Terror Management SDM Documentation

# Overview[[1]](#footnote-1)

This model is a basic SDM developed to model the resulting increase in “religiosity” (as energy) during and after the presence of some threat related input. It is designed in order to be scalable and reusable in other models (such as the ABM published in Shults et al. (Submitted). It incorporates the relevant aspects of terror management theory (TMT) and situates it within an evolutionary paradigm inspired by the hazard precaution literature (see Hinds et al., 2010; Liénard & Boyer, 2006; Liénard & Lawson, 2008; Woody & Szechtman, 2011) in order to address different environmental stressors. It serves as an agent based instanton of the general terror management model developed as an SDM as published in Shults et al. (Submitted).

## Purpose

The purpose of this SDM is to formalize the interacting variables within the TMT system. This provides 1) a specific formalism for debate regarding the theory of terror management and 2) a computational basis for experimentation and theoretical extensions. It also serves to be an extendable framework for use in other, more general, cognitive architectures addressing religious beliefs and behaviors in the future.

## Variables, Stocks, Flow Rates, and Scales

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Description | Type | Initial Value |
| HabituationRate | The extent to which participating in a ritual will result in efficacious mediation of perceived threats/hazards.[[2]](#footnote-2) | double | 0.379 |
| HazardContagion\_Intensity | The intensity of an encountered contagion hazard | double | 0.974 |
| HazardContagion\_OccurenceRate | The rate at which a contagion hazard will occur (modeled as simulated input into the system) | double | 100 |
| HazardNatural\_Intensity | The intensity of an encountered natural hazard | double | 0.111 |
| HazardNatural\_OccurenceRate | The rate at which a natural hazard will occur (modeled as simulated input into the system) | double | 100 |
| HazardPredation\_Intensity | The intensity of an encountered predation hazard | double | 0.8 |
| HazardPredation\_OccurenceRate | The rate at which a predation hazard will occur (modeled as simulated input into the system) | double | 100 |
| HazardSocial\_Intensity | The intensity of an encountered social hazard | double | 0.116 |
| HazardSocial\_OccurenceRate | The rate at which a social hazard will occur (modeled as simulated input into the system) | double | 100 |
| prior\_religiosity | The initial setting for religiosity into the system. | double | 50 |
| Religiosity\_Decay | The rate at which an individual's religiosity decays over time.[[3]](#footnote-3) (similar to the documented Tedium effect). | double | 0.01 |
| hazard\_event\_count\_social | Count of total number of social threats encountered by the system | double | 0 |
| hazard\_event\_count\_natural | Count of total number of natural threats encountered by the system | double | 0 |
| hazard\_event\_count\_contagion | Count of total number of contagion threats encountered by the system | double | 0 |
| hazard\_event\_count\_predation | Count of total number of predation threats encountered by the system | double | 0 |

Table System Variables and Initial Values

|  |  |  |
| --- | --- | --- |
| Stock | Description | Initial Value |
| CurrentReligiosity | The current amount of energy in the system that is an individual’s religiosity. | prior\_religiosity |
| RitualEngagement | The amount of religiosity that has instantiated itself as ritual engagement. | StressRate |
| AddedReligiosity | The additional religiosity added due to perturbations in the system. | 0 |

Table System Stocks and Initial Values

|  |  |  |
| --- | --- | --- |
| Flow Rate | Description | Value |
| ReligiosityDecayRate | The natural rate of decay of religiosity for the individual. | CurrentReligiosity \* Religiosity\_Decay |
| StressRate | The amount of stress experienced due to the presence of perceived threats. | Sociographic\_Prudery  + (HazardSocial\_Intensity / (hazard\_event\_count\_social + 1))  + (HazardNatural\_Intensity / (hazard\_event\_count\_natural + 1))  + (HazardContagion\_Intensity / (hazard\_event\_count\_contagion + 1))  + (HazardPredation\_Intensity / (hazard\_event\_count\_predation + 1)) |
| EfficacyRate | The extent to which an individual perceives stress to be relieved via ritual participation | (RitualEngagement \* HabituationRate)+ Anthropomorphic\_Promiscuity |
| ReligiousIncreaseRate | The added religiosity to the system because of a perceived threat. | AddedReligiosity |

Table Flor Rates and Calculations

### Additional information

The variables included in the table above are initialized with parameters given in the final column.

## Process overview and scheduling

The SDM itself can be described by the stock and flow diagram below (see Figure 1).

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Figure Terror Management SDM Stock and Flow Diagram

# Details

## Initialization

The model is initialized given the parameters outlined above. General variable settings such as parameter distributions for use at initialization were chosen using consultation with subject-matter experts.

## Input

During a simulation run, no input data is necessary.

During an experimental run, no input data is necessary. However, in order to match data for conditions of steady states, such as that described by Shults et al. (Submitted) data may be created and imported by a user as a .csv file. Otherwise all necessary data is included in the model as hosted in the java applet submitted to the electronic appendix.

## Sub-models and processes

There are no sub-models embedded within the model described here.

# Experiments

Experiments are documented in Shults et al. (Shults et al., Submitted). They were run using the same software as the model was developed in (The AnyLogic Company, 2015). By setting the memory settings in Main in the development environment, one should be able to run the simulation on any modern desktop or laptop. However, greater memory requirements may be necessary for running larger simulations such as the Monte Carlo Experiment described Shults et al. (Shults et al., Submitted). Results are included in the folder ~/data\_files.

# References

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1. This documentation is based roughly on the ODD format for documenting agent based models. For a description of the ODD and any definitions, see (Grimm & Railsback, 2005; Grimm et al., 2006; Railsback & Grimm, 2011) [↑](#footnote-ref-1)
2. This is similar to the concept of “yedasentience” (Hinds et al., 2010; Woody & Szechtman, 2011) [↑](#footnote-ref-2)
3. This is similar to the documented “Tedium Effect” (see Whitehouse, 2002, 2004). [↑](#footnote-ref-3)