

Political Power, Economy and Society

Some basic Cybernetic Concepts found in Strategic Computer Simulations

by Michael Endl

Cybernetic Concepts

Although the world of politics seems far removed from mathematics, Norbert Wiener based his conceptual frameworks for describing society on some mathematical ideas.

It was in the 1940's when Norbert Wiener described his ideas and his views on political power and its uses in society. His ideas can not only be found in psychiatry, linguistics, social anthropology, political science, and industrial management, but also in popular strategic computer simulations like SimCity, WarCraft and many others.

Wiener's synthesis was based on his primary focus on the "communications" aspect of all social phenomena and on the aspect of "control". He believed this to be a particularly appropriate focus for social science, because it appeared to him that communication and control were likely to be central concerns of society.

Each of these concepts could be further qualified by descriptive adjectives, such as "two-way" communication or "top-down" communication. From physiology he took the concept of homeostasis (self-regulation), which refers to the biological mechanisms giving stability and viability to an organism, and applied it to social and political systems. He also introduced the word "feedback" from control engineering, a concept more general than homeostasis, and again provided it with qualifying adjectives. From conventional descriptions of human behaviour he selected a few concepts, namely, learning, memory, flexibility, and purpose, and applied them more generally to "systems".

Wiener's ideas were implicitly "organismic", in that elements which are interacting through mechanisms of communication and control would lead to emerge patterns of organisation. Since he tended to include, besides people, other organisms and the environment, man-made or not, his outlook can be characterised as ecological.

In computer games the player is part of the overall system of control and communication and cannot in principle be isolated from it. The paradigm for a decision maker in a strategic computer simulations is a mixture of the von Neumann "game player" and the "steersman" who relies not only on skill and experience to achieve his goal but especially on constant feedback.

The cybernetic mode of analysing elements of these artificial societies traces the patterns of communication and control, the selfregulating and destabilising elements, the sources of learning and flexibility, the freedom to realise possibilities and purposes. So the player would be able to choose among different opportunities.

The player of such games represents in most cases the political leader of a community and should receive correct information about environment, enemies, partners or other dangers. His task is to keep the simulation running properly by using the right equipment, pattern of social organisation, and resources and maintain the well-being of its "inhabitants". Thus, good visibility, accurate information, knowledge, resourcefulness, experience, co-operation, and responsiveness among the items. All come into play in heading off danger.

While Wiener found the large-scale communist or capitalist societies to be antihomeostatic, he considered small communities in which people have direct contact with each other. Individual self-respect and integrity are consonant with the viability of such a community. But it would be very boring if these communities do never change or there wouldn't be any progress, so even they are quite vulnerable to power hunger and acquisitiveness, and other pressures coming from outside and within.

Scenario

In all the games the designated goal is quite similar: *Hostile settlements are hidden somewhere on the map, as your own simulated nation they will expand during the game.*

In the beginning the country is quite small not more than a village, and everything outside the area secured by the player is indicated only as a black nothing. First of all the player must bring the economy into a swing, to be able to manufacture sufficient weapons. In most cases a mission counts as successfully completed, if all settlements found on the map are governed by the player.

Building an Infrastructure

The key to success lies only partially in the use of the army. Much more important is the construction of a smoothly functioning national economy. For a productive industry there is namely more required than some weapon-factories.

First of all the supply of building material must be secured. Lumberjacks decimate the surrounding forest, while forest rangers reafforest the woods and sawmills care for the processing. In the quarry bricks are made from rocks, and mines deliver gold, coal or iron.

Because all of your inhabitants want to eat farmers plant grains, which become flour in mills and then will be processed in bakeries. Alternatively pigbreeders can be supplied with the grain, which provide again the butcher.

Scouts look for raw materials, and a well improved road-system is vital to supply the organisations with the required materials. Foundries, blacksmiths and waterworks are likewise necessary. In some simulations it is possible for the player to interfere in the production processes and do some fine-tuning for urgent demanded objects.

If there is overproduction the goods should be stored in warehouses. Overproduction also gives the ability for trade. Trade is an other possibility to get in contact with your neighbours. It marks a good simulation that each group produces special goods the others do demand but cannot produce.

There should always be enough construction workers available, which will erect all the buildings needed. Special symbols indicate the area for a new building. Additionally they show how much its construction will „cost“.

Workers not only want to be supplied with food, they also want to be paid for their job, so be sure there is always enough gold in the treasury. Otherwise they will be on strike, and can make the simulation stuck.

Sooner or later you push against the boundaries of your area. In some simulations they are determined by watchtowers. To expand the territory, just build additional towers, in so far as there has not settled already the competitor. Temporarily pioneers can annex even further remote pieces of land.

Expansion

In many cases there are islands to be settled, and it is advisable, to set up several settlements. For the transport of soldiers and material ferries respectively trading vessels are used, which are built in shipyards. Sometimes it is necessary to form alliances for economical or military purpose, some games do actually support this. Therefore a good road construction and maintenance is quite in need.

Since some raw materials are very rare in the one or other mission, the player should consider carefully, in which sequence the production buildings will be erected. Otherwise the economic system could run quickly in the void.

Also the conquest of new resources is not always possible. Often a conflict erupts very early about close to the border deposits, and so it will be a good tactic to explore the environment through scouts.

After a while it will be necessary to improve your military, trade and production capabilities, science will help. In some simulations it will be represented by a temple or a „magic tower“ where scientific discoveries will be done. These discoveries will make it possible to upgrade a trading post into a commercial centre, a workshop into a factory or a guard tower into a castle where simple soldiers will be trained into captains.

Even the „magic tower“ can be upgraded into an academy, where diplomats will be trained for better a relationship with the neighbours.

Conflicts

If you cannot expand the area any more, because your competitors have expanded already everywhere, it will be over with the peaceful coexistence. If diplomacy (a game developed by myself actually supports it) fails only the strategy of **preventative fast-forward-defence** will help to prevent the planned attacks by the adversary.

If there is a good supported and well trained army in your idyllic feudalistic military dictatorship, all the swordsmen, lancers or archers can be sent per Mouse-Click to the anticipated operational area.

With each conquered tower or castle the boundary shifts in the hostile area.

To win the game sometimes it is necessary to destroy all of the competitors armies, peoples or buildings, but in some of the newer games only the armies must be beaten and the cities occupied to subject the peoples ...

Simulation Components

Social systems can be divided into four groups.

- Warriors, they represent the military and police.
- Merchants represent transport and the exchange of goods, they also send out scouts to explore the environment and to get in contact with the neighbours.
- Producers deliver all goods needed to keep the infrastructure running.
- Priests or Magic's represent science and diplomacy.

Most of the institutions mentioned above can be modelled by buildings, only a few by figures or crafts like ships.

Models

The buildings to model a simple social system are : farm, workshop, town hall, trading post, magic tower, warehouse, ship yard and guard tower.

The needed „natural“ resources are : forests, mines (gold, coal or iron ...) and quarries.

All these buildings and resources are linked by a road system. This system by itself models overland transportation.

The transport of goods on rivers and the sea is done by ships.

- Scoutships are fast and highly manoeuvrable but less armed and have a minor firepower. They are like the caravels the Spanish and Portuguese used to discover the new world.
- Trading vessels have an enormous freight capacity, they are unarmed.
- Battleships, as their name says, are superior armed. They are made for sea combat and to protect the trading fleet.

Each of the four groups (warriors, merchants, producers and magic's) are represented by figures.

- Workers cut trees, dig for gold, coal or iron and do all the construction work. They can be trained (Worker → Foreman → Architect) because for more sophisticated projects you need highly skilled workers.
- Soldiers protect the borders. Soldier → Sergeant → Captain is their training scheme.

- Scouts explore the environment and try to get in contact with potential trading partners. Scout → Merchant → Master Merchant is their training scheme.
- Shamen represent the priestclass, they are healers and diplomats. The next training step is the wizard, he is good in natural science and an excellent diplomat. Wizards can be trained till they are Sorcerers. The Sorcerer is a kind of joker in the game, because he's superior to all other figures. Only a Sorcerer is equal to another sorcerer!

Upgrading

Not only figures can be trained, also buildings can be upgraded to perform in an adequate way. Workshops will be upgraded into factories, guard towers into castles, magic towers into academies and trading posts into commercial centres.

Scenario Editor

There are editors for some of the simulations where the player can develop new game-levels or scenarios. Some of these properties I would like to introduce.

Creating Computer Opponents

In most cases there is a single player challenging the computer. Therefore the so called *Player Properties* do mark any player as a computer opponent, and select its artificial intelligence (A.I.) type.

- The passive A.I. does not build any buildings or units. It is ideal for lets say an "assault the castle" type of level.
- There can be also active A.I.'s: e.g. land attack, sea attack, or air attack ... These A.I.'s are all capable of building their own towns, training units, and launching attacks on the human player. In my opinion they are the most interesting A.I.'s for most of the players.

Since the active A.I.'s build their own towns, it is not necessary to start them out with a large material advantage. They will build up as quickly as a good human player can, and most of them provide an intense challenge.

If you do start the computer with pre-placed units, make sure that you also place enough farms to support those units. Otherwise, the computer will be slowed down while it produces enough farms to feed all of its people.

In order to ensure that the computer builds properly, you should make sure that it has access to as many resources (e.g. gold, lumber, or energy) as it will need. This is especially true when using A.I.'s, which build very expensive units like battleships. If you don't provide the computer with access to enough resources, it will eventually run out of supplies and be unable to train new units.

Map Layout

The computer A.I. must adapt itself to each new map that you build, developing attack routes, staging points, and so on. Because of this, it is important that you design your terrain with the computer in mind.

In addition of giving the computer a clear path to the human player, you should make sure to give it a clear path from its town hall to the resources it will harvest. If you place buildings for computer players, make them relatively spread out. Avoid grouping buildings in tight clusters. And make sure to leave plenty of empty space around the computers starting location for it to place new buildings.

Simulation Properties

- *Map Properties* give you the ability to change the terrain type of the map (e.g. deserts, forests or islands in the sea) and the map description.
- *Player Properties* as mentioned before change the race, controller or A.I. for all players (human or computer).

If the player should be controlled by the computer, some options allow you to specify an A.I. for each player. These A.I's could be passive, Land Attack, Sea Attack or Air Attack also mentioned before.

- *Starting Conditions* edit the amount of resources each player will have at the beginning of the simulation.
- *Unit Properties*

The following options may allow you to specify values of different properties for all unit types.

Visible Range	distance that a unit can see.
Hit Points	the total amount of damage a unit or building can sustain before it is destroyed.
Build Time	the time it takes to build or train each unit.
Gold Cost	the cost in gold to build or train each unit.
Lumber Cost	the cost in lumber to build or train each unit.
Attack Range	the maximum distance at which each unit can attack another.
Armour	the amount of damage a unit can absorb before damage is deducted from its Hit Points.

- *Upgrade Properties* do edit the cost of all the upgrades.

Step Cost	the amount of game time that the upgrade takes.
Gold Cost	the amount of gold that the upgrade costs.
Lumber Cost	the amount of lumber that the upgrade costs.

Feedback - The User-interface

There is a *feedback-loop* between the player and the game. Via monitor the player receives all necessary information to play the game. This *human-to-machine-* or *user-*interface makes the communication with the computer-game possible.

A graphical user interface offers the player a selection of simple commands by showing symbolic elements (Icons) and menus on the screen. Generally the selection can be done either with the keyboard or a mouse.

Basically for the player a graphical user interface offers a more direct communication with the computer. It allows the player to concentrate on the real tasks without lingering with the details of screen display, the mouse or the keyboard.

What makes a good user interface?

A good interface makes it easy for the player to tell the computer what it should do, for the computer to request information from the player, and for the computer to present understandable information. Clear communication between the player and the computer is the working premise of good user interface.

Good interfaces are:

- *Clear* - to prevent user errors, they make important information obvious and easy to handle.
- *Consistent* - a consistent interface allows the player to apply previously learned knowledge to new tasks.
- *Simple* - the best interface designs are simple. Simple designs are easy to learn and to use and give the interface a consistent look.
- *User-Controlled* - the player, not the computer, initiates and controls all actions.
- *Direct* - players must see the visible *cause-and-effect relationship* between the actions they take and the objects on the screen. This allows players to feel that they are in charge of the computer's activities.
- *Forgiving* - users do make mistakes and a player's action should be reversible.
- *Provide feedback* - to keep the player informed and provide immediate feedback. Also, ensure that feedback is appropriate to the task.
- *Aesthetic* - every visual element that appears on the screen potentially competes for the player's attention. The environment should be pleasant to work in and contributes to the understanding of the information presented.

Purpose and possibilities of these game

Despite the entertaining-factor these games shown, that it is possible to model very complex social behaviour with just a few rules. These rules are of course asserted, however they are not complete. So there is enough room for the individual player to adapt himself to the given situation.

The goal of these games is to take possession of as many resources as possible. This should be reached with the help of *communication*, *co-operation* and *confrontation*. Further the game should not begin with less than three opponents, hence it can degenerate to pure slaughter and it will end with one of the parties extinguished, or they form an alliance immediately after a *First-Contact*, and both parties spend the remaining time to search for the not yet found resources.

- **Communication** : It is possible for the playing parties, yes it is even necessary; to communicate with each other. But this is only possible after a First-Contact has occurred. It is impossible to communicate with someone nothing known about his existence.
- **Co-operation** : Further exists the possibility to form alliances, thereby the resources pass over to both parties. Alliances are appropriated communities which can be dissolved if there is no advantage further more. If a party of an alliance is extinguished in combat all resources pass over to the remaining ally.
- **Confrontation** : As mentioned before, war is also a possibility to take possession of the resources of other playing parties.

Literature

"*The Human Use of Human Beings : Cybernetics and Society*"; Norbert Wiener; Paperback (March 1988) Da Capo Press;

"*Cybernetics or Control and Communication in the Animal and the Machine*"; Norbert Wiener; Paperback 2nd edition (June 1965) MIT Press;

"*Simcity 2000 : Power, Politics, and Planning (Secrets of the Games)*"; Nick Dargahi, Michael Bremer; Paperback - 476 pages Revised edition (April 1995) Prima Publishing;

"*GUI Design for Dummies with 3.5 Disk*"; Laura Arlov; Paperback - 392 pages (September 19, 1997) IDG Books;