reference

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Chapter 1

reference

1.1 reference

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                    EPISTISM - SIMULATOR DOCUMENTATION.
                      Version 1.5, March 15,1996.

        The program Epi - Sim is copyright 1996 by T. Baumeister.
        It is freely distributable as  long as this documentation
                               is  included.



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1.2 EPI-SIM Documentation: Introduction

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Introduction:
  In the beginning there was nothing. In fact there was less than
  nothing: even the idea 'nothing' couldn't exist. But suddenly,
  in only one little moment, the nothing had an awful anomalie and
  it exploded. - it created time and space -
  This ball consisting of unbelivable energy expanded and parts of it
  changed to matter. Everything was in movement.
  Finally, the matter began to built connections: Small dust-clouds,
  stars or simply planets.
  This was the time, when far out in the uncharted backwaters of the
  unfashionable end  of the western spiral arm of the galaxy, a small
```

unregarded world began to exist.
On this stony vehicle drifting through the endlesnes, small molecuels
grew in the very resourceful oceans. This happened by accident and
a very lucky coincidence suddenly created a molecul that could re-
produce itself. This was a turning-point in history: 'Life' had begun.
The reproduceable molecule, perhaps similar to our DNA, had a big
advantege against the others. Its production was now less dependant
on accident. Or better: The dergree of probabilities incresed.
So it easily spread all over the oceans. But its reproduction was
not perfect, small errors, called mutations, happened permanently.
After some time there was a huge mass of reproduceable molecules that
competed for the decreasing resources. Now accident created a
second revolution. One molecule had some mutations that enabled it
to 'break' others and to use them for reproduction. This was the
first time when earth saw a predacious 'lifeform'.
Since that point, time has changed a bit and evolution has done its
task. Life seems not longer to be bound to small reproduceable mole-
cules. But in fact they only have built large survival machines
that hang around, collect pieces of green paper and that use their
nights to write documentations noone is interested in. These
molecules are still in us.
And with them the disposition how to get resources:
    -hetrotroph lifeforms: Plants use CO2 and sunlight to grow.
    -herbovor lifeforms : Herbovore Animals eat plants to extract
                             the resources of them.
    -carbovor lifeforms : Many animals and so man (exept vegetarians)
     (episits)   hunt others and eat them.
The program EPI-SIM implements animals that use the last two strtegies.
My idea was to show how different attributes of the individuals
 (now short: indies) can influence the type and the stability of the
ecosystem >Eat and to be eaten<.
The biological background are the Laws of Volterra

1.3   EPI-SIM Documentation: Laws of Voltera

Laws of Volterra
    In 1930 the bio-mathematician Volterra analyzed fluctuations
    of the population density of robber-prey-relations and
    combined his discoveries to the following model:

      ----> Increase of prey   ----> Increase of episit ----
      | |
      ---- Decrease of episit <---- Decrease of prey <----

    After further investigations Volterra formulated 3 laws:
      *First law of Volterra:
        In food relations between two sorts the number of Indies
        of each type varies periodically, even if the circum-
        stances are constant.
        The maxima of the episit and prey follow each other with some
        delay.
      *Second law of Volterra:
        Though the density of the populations varies steadily
        the average number remains stable.

```
  *Third law of Volterra:
    Homogenous exterial influences on both sides affect the
    episit population more intense than the prey.
```

The third law has been confirmed by experiences with pest control
in the USA. After the DDT-treatment of Icerya purchasi, a vermin
that damages lemons, the population increased.
The reason was the nearly elimination of the ladybug a natural
enemy of Icerya purchasi, caused by the same DDT.

1.4   EPI-SIM Documentation: System requirements

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EPI-SIM requires...
   Amiga operating system 2.04 or higher.
```

1.5   EPI-SIM Documentation: How to install

```
Installation:
   The programm uses gadtools.library and reqtools.library.
   I guess you already have them, so they are not included here.
   Sorry for the icon. It will look awfull under MWB, but that is
   my revenge on those persons who only include MWB icons.
```

1.6   EPI-SIM Documentation: How to start

```
To start...
   simply doubbleclick the WB-Icon or type epi from CLI.
   The program accepts some command-line options
   Here they are:
     - 'FILEREQ' : A File-requester will pop up before start
                    So you can use own parameters from the early
                    begin
     - 'FILE' <filename>: Same as above but instead of requesting a
                 file, <filename> will be used.
     - 'NOVIEW' : This option disables the Animation-field
                  with the result that the programm will
                  run up to 5 times faster.
     - 'SLIDER' : Instead of the numeral display on the right, two sliders
                  will indicate the population density.
     - 'LOG' :    A Log-File will be opened (Ram:EPI.log).
                  The absolut numbers of both populations will be
                  written every round to this file.
     -'X' <size>: Defines the width of the animation-field (0<size<10).
     -'Y' <size>: The same with the height (0<size<40).
   Sorry, Epi-Sim doesn't support Tool-Types.
```

1.7   EPI-SIM Documentation: The main window

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The main window...
   builts the graphical interface of the program
   Here you can get all information that confer to the condition
   of the ecosystem:
      -The  Animation-field : The 'black-box' is the world that
          can be inhabited by indis.
      -The statistics: It shows the absolute poulation-density of
          both sorts. Here you can see if the simulation really
          confirms the  Laws of Volterra .
      -The numeral/slider box: It simply shows the current numbers of
          indis that inhabit the field.


   You can use following gadgets and menue-items:
      Menue:
      -Restart:    With this option you can start the system again with the
                   defined parameters.
      -Quit:       Why are you reading this???
      -Colors:     Pops up the reqtools color-requester.(Only because
                   it's so easy)
      -Size:       Lets you determine the x- and y-size of the animation-field.
                   ( 2<x<41 ; 2<y<11 )
                   After changing it the system will be restarted.
      -Log-File:   For scientific pupuses you can activate a protocoll.
                   All datas such as numbers of both populations, decrease
                   and system-colloaps will be written to the file 'RAM:epi.log'.
                   Usually the protocoll needs around  20Byte per round.
      -Animation:  Same as the command-line option NOVIEW.
                   This enables/disables the animated
                   field. The program will run much faster
                   without it (4-5 times) but you won't see what
                   happens.
      -Slider:     With this option you can change the numeral display in the
                   box to the right to a slider-display.
      -freq.Decrease: Lets you configure how often an automatic decrease
                   will be initiated (time in rounds).


      Gadgets:
      -parameters: Opens window to configure attributes.
                   See more at chapter  The parameter window
      -decrease:   Let you influence the absolute number
                   of indies.See more at  The decrease window
      -pause:      Freezes simulation
```

1.8   EPI-SIM Documentation: The Animation-Field

```
The animation-field...
   ... lets you  see what every single Indie does.
   Their options are the following:
   - Movement: Every animal can move a certain distance during
        one cycle, if the place it wants to move to is not yet
        inhabitet by another one.
        The field has no borders - that means, if an indie tries to
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        move over the right edge, it will appear to the left.
    - Hunt and eat: If the episit meets a prey while moving,
          it will try to catch it. If it succeeds is dependent
          on the variable >possibility of refuge< and the random generator.
    - Reproduction: The indies can reproduce themselves when they have reached
            the defined age. The prey can only do this if a field next to it
            is free. The episit can also bear offsprings to inhabited areas
            by killing the prey that lives there.
    - Death: If the life expectancy is reached the animal will die.
    You can configure the height and the width of the field by
    choosing Field-Size from the menu. Usually, bigger areas mean
    a higher stability of the system.
```

1.9   EPI-SIM Documentation: The parameter window

```
In the parameter window...
    you can change all atrributes of the sorts and of the condition
    of the ecosystem:
    -Natural life expectancy: This is the maximal age inidies can
            reach if they are not killed by hunger or by being eaten.
    -First Reproduction: This flag indicates how long an
            an animal needs until it can  bear its first offspring.
            The number of decendants it can have under ideal conditions
            is defined by (life_expectancy-first_repro)/Repro_Time.
            It should be able to have at least more than 1 descendant -
            otherwise the sort will die out immeadiately.
    -Number at beginning: This is only important when restarting
            the system. It determines the number of indis that are
            set into the ecosystem befor the first cycle.
    -Maximum of hunger cycles: If the episit gets no food for this
            time it will starve. This is the most important flag for
            the ecosystem.  It shouldn't be too high or the episit will
            wipe out the prey easily - but also not to low, or in
            times of low prey population it won't be able to survive.
    -Posibillity of refuge: Dependant on the strenght-relation of the
            two sorts and the geographical condition of the terrain,
            the episit won't be able to catch the prey at every encounter.
            The flag defines how often(procentual) the prey can escape.
    -Repro-Time: This flag determines how many cycles the reproduction
            of an animal takes. This means: An animal will bear an offspirng
            after the cycles defined by FIRST_REPRODUCTION.
            Then it will frequently have descendants after the time defined
            by repro-time. (e.g.: a female human has a first-reproduction-time
            of around 15 years. Her repro-time is 9 months).

    After changing the parameter you have different options how to
    continue :
    -Go on:   The old system continues with the new attributes.
    -Restart: A new system will be installed by seeting the defined
            number of indies(Number at beginning) into the field.
    -Save:    The parameters will be saved to a file. So you can
            store well running combinations.
    -Load:    A parameter-file will be loaded.
```

1.10 EPI-SIM Documentation: The decrease window

```
The decrease window:
   With the decrease option you can lower the number of indis
   in the field. So you can investigate the consequences
   of the use of insecticides on the ecosystem.
   See the third law of voltaro for more infos.

   To change the number simply choose the percentage of indis
   that you want to annihilate.(100 will kill the whole population of
   the sort). Then press the DECREASE button. With QUIT nothing will
   be changed.
```

1.11 EPI-SIM Documentation: Bibliography

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Send me a note if you know something.
```

1.12 EPI-SIM Documentation: Future and end

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End and Author:
    If  you are interesterd in changing the program I will
    send you the AmigaE-source-code with some remarks.
    Please write me a mail.
    If you have praise, critics, bug-reports or any other suggestions
    you can also write to:
        Timm Baumeister
        Ihmerter Str.77
        D-58762 Altena
        Germany
        Tel.(Voice): IAC + (0)2352/77149
        EMail: timm@thunder.art-line.de
    That's all.
    Don't send me money for this (I suppose you haven't thought of it ;-))

    Stay alive! ***
```

1.13 EPI-SIM Documentation: History

```
 V 1.2 (September 1995): First released version
                        -full of bugs concerning font sensitivity
 V 1.5 (March 1996):    -Epi-Sim now opens its own screen (I have given
                         up writing a font sensitive program)
                        -some correction in the graphics
                        -Repro-time added
                        -bigger field
                        -rewriting of critical parts and usement
                         of registers make the program faster
                         (especially in NOANIM mode)
                        -hope I have not build in new bugs
```