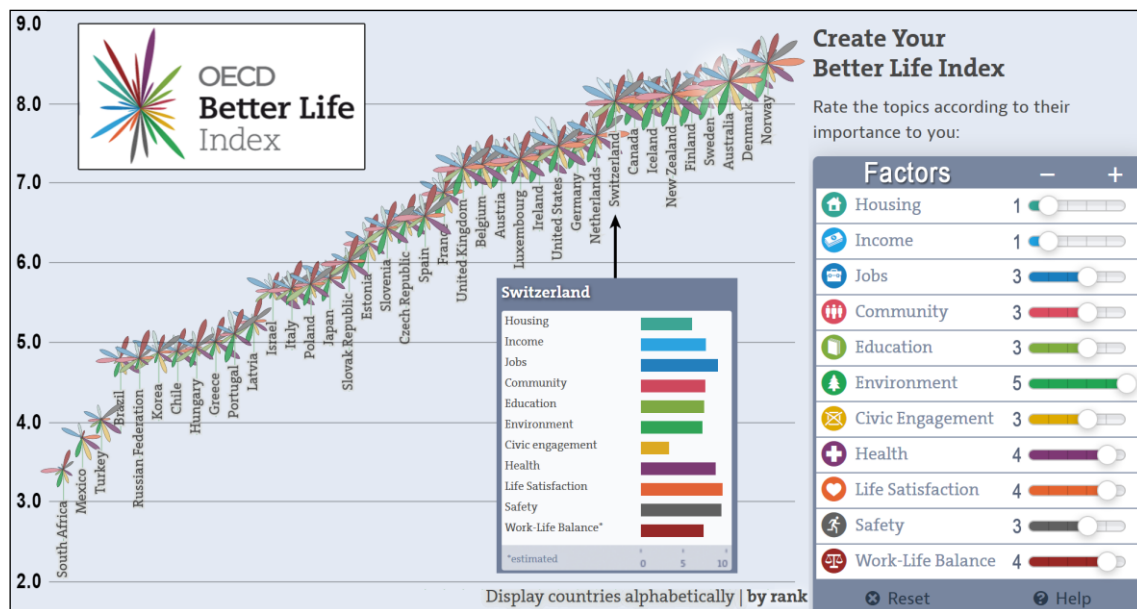
Combining these two components into a single phrase, the topmost goal of a democracy is *an optimal sustainable quality of life*. That goal is the Sustainable Quality of Life Index, which is the multiple of its two components. The equation and abbreviations are:

$$\text{Sustainable Quality of Life Index (SQLI)} = \text{Quality of Life Index (QLI)} \times \text{Sustainability Index (SI)}$$

#### ***The Quality of Life Index (QLI)***

Numerous QLIs have appeared, such as the Genuine Progress Indicator of ecological economists, the Economist’s Quality of Life Index, Bhutan’s Gross National Happiness Index, the United Nations Human Development Index, and the OECD’s Better Life Index. All use a collection of factors to calculate an overall index.

The most mature appears to be the OECD’s Better Life Index (Figure 10). This index demonstrates that an adequate QLI is easily implemented. Presently its index ranges from zero to ten. This would be changed to zero to 100% for use in the above equation. If an approach like the Better Life Index was used, its factors and weights would have to satisfy all nations, not just OECD members. However, in its present form, the index is already a reasonable version of an adequate QLI.



**Figure 10.** OECD Better Life Index.<sup>45</sup> Using eleven factors, the index is measured every two years for all OECD members plus several non-members. The index is on the left axis and ranges from zero to ten. Measurements for Switzerland are shown. To illustrate that factor importance varies across countries and people, website visitors can adjust the factor weights to their own preference, as the example has done. Country indexes are then recalculated using those weights. The first three factors (housing, income, and jobs) are material living conditions. The rest are quality of life factors.

### The Sustainability Index (SI)

QLIs are much easier to implement than SIs, since most quality-of-life data is usually already being collected by governments. The rest is relatively easy to collect, using existing data or initiating surveys.

By contrast, implementing an adequate SI is so difficult it appears to have not yet been done. None of the 13 SIs that Mori and Christodoulou<sup>46</sup> examined were capable of providing an adequate basis for a complete City Sustainability Index (CSI). A CSI is the same as a national or global SI. Only the scale and system boundary has changed. No adequate basis for a complete SI has emerged since Mori and Christodoulou's research in 2010.

A complete SI is more difficult than a QLI because data must be collected on all three pillars. In addition, it must incorporate measurement of Daly's<sup>47</sup> three requirements of environmental sustainability:

- (1) Renewable resources: The rate of harvest should not exceed the rate of regeneration (sustainable yield).
- (2) Pollution: The rates of waste generation from projects should not exceed the assimilative capacity of the environment (sustainable waste disposal).
- (3) Non-renewable resources: The depletion of the non-renewable resources should require development of comparable renewable substitutes for that resource.

Daly's three requirements deal with whether a resource use rate is sustainable. Missing is consideration of the amount and quality of the resource, which raises these questions:

- Renewable resource: What if a renewable resource is so depleted there is no longer enough for a population to live on, as in deforestation, river flow for drinking water, or ocean fish stocks?
- Pollution: What if a river or lake is too polluted to drink, or city air is too polluted to breathe?
- Non-renewable resources: What if a non-renewable resource is so depleted there is no longer enough to live on, as in exhaustion of topsoil, phosphate rock for use in fertilizer, or ancient groundwater aquifers filled millions of years ago?

To address these questions two more requirements are needed:

- (4) The rate of resource use available must be sufficient for a given population level.
- (5) The resource quality must be high enough for effective use.

Once the factors needed to calculate a complete SI for all three pillars of sustainability are identified, they can be collected. The index need not be perfect. It only needs to address the most important factors, those related to global society's most pressing problems. In order of importance and therefore factor weight, we currently see the top three problems as climate change, nuclear war, and high wealth/income inequality, both within and between nations. These fall into the environmental, social, and economic pillars of sustainability. Using estimates, this allows creation of an illustrative SI (Table 2). Values for sustainability and weight are estimated for the planet as a whole, rather than a nation or region. The three top problems are bolded and have higher weights than other factors.

**Table 2.** An example of a complete Sustainability Index (SI).

Pillar	Factor	Sustainability	Weight	S x W
Environmental	<b>Climate change</b> (critical factor)	10%	5	.5
	Freshwater shortages	20%	2	.4
Social	<b>Nuclear war</b> (critical factor)	80%	4	3.2
	Large-scale discrimination	60%	1	.6
	Government corruption	40%	2	.8
	Democratic backsliding	40%	3	1.2
Economic	<b>High wealth/income inequality</b>	30%	4	1.2
	Large recessions	80%	1	.8
Totals			22	8.7

Weighted index = sum (sustainability x weight) / total weight = 8.7 / 22 = 40%

Final index = minimum of weighted index and critical factors = 10%

The factor weights show how some factors are extremely vital, much more so than is commonly assumed by present policies. To illustrate consideration of other problems or proximate causes beyond the three problems mentioned above, additional factors were added to the table. An actual table would be far bigger, as may be seen in the UN's Sustainable Development Goals, which have 17 goals and 169 targets.<sup>48</sup>

The factors are interconnected. For example, war or large recessions destroy a nation's *ability* to commit large resources to solving common good problems. Democratic backsliding to an autocratic democracy or high corruption destroys a nation's *willingness* to solve common good problems, unless they are directly affected in the short term.

Table values for environmental sustainability factors would meet the requirements of a sustainable resource and are calculated this way:

- (1) Renewable resources: The value is harvest rate / regeneration rate.
- (2) Pollution: The value is pollution generation / pollution assimilation/recycling by the environment.
- (3) Non-renewable resources: The value is depletion rate / expected substitution rate. The expected substitution rate should be very conservatively calculated, to avoid over-optimism and minimize risk.
- (4) The rate of resource use available must be sufficient for a given population level: The value is total resource rate available / (needed resource rate per person x number of people). Note that population can be reduced.
- (5) The resource quality must be high enough for healthy use: The value is resource quality / needed resource quality.

Table values for social and economic sustainability factors is the percent of the problem solved that is sustainable. There are two types of problems. Each requires a different approach to calculation. Some problems could have a mixture.

- (1) Ongoing problems: For example, large-scale discrimination is about 60% solved, since racial, ethnic, age, and gender discrimination is largely illegal but persists. Some factors consider a 100-year horizon. Backsliding has occurred in about 60% of nations who hold elections.<sup>49</sup> Thus only 40% are sustainable democracies, which becomes the value in the table.
- (2) Recurring event problems: For example, we estimate there is only a 20% chance of nuclear war in the next 100 years, which is an 80% chance of non-occurrence, which becomes the value in the table.

A weighted index of 40% was calculated using the table. This appears reasonable until critical factors are considered. When a critical factor occurs, the entire system with the problem is doomed.<sup>50</sup> Thus, the final index is the minimum of the weighted index and the critical factor sustainability values. There are two critical factors, climate change and nuclear war. Taking the minimum of 40%, 10% and 80%,



the final index is 10%. This is the true SI for the example table. We feel it reflects about where the planet is today.

### ***The new top system goal of SQLI***

We have described how adequate QLI and SI indexes can be built. Next, consider how they produce the SQLI. Recall the equation:

$$\text{Sustainable Quality of Life Index (SQLI)} = \text{Quality of Life Index (QLI)} \times \text{Sustainability Index (SI)}$$

The OECD's Better Life Index shows that well-developed nations have a high QLI of 70% to 85%, while medium-developed nations have a medium QLI of about 50%. We expect that poorly-developed nations (most of which are not OECD members) would have a low QLI of about 20%.

If a developed country had a QLI of 70% and a low SI of 10%, its SQLI would be 7%. For most people in developed countries this will seem shockingly low, because most people have a short-term and non-global mindset. That mindset needs to change, if the planet is to solve its most pressing global problems, particularly climate change. This demonstrates the importance of implementing the correct goal of the system, in a manner that all citizens can use to hold their elected leaders accountable to.

The SQLI and the components that produce it would replace GDP and GDP growth rate as the most common goal of nations, because:<sup>51</sup> (*italics added*)

...the model of economic and social progress which has dominated the second half of the [twentieth century] no longer works. The problems of environmental degradation, global poverty, and domestic inequality have begun to threaten, even overwhelm, the gains which have been made. ... Any alternative model must start by addressing the unquestioned pursuit of economic growth. Over the last 50 years, *growth has become the main objective of politics, regarding not just as the source of wealth creation, but as the automatic solution to all other problems.*

### ***Solution element 6. Truth Literacy Training***

As described in the paper, this solution element trains citizens on how to tell truth from deception, and then using that knowledge, how to make important political decision correctly, especially voting.

### ***Solution element impact considerations***

We have described Politician Truth Ratings at some length, as we see tremendous impact potential. If well-funded and well-designed, it could make the biggest short-term difference, since the work of PolitiFact, FactCheck.org, and others could be rapidly evolved to a mature version of Politician Truth Ratings. Once the



ratings become widely available, we expect they will have the same beneficial impact that thousands of other types of ratings have had.

In the long-term we see Truth Literacy Training as the most effective solution element, due to the systemic power of universal truth literacy. However, a nationwide Truth Literacy Training program would require a higher budget than Politician Truth Ratings and would take far longer to reach high impact, due to delays involved in experimentation/improvement of training design and years of student education. The education delay could be less for adults.

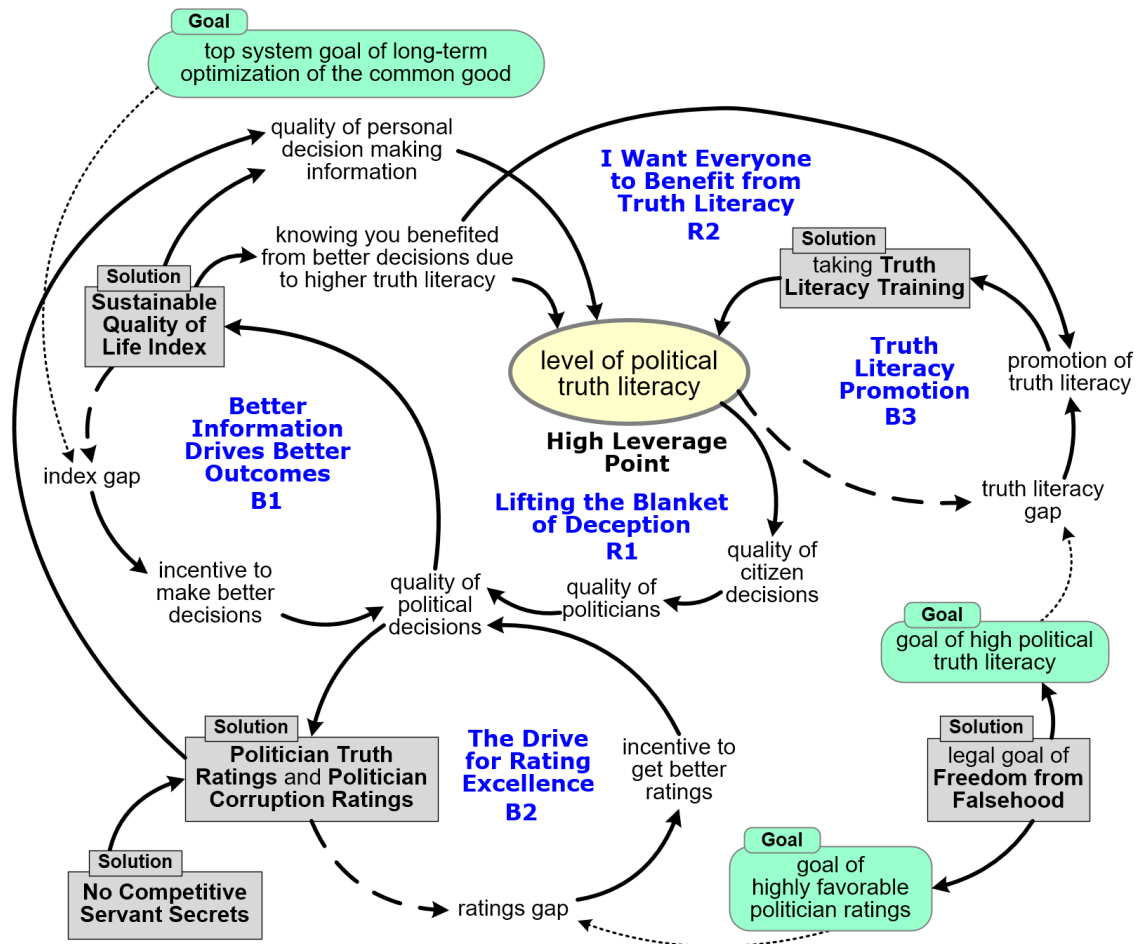
On the other hand, it may be possible to greatly accelerate the Truth Literacy Training solution element, such as by developing an adult online training program requiring an estimated twenty to forty hours, supplemented with refresh training and an online catalogue of fallacies, deception strategies, current examples of clever deception, etc. Instead of small amounts of training every year in school, the training could be given to young adults just before they turn voting age. The training could also be accelerated by embedding it into news coverage, as discussed in the paper. The LTQ (logical truth literacy) aspects of the training should begin as early as possible in school curriculums due to way LTQ improves reasoning abilities in general.

Imagine an app on your smart phone that supported your instant analysis of a politician's claim using what you learned in Truth Literacy Training, plus the ability instantly check the politician's truth and corruption ratings, and drill down for details that you were interested in. You could share what you found with others. You could save it for future reference, as you accumulated information for use in voting decisions. The beneficial impact on the health of democracy would be enormous.

### ***How the solution elements work together***

The key strategy is that a properly designed solution structure will create *a self-managing solution*. Once a self-managing solution is in place, it will automatically evolve solution details to solve the problem and keep it solved. Exactly how this would occur is unpredictable. Historic examples are the agriculture and industrial revolutions, which solved the problems of limited food supply and high cost of mass production. Both revolutions were driven by new feedback loops: Food Supply Growth (due to continuous improvement of domesticated food sources) and Falling Cost of Mass Production (due to invention of universal power beginning with the steam engine, supplemented with other inventions like interchangeable parts and the concept of mass production itself, as in Adam Smith's pin factory). Once these revolutions began, their exact mechanisms and consequences were unpredictable but hugely successful.

In industry, self-managing solutions are the equivalent of the long-term process control function. After initial solution success, "don't be too hasty to declare victory. The last battle has yet to be fought. The battle against creeping disorder, the battle against entropy. The battle to ensure the gains you made are permanent."<sup>52</sup>



**Figure 11.** How the solution elements work together, using a causal loop diagram. The strategy is to push on the high leverage point using well-designed feedback loops and solution elements. The solution is self-managing due to the powerful balancing loops and explicit goals. Favourable truth ratings are high. Favourable corruption ratings are low.

How the solution elements work together to create a self-managing solution is shown in Figure 11. This is presented not as *the* solution, but as an example of how once a high leverage point is identified, solution elements and feedback loops can be designed to solve the problem and keep it solved.

Feedback loop structure is designed to push on the high leverage point of *level of political truth literacy*. This begins when a state passes legislation creating the *legal goal of Freedom from Falsehood* for all citizens. Implementing that goal can be done by creating two implementation goals: *goal of highly favourable politician ratings* and *goal of high political truth literacy*.

The five feedback loops work this way:

**B2 loop.** The *goal of highly favourable politician ratings* allows creation of **The Drive for Rating Excellence** feedback loop, a balancing loop. All balancing loops strive to achieve a goal. This one begins by creating *Politician Truth Ratings and Politician*

*Corruption Ratings.* Once ratings become available, the goal of highly favourable ratings compared to a politician's ratings equals the *ratings gap*. If the gap is high or medium, this gives a politician a strong *incentive to get better ratings*. This in turn improves *quality of politician decisions*. The next time the ratings are updated, that politician's ratings would be better. This would reduce the *ratings gap*, and the loop starts over again.

Collecting the data for politician ratings requires *No Competitive Secrets*. If certain information can be kept secret, such as money flow and communications, then it is impossible to accurately measure a politician's level of truth and corruption. For example, the use of "dark money" to influence politicians could not be measured. But yet it must be measured because:<sup>53</sup>

Democracy is in crisis, and unaccountable and untraceable flows of money are helping to destroy it. ... Dark money is an American neologism for an increasingly global phenomenon: funds from unknown sources that influence our politics. This money gets into the political system in an increasing variety of ways, from loopholes in election law and online campaign fundraising [and flows] to anonymously funded, agenda-setting pressure groups.

**B3 loop.** The other goal, *goal of high political truth literacy*, is the goal for the **Truth Literacy Promotion** balancing loop. Once a state commits to achieving universal truth literacy, a nationwide Truth Literacy Training program is created. This would involve educational curriculum changes, setting up online training that was free and available to all, encouragement of using of components of the training in news organizations, etc.

The loop begins with calculation of the gap. The *truth literacy gap* equals the *system goal of high political truth literacy* minus *level of political truth literacy*. At first the gap will be high. This causes *promotion of truth literacy*, which leads to many citizens *taking Truth Literacy Training*. The training increases the electorate's *level of political truth literacy*. That causes the *truth literacy gap* to go down, and the loop starts over again.

Something else happens when *percent falsehoods detected* goes up. This feeds into two other feedback loops, R1 and R2. These are reinforcing loops and have no goal.

**R1 loop.** As *level of political truth literacy* goes up, so does *quality of citizen decisions*, due to **Lifting the Blanket of Deception**. People can now see who's been telling the truth and who's been lying. Better voting decisions increase *quality of politicians*, which increases *quality of political decisions*. That in turn improves the *Sustainable Quality of Life Index*, which increases *knowing you benefited from better decisions due to higher truth literacy*. This causes people to want to improve their truth literacy still further, such as by more training, study of the catalogue of fallacies, talking to friends about spotting deception, and so on. This increases *level of political truth literacy* and we're back where we started.

As *quality of citizen decisions* improves, so does voting decisions. This strengthens the Voter Accountability loop (aka Voter Feedback loop), not shown. However, the solution elements do more than simply strengthen the Voter Accountability loop. They cause the democratic system to *efficiently focus* on what matters most to citizens: The *top system goal of long-term optimization of the common good*.

**R2 loop.** As *knowing you benefited from better decisions due to higher truth literacy* increases, people want to personally spread the word to others so they can benefit too. This creates the **I Want Everyone to Benefit from Truth Literacy** loop and leads to more *promotion of truth literacy*, which leads to more people *taking Truth Literacy Training*, which raises the *level of political truth literacy*, and so on. This loop strengthens the R1 and B3 loops.

**B1 loop.** The **Better Information Drives Better Outcomes** balancing loop is found in all large organizations. The better the loop is designed, the better the outcomes. Here the loop starts by setting the topmost goal of the democratic system, the *top system goal of long-term optimization of the common good*. This goal is so crucial that earlier we described in detail how it could be well-measured, using the *Sustainable Quality of Life Index*. Once that index exists, the *index gap* can be calculated. The gap is the system goal minus the index value. Currently the gap is large. The bigger the gap, the stronger the *incentive to make better decisions*. That increases *quality of political decisions*, which raises the *Sustainable Quality of Life Index*, and the loop starts over again.

### ***Moving to the solved mode with the right explicit goals***

Once the analyst has built a glass box model of the problem that supports the social force diagram and has designed solution elements that address the right explicit goals, moving to the solved mode becomes a predictable exercise in solution implementation. A well-engineered solution plan exists.

All dynamic systems are composed of reinforcing and balancing feedback loops. Every balancing loop has a goal. Goals determine where a system wants to go.<sup>54</sup>

One of the most powerful ways to influence the behavior of a system is through its purpose or goal. That's because the goal is the direction-setter of the system, the definer of discrepancies that require action, the indicator of compliance, failure, or success toward which balancing feedback loops work. If the goal is defined badly, if it doesn't measure what it's supposed to measure, if it doesn't reflect the real welfare of the system, then the system can't possibly produce a desirable result.

**Table 3.** The six solution elements and their functions.

Solution Element	Function
1. Freedom from Falsehood	The legal goal that is the foundation of the solution. This goal motivates creation of the goals for the B2 and B3 loops.
2. No Competitive Servant Secrets	Allows politician ratings to be calculated.
3. Politician Truth Ratings	Creates the B2 loop goal of high truth ratings.
4. Politician Corruption Ratings	Creates the B2 loop goal of low corruption ratings.
5. Sustainable Quality of Life Index	Creates the top system goal and the B1 loop to directly achieve that goal.
6. Truth Literacy Training	Creates the B3 loop goal of high truth literacy, and greatly strengthens the R1 and R2 loops.

The six solution elements are listed in Table 3. Each provides or is related to an explicit feedback loop goal, as diagrammed in Figure 11. One cannot say which feedback loops are the ones that actually solve the problem. *All* are required for a comprehensive self-managing solution that solves the problem as rapidly and efficiently as possible, and keeps the problem solved.

But we can say that for solution design, the five feedback loops shown (or something like them) are the most important of the many loops in the system. Other loops requiring improvement will be identified and improved as necessary, in the course of managing the five loops that provide the architecture of the fundamental solution. That's how root cause analysis and system dynamics work. You focus only on what matters at each step in the problem-solving process.

If a social system structure is engineered to contain the right explicit goals in order to resolve root cause forces, *by motivating social agents to achieve the explicit goals*, then the structure will rapidly and efficiently solve the problem and keep it solved. The research presented here illustrates how that structure can be found. Figure 11 explains how, using the right explicit goals and feedback loops, a democratic system can be engineered to move from the unsolved mode of simulation run 5 to the solved mode of run 10. However, much further research remains, particularly real-world experimentation.

### The Truth Literacy Training study

Good “scientific modeling,” as Homer<sup>55</sup> reminds us, requires testing of all key assumptions: “...every system dynamics model goes through an early exploratory stage in which some hypotheses are formulated with little or no empirical foundation. But models that go no further than the exploratory stage should not be confused with those that are subjected to the rigors of scientific evaluation.” How much empirically based confidence can we have in the hypothesis that political truth literacy is low and can be raised to high in a practical manner, which forms the bedrock of the model?

The results reported here are part of a larger body of work which designed a comprehensive collection of solution elements (described above) for pushing on the high leverage point of *raise political truth literacy from low to high*. The easiest element to test with the highest impact was Truth Literacy Training. This led to the Truth Literacy Training study, which this paper briefly summarizes. A subsequent paper will present the complete study.

The purpose of the study was to test if political truth literacy (DTQ) is currently low and can be raised to high in a practical manner. If so, we have preliminary evidence the root cause exists and can be resolved.

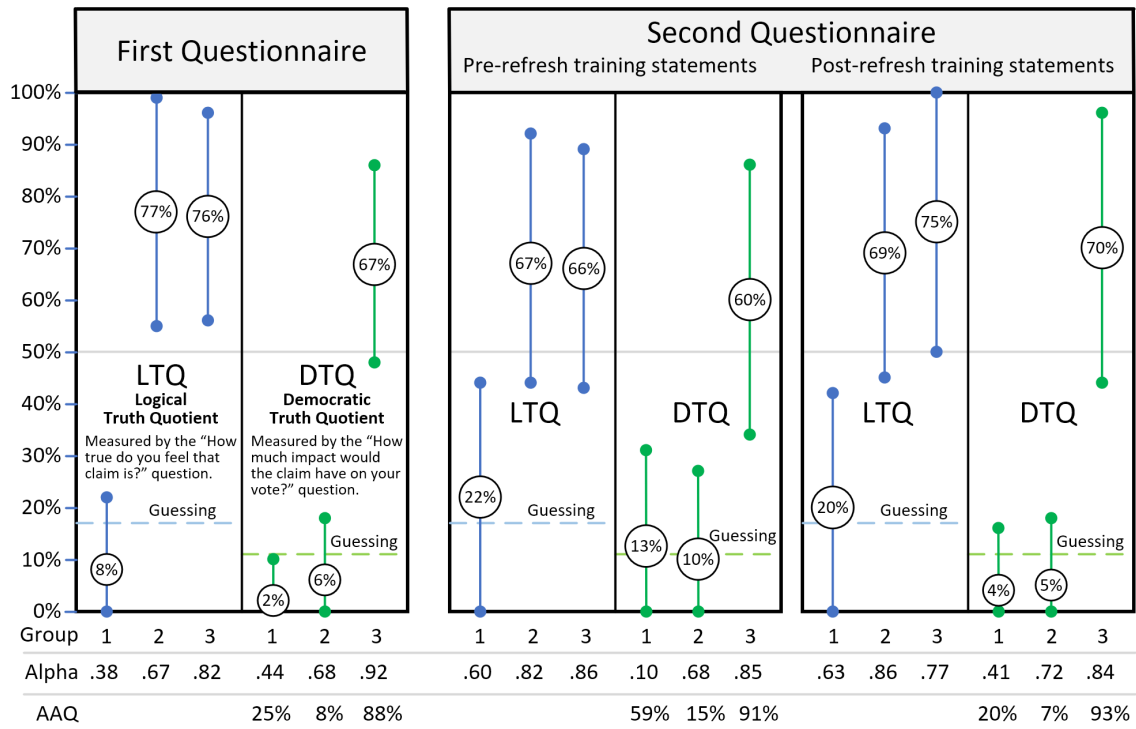
The study consisted of initial and follow up questionnaires using a Prolific<sup>56</sup> online panel. The first questionnaire was run on 93 US subjects randomly assigned to three groups. Demographics were age range 22 to 51, average age 31, 49% male. Educational levels were 34% high school, 55% college degree, 10% PhD. The three groups were:

- (1) *Control group*. Trained on the neutral topic of how democracy works.
- (2) *Trained on claims*. This covers how to tell if a political claim was true or false, by spotting the pattern of fallacy or non-fallacy used.
- (3) *Trained on claims and vote*. Received the same training as group 2 plus training on how to vote correctly (given the perceived level of truth of a claim) by applying two rules: Reward the Truth Teller and Penalize the Deceiver. Total time for group 3 averaged 87 minutes, of which about one hour was training. Group 3 training utilized 37 questions and related text.

All subjects took the same questionnaire after training. The first questionnaire contained 17 political statements containing bolded claims. 13 statements were deceptive and used six fallacies we found common in political appeals, such as cherry picking and *ad hominem* attack. Each statement was followed by three questions:

- (1) *The truth question*: “How true do you feel the claim is?”
- (2) *An open-ended question*: “What was the main reason for your decision in the above question?” This was designed to maintain cognitive motivation and give us feedback.
- (3) *The vote question*: “If the election was held today and this was all the information you had, how much impact would what the politician claimed have on your vote for or against the politician?”

LTQ was measured by the truth question for deceptive statements. DTQ was measured by the vote question for deceptive statements. A follow up study was run 26 days later using different statements and group-appropriate refresh training, with an average dropout rate of 18% per group.



**Figure 12.** Results of the Truth Literacy Training study. Average scores and 95% confidence intervals for answers to deceptive statements are shown, with guessing levels, Cronbach's alpha, and calculated AAQ. (AAQ = DTQ / LTQ) Treatment groups were: 1. Trained on neutral topic (control group), 2. Trained on claims, 3. Trained on claims and vote.

Figure 12 summarizes study results. Results confirm the main root cause exists in the US, a typical democracy. Group 1 represents the average voter, who has never received the equivalent of Truth Literacy Training. Their DTQ was very low, at about 2%. This is a crucial finding and explains why nations are so susceptible to a dominant Race to the Bottom and democratic backsliding. While we cannot say DTQ is exactly 2% due to the 95% confidence interval of +/- 8 points, as well as the limitations of a single laboratory experiment and training on only a small set of fallacies, we can say that DTQ is low.

Study results also confirmed that the root cause can be resolved in a practical manner. The key data is DTQ for groups 1 and 3. The large increase, from 2% to 67%, a 65-point rise, suggests that Truth Literacy Training is capable of pushing on the high leverage point of *raise political truth literacy from low to high* successfully. Group 3 training averaged about one hour, indicating that Truth Literacy Training, such as in education systems and online training, will not require that much of a person's time.

Training on spotting deception alone (group 2) has almost no effect on raising DTQ, which rose only four points, from 2% to 6%. Vote training (group 3) is also required. This is a second crucial finding with strong implications for solution requirements, and explains why *actionable false memes* (AAQ) play a central role in the simulation model. AAQ is the equivalent of vote training.



A second questionnaire run 26 days later found DTQ for group 3 had declined from 67% to 60%, only a 7-point fall. After an average of 30 minutes of refresh training, DTQ for group 3 rose to 70%, indicating regular refresh training of some type can work and will be required. Or it may be that like reading and writing literacy, once political truth literacy matures, becomes the reasoning default and is exercised often enough, little decline will occur.

The study raises a question. How can the training work on people highly committed to a false ideology, like the far right and Trump supporters?

The biggest training impact would be on swing voters and the young, who are loosely committed or not yet committed. Voters already strongly committed to a false ideology will tend to resist change due to the deceptive power of motivated reasoning.<sup>57</sup> Training is not urgently needed for voters already supporting truth-telling politicians. This suggests that initial training should target those who would benefit the most. In the long-term, all citizens should be trained.

## Further conclusions

The paper concluded that the main root cause of democratic backsliding, low political truth literacy, exists and can be resolved with practical solutions. It also concluded that democratic backsliding is analytically solvable, if a suitable form of root cause analysis is used. Here we offer further conclusions.

Much further research lies ahead. On difficult problems, especially in evolving large social systems, root cause analysis is highly iterative. Full solution is usually a long process of gradual system optimization.

The analysis was kept as simple as possible. It does not attempt to explain the rise and decline of democracy, nor the timing, nor the three waves of autocratization. Nor does it handle the case where due to autocratization, fair elections no longer prevail or never did. The analysis only explains why democracy is susceptible to decline, which is enough to solve the backsliding problem in the case where fair elections still prevail. A hallmark of root cause analysis is economy of analysis. Everything not related to finding and resolving root causes can be ignored.

The analysis and Truth Literacy Training (TLT) study provide the first version of a comprehensive theory explaining democratic backsliding. Using a social force diagram paired with a system dynamics model, the Dueling Loops theory meets the four requirements for a comprehensive theory listed in the paper. Each requirement stems from one of the four main forces present in all difficult large-scale social problems. The theory explains:

- (1) Force S. *Why past solutions have failed.* Superficial solutions (S) have pushed on the intuitively attractive low leverage points of *more of the truth* and *misinformation correction*.



- (2) Force R. *Why backsliding can occur.* This is due to the Dueling Loops structure and the unresolved main root cause (R) of *low political truth literacy*. Existence of the root cause was verified on a preliminary basis by the TLT study.
- (3) Force F. *How the problem can be solved in a practical manner.* The TLT study provides preliminary evidence that fundamental solutions (F) can fairly easily push on the high leverage point of *raise political truth literacy from low to high* to resolve the main root cause.
- (4) New Force R. *Why the solution will be relatively permanent.* Root cause resolution leads to New Force R, which causes a systemic mode change and a permanently dominant Race to the Top. The feedback loops which solve the problem and keep it solved are described Figure 11.

The key finding is the main root cause and its high leverage point: *raise political truth literacy from low to high*.

This raises a question. How can a notoriously difficult problem like democratic backsliding have such a simple solution strategy? Doesn't this indicate the analysis is overly simplistic and somehow flawed? We think not for two main reasons:

1. *100% of authoritarian governments depend on copious amounts of propaganda to fool their citizens into supporting them.* Evidence may be found by examination of authoritarian states. All we have examined are propaganda dependent. The pattern is so reliable that using the V-Party dataset, Luhmann et. al.<sup>58</sup> identified four key characteristics of anti-pluralism. As discussed in the paper, all require political deception to implement.

100% of authoritarian leaders or parties depend on massive amounts of political deception to rise to and stay in power. Political deception works only if a population's political truth literacy is low. It follows that if it was raised to high, authoritarians would be forced to turn to another device to gain and/or maintain power. What would that be? We see no plausible alternatives.

2. *The high leverage point has never been pushed on before with focused, large-scale, long-term solution elements.* Consider just Truth Literacy Training:

- (1) No education system has ever deeply educated students in political truth literacy, right alongside reading, writing, and math literacy.
- (2) No large news organization has ever made continuing education of the public in political truth literacy part of its mission, via news coverage that includes components of TLT. An example would be an article on how Hitler, Putin, and Trump each employ the classic authoritarian deception pattern of painting a false common enemy to push the fear hot button and justify violence against that enemy, when in reality no such enemy existed. Or there might be a daily TV series on "The biggest lie and the most novel fallacy of the day." Or a newspaper might identify each obvious deception (only the obvious ones since finding them

all can take days) in important political statements or speeches, state the fallacy used, and provide a link to how the fallacy works. This allows readers to continually learn how to spot patterns of deception and not be fooled. "...the ways by which we are deceived are consistent and not so hard to recognize".<sup>59</sup>

- (3) No major research organization has ever focused a project on developing empirically based approaches to TLT and other solution elements for pushing on the high leverage point.
- (4) No government has ever adopted the policy of universal political truth literacy. Yet we have long witnessed the extraordinary gains from universal reading, writing, and math literacy. If the high leverage point is correct, then we can expect the same extraordinary gains from universal political truth literacy.

Some education systems have offered training in skills related to truth literacy, like critical thinking and media literacy. Definitions of critical thinking vary widely. Robert Ennis, one of the founding fathers of the critical thinking movement in North America, offers this definition: "Critical thinking is the intellectually disciplined process of ...evaluating information ...as a guide to belief and action."<sup>60</sup> This describes the ability to correctly reason in general. Critical thinking is not the same as the specific skill of political truth literacy. Nor is media literacy, which Livingstone<sup>61</sup> defines as "the ability to access, analyse, evaluate and create messages across a variety of contexts."

Given the analysis, the positive results of the TLT study, and the above four observations, we conclude that pushing on the high leverage point with TLT alone would have a highly beneficial effect. However, as discussed earlier, something like the six solution elements in Table 3 are required to provide a complete solution.

## Notes

<sup>1</sup> Blumschein et al., *Model-Based Approaches to Learning: Using Systems Models and Simulations to Improve Understanding and Problem Solving in Complex Domains*, 9.

<sup>2</sup> Ibid.

<sup>3</sup> Homer, "Why We Iterate."

<sup>4</sup> Sterman, *Business Dynamics: Systems Thinking and Modeling for a Complex World*, 107.

<sup>5</sup> Waldner and Lust, "Unwelcome Change."

<sup>6</sup> Dukalskis, *Making the World Safe for Dictatorship*.

<sup>7</sup> Corke, "Democracy Playbook 2021: 10 Commitments for Advancing Democracy," 9.

<sup>8</sup> Merkel and Lührmann, "Resilience of Democracies."

<sup>9</sup> Benkler, Faris, and Roberts, *Network Propaganda: Manipulation, Disinformation, and Radicalization in American Politics*, 4.

<sup>10</sup> Woolley and Howard, *Computational Propaganda: Political Parties, Politicians, and Political Manipulation in Social Media*, 3–10.

<sup>11</sup> Arendt, *The Origins of Totalitarianism: Part Three*, 39.

<sup>12</sup> Ibid, p172.

<sup>13</sup> Orhan, "The Relationship between Affective Polarization and Democratic Backsliding."

- <sup>14</sup> Svolik, “Polarization versus Democracy.”
- <sup>15</sup> Somer, McCoy, and Luke, “Pernicious Polarization, Autocratization and Opposition Strategies.”
- <sup>16</sup> Ghaffarzadegan, Lyneis, and Richardson, “How Small System Dynamics Models Can Help the Public Policy Process.”
- <sup>17</sup> Forrester, *World Dynamics*, 20–21.
- <sup>18</sup> Ghaffarzadegan, Lyneis, and Richardson, “How Small System Dynamics Models Can Help the Public Policy Process,” 36.
- <sup>19</sup> There are about 320 variables in a Vensim reproduction of World3, which was originally written in the earlier modeling language of Dynamo.
- <sup>20</sup> Sterman, *Business Dynamics: Systems Thinking and Modeling for a Complex World*, 4.
- <sup>21</sup> Dawkins, *The Selfish Gene*, 189–201.
- <sup>22</sup> We originally used a longer incubation time of 5 years. However, this caused the first five years of some of the model graphs to have distracting straight lines. Because of this we changed to 1 year. This had no effect on the model after 5 years.
- <sup>23</sup> The PEW Research Center found that “People rarely switch parties.” “Voters Rarely Switch Parties, but Recent Shifts Further Educational, Racial Divergence.”
- <sup>24</sup> Sze To and Chao, “Review and Comparison between the Wells–Riley and Dose-Response Approaches to Risk Assessment of Infectious Respiratory Diseases.”
- <sup>25</sup> Noel and Therien, *Left and Right in Global Politics*, 34.
- <sup>26</sup> Dillard and Shen, *The SAGE Handbook of Persuasion: Developments in Theory and Practice*, 16.
- <sup>27</sup> Bobbio, *Left and Right*, 34:xvi, xvii.
- <sup>28</sup> Ibid, 7.
- <sup>29</sup> Denney, “The German Far Right Doesn’t Need to Win Elections to Be Dangerous.”
- <sup>30</sup> Norris and Inglehart, *Cultural Backlash: Trump, Brexit, and the Rise of Authoritarian Populism*, 9.
- <sup>31</sup> For example, see Fisher’s description of how Facebook’s recommendation engine amplifies false memes and how large the effect has become. “The more incendiary the post, the more widely the platforms spread it. ... Our algorithms exploit the human brain’s attraction to divisiveness.” Fisher, *The Chaos Machine: The Inside Story of How Social Media Rewired Our Minds and Our World*, 5, 9.
- <sup>32</sup> Kunda, “The Case for Motivated Reasoning.”
- <sup>33</sup> Ellul, *Propaganda: The Formation of Men’s Attitudes*, xi–xvii.
- <sup>34</sup> Silkstone, “‘Pollie Graph’ Idea to Stamp out Porkies.”
- <sup>35</sup> “Research and Testing Summary.”
- <sup>36</sup> “Annual Report on Nationally Recognized Statistical Rating Organizations,” 11.
- <sup>37</sup> There are many niche politician ratings. Examples in the US are: (1) Planned Parenthood’s Congressional Scorecard. The scores are based on votes on key legislation related to sexual and reproductive health and rights. (2) The Human Rights Campaign’s Congressional Scorecard, based on how elected officials voted on issues of LGBTQ equality. (3) The Center for Legislative Accountability’s Conservative Congressional Scorecard, based on whether a politician voted in accordance with conservative beliefs. Note how none of these ratings deal with something far more important: truth and corruption. Sources: “Congressional Scorecard,” 2021; “Congressional Scorecard,” 2022; “About the Center for Legislative Accountability.”

- <sup>38</sup> Holan, “All Politicians Lie. Some Lie More Than Others.”
- <sup>39</sup> Ibid. PolitiFact uses six classifications for fact-checking statements: Pants on Fire, False, Mostly False, Half False and Half True, Mostly True, and True. “Pants on Fire refers to the most egregious falsehoods.”
- <sup>40</sup> “Corruptiopn Perceptions Index.”
- <sup>41</sup> “Control of Corruption Indicator.”
- <sup>42</sup> Farrales, “What Is Corruption?,” 7.
- <sup>43</sup> This goal may be inferred by study of democratic constitutions. All provide rights and mechanisms as the necessary conditions for a population to optimize its own wellbeing. Some explicitly mention the goal, as most famously in the US constitution in 1776: “promote the general welfare.” Others only imply it, as in France’s fifth version of its constitution in 1958: “founded on the common ideal of liberty, equality, fraternity, and conceived for the purpose of their democratic development.” Sources: “The Constitution of France”; “The Constitution of the United States.”
- <sup>44</sup> Purvis, Mao, and Robinson, “Three Pillars of Sustainability.”
- <sup>45</sup> “OECD Better Life Index.”
- <sup>46</sup> Mori and Christodoulou, “Review of Sustainability Indices and Indicators.”
- <sup>47</sup> Daly, “Sustainable Development.”
- <sup>48</sup> “Sustainable Development Goals.”
- <sup>49</sup> Regarding: “Backsliding is an ongoing problem occurring in about 60% of nations who hold elections.” Data in Alizada, Boese, and Lundstedt, “Democracy Report 2022: Autocratization Changing Nature?,” 14. Figure 5 of that paper shows, for world population, that 26% live in closed autocracies such as China, 44% in electoral autocracies such as Russia, 16% in electoral democracies, and 13% in liberal democracies. Backsliding can occur in those that are not closed autocracies, which total 74%. Backsliding from the minimum democratic norm has occurred in the electoral autocracies, which are 44%.  $44\% / 74\% = 59\%$ . This is rounded to 60%. This is a quick estimate.
- <sup>50</sup> Regarding: “When a critical factor occurs, the entire system with the problem is doomed.” This is similar to “A chain is only as strong as its weakest link.”
- <sup>51</sup> Jacobs, *The Politics of the Real World: Meeting the New Century*, 117.
- <sup>52</sup> The process control phase of industrial root cause analysis is described in Pyzdek, *The Six Sigma Handbook: A Complete Guide for Green Belts, Black Belts, and Managers at All Levels*, 649. The page includes the quoted material. Six sigma is the leading form of root cause analysis in business.
- <sup>53</sup> Geoghegan, *Democracy For Sale: Dark Money and Dirty Politics*, 3–4, back cover.
- <sup>54</sup> Meadows, *Thinking in Systems: A Primer*, 138.
- <sup>55</sup> Homer, “Why We Iterate.”
- <sup>56</sup> See <https://www.prolific.co>.
- <sup>57</sup> Kunda, “The Case for Motivated Reasoning”; Lodge and Taber, *The Rationalizing Voter*.
- <sup>58</sup> Luhmann, Medzihorsky, and Lindberg, “Walking the Talk: How to Identify Anti-Pluralist Parties.”
- <sup>59</sup> Jackson and Jamieson, *Unspun: Finding Facts in World of Disinformation*, 6.
- <sup>60</sup> Ennis, “Critical Thinking: A Streamlined Companion.”
- <sup>61</sup> Livingstone, “What Is Media Literacy?”

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