COMMUNITY LAND USE GAME
An Evaluation

by Joseph L. Davis

INTRODUCTION

Confessions of a *CLUG*er

A great disappointment of my personal and professional life is that I have had the opportunity to play *CLUG* only once. The *Community Land Use Game,* created by Allan G. Feldt, was a mainstay of The Center for Simulation Studies as far back as 1971 when I first became involved with it. It was also the first simulation I ever played. The interest I developed in simulations after playing *CLUG* led me to intern with the Center, where one of my first tasks was to learn to run it. In the last seven years I have run *CLUG* in one form or other, estimating conservatively, three hundred times. Unfortunately, I have never had an opportunity to play it again. But in those roughly two thousand hours of "*CLUG*-ing" I have developed some definite opinions and insights on this very elegant simulation.

My background is in political science. And while I have run the model for political science classes more often than any other groups, my work with the Center has allowed me to present *CLUG* to a vast array of groups ranging from junior high school age through senior citizens and, in subject matter interest, from graduate classes in social work to county planning authorities to I.B.M. middle management executives.

Purpose

It is my purpose to: (1) present my insights into *CLUG*; (2) explain its adaptability as well as its limitations; (3) help the reader to determine the suitability of this model for particular simulation or teaching needs; (4) give some suggestions for running the game (as well as a few tricks of the trade); and (5) try to give a bit of the "flavor" of *CLUG.*

What is *CLUG*?

CLUG stands for the *Community Land Use Game* (originally the *Cornell Land Use Game*). It is a noncomputer based, nonzero-sum simulation designed by Allan G. Feldt of the Cornell Graduate School of Economics as a model for showing the economic development of American cities. A complete kit is available for $75.00 from the Institute of Higher Education Research and Services (Box 6293, University, Alabama 35486). Player's manuals are $6.95 each from The Free Pres (Department F, Riverside, New Jersey 08075).

The simulation is played by ten to thirty participants de vided evenly into five teams. Each team has a certain amoun of resources in the form of money or credit and has the option of spending the money in a variety of ways. *CLUG* is playe on a board that is a 14" x 14" grid representing a particular area of land. Teams have the opportunity to invest in variou types of land use that, when placed at specific locations on the map in the form of building blocks, Legos, or anothe medium of construction, form a physical development the eventually grows into a community. The types of land use available for investment include several varieties of industrial commercial, and residential buildings. These buildings have certain fixed construction prices and income values that de pend on how well they are used.

CLUG is played for an extended period, usually six to sevet hours, in a series of rounds, each round representing from one to five years. Hence, the more rounds that are played the more years are played through, and the more the community can develop. In each round participants go through a set, specifiec and ordered series of steps that break down the types of decisions the community needs to make into a logical sequence and also simplify the rather complex economic proceedings of the game.

CLUG Steps of Play

The rules for *CLUG* are available in the player's manual There are no hidden rules or secret dealings between the game operator and any players. Everything is available and know able. The only limit on information for participants is time and the complexity of the simulation. For this reason, the game is played in a series of rounds. The first round is playec very slowly so people can catch on, but because the same steps and processes are played in every round, players can pick up the process quickly. By the third or fourth round, the game proceeds quite rapidly.

The steps of play for one round of the basic *CLUG* model follow:

Editor's Note: *CLUG* is listed in the urban section.

(1) Land is bought and sold between team members or from the "bank," which holds all unowned land. The *CLUG* board is numbered at the top and side so any square of land on the grid can be located by coordinating the two axes. Land bids can be recorded and marked on the board so that the same piece is not bid on twice. Competitive sealed bids are submitted, with the highest bidder getting the piece of land.

(2) After land bids there is a sort of community meeting that involves all participants. Two important decisions to make are locating utility lines and setting the tax rate. Utility lines, which are necessary before any building can be put on any land a team owns, start from a point on the board marked as the power plant, run down the boundary lines of grid squares (which also denote the road system), and, of course, all must connect.

The cost of utilities is assessed from all teams out of the property taxes. Teams are taxed on the price of land they buy plus the value of any buildings they construct (depreciated by five percent each round). After all teams have voted on utilities (which must be passed by three teams out of the five), the community sets a tax rate The tax rate pays for utility construction and maintenance and for such community services as fire and police protection figured on a cost-per-resident charge.

(3) After the council meeting there is a construction phase in which teams have an opportunity to build whatever they wish from the types of land uses available at the costs indicated in the player's manual. Teams can construct as much as they wish if they own the land, have utilities for it, and the money for construction.

The game is designed, and the economics of the model are so balanced, that it is almost impossible for one team to build all it needs to be self-sufficient. Consequently, teams need to interact to buy labor or store goods or to find jobs for their residents.

(4) In the next step of play we designate the places of employment for all residents and all jobs to see who is working, who is unemployed, and what businesses are not open in the community. The manual tells how many employees each type of business needs.

(5) All commercial enterprises that have been built in this round and now have workers (that is, are open) may set their prices and try to pick up customers among the residences built on the board.

(6) After these agreements have been made, the game operator pays all the industries for their industrial income.

(7) Then all the stores collect their charges from the customers, and all labor collects income from their employers.

(8) All this time, a second game operator, called the community accountant or community tax assessor, has been keeping a duplicate record of all the transactions on the playing board—the buildings constructed and the land sold—and has been figuring the tax rate on the assessed evaluations of the individual teams and of the whole community. This information is reported, usually on a blackboard, and the game operator collects taxes from each team.

(9) The game operator then collects transportation charges incurred by the various teams in that round. Because the game is played on a map, and movement across it is movement of physical distance, players incur transporation charges as they go to work, to the stores, and to the marketplace.

(10) The collection of taxes and transportation costs marks the end of the round, and we immediately begin with buying and selling land in the next round.

Renovation

This event occurs only in rounds divisible by five. Since we are playing through time, and buildings are being depreciated at five percent per round to make them cheaper to operate, renovation gives teams the opportunity to fix up their existing structures. The incentive to spend money in renovation is based on a probability table stating that the older a building gets without renovation, the greater the chance it will be destroyed by natural or man-made disaster. Every fifth round all teams must roll the dice on all of their buildings, and if they roll a losing number they lose the building.

Debriefing

The game proceeds through numerous rounds. I try to get people through two renovations, which means ten rounds, so they have a lot of development to look back on. The game ends not at any set point but unexpectedly, because the "real world" does not really end.

The last section of the simulation, the debriefing, is the period in which we sit back, look at what has been happening throughout the simulation, reflect on it, and try to learn from this experience.

An Elegant Simulation

It is clear from its title that *CLUG* deals with land use in a community setting. But one of its primary advantages is that the issues and knowledge that emerge from it go far beyond determining the use of land for economic ends. In discussing *CLUG*'s usefulness I find myself in a situation like that of a Shakespearian scholar. After extensive use of this model, in which I have found many gems of insight, I am not certain whether all of them were actually designed into it (no offense to Dr. Feldt) or whether the basic design was so good and so flexible that the model can address the additional knowledge I wish to bring out of it even though they may not have been part of the original intent.

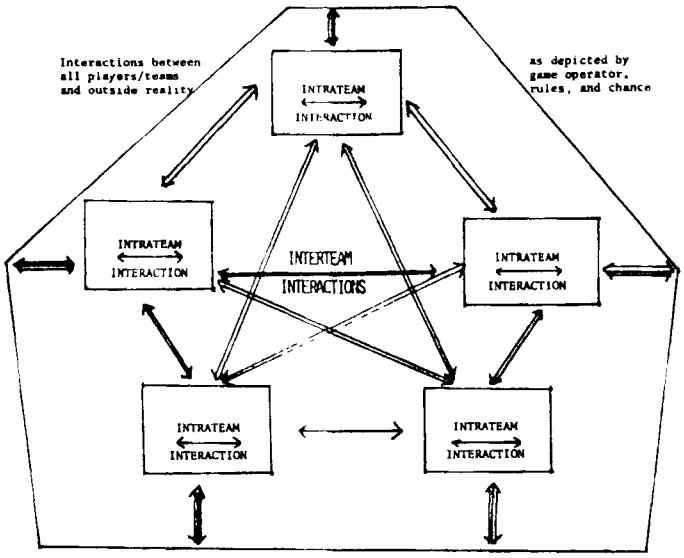
CLUG—THE PROCESS

CLUG is a person-to-person simulation. Its interaction take place on three levels—among members of each team, between the teams, and between the teams and the outside world as portrayed by the game operator, the rules, and the elements of chance.

Interaction Within Teams

CLUG provides no structure or instructions for the types of behavior that occur within each team. However, this level of interaction should not be ignored. How a team organizes its

FIGURE 1 *CLUG* Interaction Diagram



resources and its activities can be a very important part of learning.

I have played *CLUG* with many groups that were looking primarily not at urban processes but at problems of interpersonal communication and cooperation. *CLUG* is an excellent model for exploring these dimensions within a real world situation. Its complexity and economic realism allow one to look at interpersonal problems not in a vacuum, where cooperation is easy because there is not much cost, but in a life-like context in which cooperation and communication take place over some *thing* and have consequences that exist beyond the interaction of the moment.

CLUG confronts players with a complex situation and strict time pressure. They must sort out for themselves how they will accomplish tasks, in what order, and which will take priority, while others may not get done at all. It is always good to spend part of the debriefing discussing how teams came to decision-making and how that decision-making affected their play.

There doesn't seem to be one best style of intrateam interaction; some teams are democratic, some are autocratic. What seems to work is whatever the particular participants on that team are comfortable with. However, whatever the style of interaction, I believe one rule is hard and fast. Not only learning but also the enjoyment in playing *CLUG* are a function of participant involvement.

Interaction Between Teams

A large part of the interaction, and that which is most clearly spelled out in the *CLUG* rules, is the activity among teams. *CLUG* is a nonzero-sum simulation, and the activities among teams resemble the very common prisoner's dilemma model, though the reward and payoff of the prisoner's dilemma are modified by "legitimate" reasons for not cooperating. The competition that arises among teams in the games can be self-defeating (as is clear whenever an imbalance of labor and jobs or an excess of one particular type of land use, such as stores, arises). It is, however, this very competition that sparks a great deal of the interest and activity in the game. Thus we are faced with a real world dilemma where conflicting values come into play so that the most perfect theoretical play of the game is not necessarily the most successful, desirable, or event the most possible.

CLUG follows the prisoner's dilemma model in that the "winnings" of one particular team are partially out of their control and are controlled by other teams over which the first has little influence. The interdependence of the five teams necessitates some level of cooperation. However, I have found that the best cities and the best plays result neither from absolute cooperation—which would mean the abolition of teams and uniting everybody and all the money into one glorious group (which also usually limits the number of active participants)—nor in complete cut-throat competition in all areas. It is necessary to find a balance between competition and cooperation that continues the interests of all teams and participants by allowing them to pursue their own goals and rewards but does not become self-destructive for the teams by playing strictly to defeat other teams.

The opportunities for cooperation are many. In the economic dimension alone, all types of land use have some dependence on other types. For instance, industry and commercial enterprises need labor, which requires residences. If a team cannot build its own, it needs to hire workers from some other team. Commercial enterprises need customers; two that require customers and labor residences are the local store and the central store. These stores (plus industries) also need to buy office space. Thus anyone building a local store, a central store, or an office needs to have cooperation in the form of customers from the other people on the board or profit cannot be made. All of this very basic cooperation forms the community.

There are also many subtle opportunities to compete—both healthy and counterproductive. What I would call healthy competition is the attempt by each team to maximize its resources and to use the success of other teams to measure its own success. But there are also opportunities for many self defeating types of competition. These make fine discussion topics in the debriefing because they almost always occur They include such tactics as pulling workers out of another business without enough warning so they must either close down for a round or shift workers from another place, thus causing a ripple effect through all the teams. Another is competition for utility lines that ends in producing too many lines simply because you won't let anybody else have any unless you get some, too; then everybody has to pay. Likewise, the construction of too many residences or local stores for instance, causes undue competition between teams.

These are destructive forms of competition because in the end everyone loses. It may seem that pulling labor out of somebody else's business to work on your own is good—it not only gives you the workers you need but keeps someone else from making a profit in that round. This is a false notion of

winning: the economic hardship it places on the other team will eventually get back to you.

All the activity in the game, no matter whose team it is in, no matter what table it is on, affects everybody else because there is just so much money in the system. If you do something to keep someone else from maximizing profit, the total value of the community cannot grow by whatever percentage is stifled. All players in the game see themselves as members of a community, in which what is good for someone as a team member may not be good for him or her as a member of the community.

Interaction Between Teams and Rules

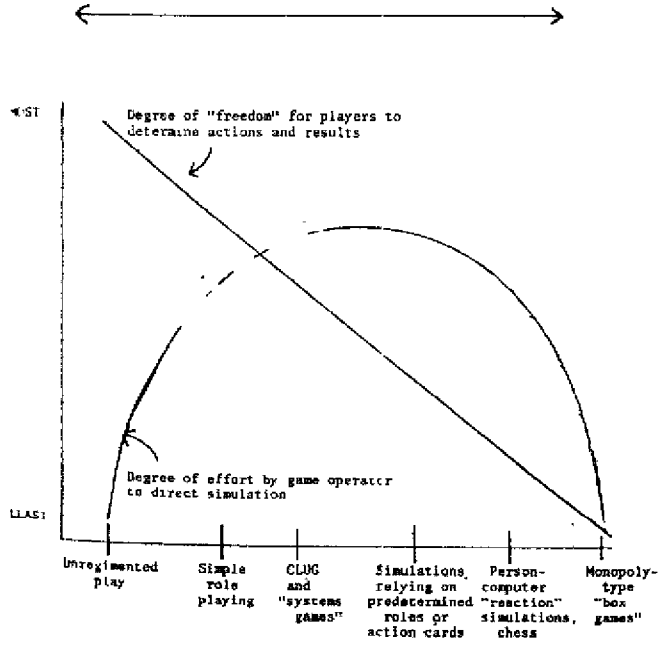
The third level of interaction in *CLUG*, the relation between all the players and the outside reality as depicted by the game operator and the rules, is one of the reasons *CLUG* is such a good simulation.

In a continuum of simulations (see Figure 2), at one extreme would be models completely determined and where all activity is fixed before the game is played. Here we would have games such as parlor games or children's games where you roll dice, move so many spaces, pick up a card, and do what it tells you. At the other extreme of that continuum are simulations; players determine all activity and no rules limit what occurs—a form of unregimented play. Most simulations on the market fall between these two extremes.

CLUG clearly belongs toward the left of this scale, because much of the activity in the game is determined by participant decisions rather than by specific game rules directing behavior.

There seems to be a trade-off between the amount of freedom the model allows participants to create their situation and the manageability of the model by the game operator. Obviously, the more determined the model, the easier it is to comprehend and control the situation. Thus, a parlor game can

FIGURE 2 Continuum of Simulations and Game Types



provide a simple page of instructions and any participant or group can pick it up and run it successfully the first time. A more open-ended game, on the other hand, requires more judgment and monitoring from the game operator to fit participants' activities into the constraints of the model. An open-ended simulation such as *CLUG* is not free-form play and does have specific subject matter, so the role of the game operator becomes one of translator and judge to fit whatever participants want to happen into the *CLUG* language.

I prefer simulations that give participants a large measure of freedom to design their own situation. One of the greatest lessons that can come out of such a simulation is an understanding that participants do create their situation and then have to live with the consequences. This learning is possible in *CLUG* because we are compressing time and can look at cause and effect relation among activities. In a situation in which all participant activity is determined and the results of that activity are preprogrammed, participants may have strong feelings of being manipulated. *CLUG* has a very low level of manipulation because so much of the activity in it is created by the participants themselves The constraints, the limitations on what players can do, are determined by their previous decisions and previous rounds rather than by the dictates of the instruction manual or the game operator.

Rules of Play—The *CLUG* Language

The rules of *CLUG* sketch an economic reality by translating realistic cost, profit, and investment rates into a model. No attempt is made to create costs that are unrealistic in relation to the "outside world." So in one sense the limitations the rules place on the model are nothing more than the boundaries of the universe and the laws of supply and demand that become the foundation on which the activity of *CLUG* takes place. Except for learning the language of *CLUG* finances, the rules are really few and quite flexible.

If one can accept the economic base of *CLUG* as realistic, which is not difficult because the game is well researched and well tested, then the participants are free to test and probe the limits of this universe. Any other limitations on participants are of their own creation through decisions in previous rounds

For instance, suppose a team has spent all of its money on unprofitable land uses and finally learns in the fourth round how to make some money. However, it has only $12,000 left to invest in, say, an industry that costs $48,000. It would be unrealistic to allow the team to build that industry for the $12,000 it has left. This would violate the translation of relative costs in the *CLUG* language. It was the fault not of the game but the team that ran out of money.

This low level of manipulation in *CLUG* frees the game operator from one of the biggest problems that she or he faces in any simulation—the sense of manipulating the group. It also gives the participants a greater feeling of owning their simulation activity, which always helps drive home the lessons. The results of *CLUG*, whatever they may be, are mostly the responsibility of the players, and not that of the designer of the model or the game operator.

There are people who do question the rules of *CLUG* to begin with—that it proposes a capitalistic system, a certain level of supply and demand, and a growth economy. This is the "universe" the designer decided to simulate. In my experience any attempts to alter this base cannot be easily accommodated in the model. Once one questions the supply of money or the existence of different groups that have to make decisions within a common framework, one has gone beyond the range of what *CLUG* can do. In my experience those groups that have tried to change this base have done so at the expense of player participation and jeopardized the logic of the model.

Modifications of the Interpersonal Process

As I will show later in discussing possible variations on *CLUG*, the content can be changed or added to quite radically, without any problems. The nature of the group processes, the interaction among the various levels, is less open to modification.

The first level of interaction (within teams) is a valuable aspect of the simulation, and, while it is completely unstructured, should take place. I would discourage an attempt to play *CLUG* with one player per team. I would also discourage playing with teams so large that interaction within them cannot occur effectively. I consider six players per team to be the maximum for effective interaction within the team; three to four is best.

Likewise, I believe that the second level (interteam interaction) cannot be dissolved without serious effects on the nature of the game. While I have run models in which groups have voted to dissolve teams and create, as it were, one classless society within which to build their city, this is usually done at the expense of participation by many players. Essentially, what happens is that the same sort of intergroup behavior takes place but it now occurs informally.

The role of the outside world and the third level of interaction is probably the most flexible part of *CLUG*, and many of the variations that have been designed have increased the role of these outside forces to accentuate some particular aspect of learning in the model.

Though we will cover some rule modifications in discussing content variations, I believe that the nature of the rules need to be kept economical, logical, and realistic lest *CLUG* fall into the range of manipulative games and lose some of its effect.

Computer *CLUG* and Group Interaction

The earliest games of *CLUG* I ran used a computer. Participants would make their decisions, we would put these decisions into the computer, and the computer would give readouts of the economic level of investments, returns on investments, cash on hand, and so forth, for each team. This was an extremely accurate and esoteric version of *CLUG*, because groups were simply looking at columns of figures, and it actually slowed down the game. It also lowered the level of intergroup activity and made for a much more studied and cool game. This was good for some groups, but for others it did not touch the level of feeling that many people have about cost and money, because participants were simply dealing with columns of figures. When we took away the computer and used paper money, it was amazing to see the difference in the level of activity, the level of trust, and the level of involvement among participants.

If you are interested in exploring the process that groups go through in making their decisions on economic matters, and you wish to explore some of the assumptions (right and wrong), groups have about economic activity, the noncomputerized version of *CLUG* is preferred. The computer becomes helpful and, indeed, essential in some of the more complex modifications. But for the basic models, the figuring is so simple (and essential if participants are to understand the system) that using a computer can detract from understanding the economics of *CLUG* by placing it all in a "black box."

Process-Oriented Groups

I have played *CLUG* a number of times with groups that were really not interested in urban planning, urban problems, land use, or the economic aspects of city development. They were, rather, interested in types of human behavior that take place within a human system in which the limits of reality modify the ideal behavior that can occur among groups. Rather than discussing notions of trust or honesty in a vacuum, *CLUG* allows participants to address these and other conceptions within the framework of a real world.

I highly recommend the use of *CLUG* as a stimulus for process-oriented group discussion. While it is quite time consuming, the payoffs can be tremendous; only in a realistic systems model like *CLUG* can the complexity of human processes be simulated with anything close to accuracy. Because *CLUG* is a nonzero-sum simulation, no interaction at any level specifically follows a win or lose pattern.

Participants playing *CLUG* possess a wide range of goals, expectations, and values. While it may fit your particular use of the model to address those values before play, I much prefer to allow the teams, within themselves and with the other teams, to develop their own goals and their own notion of winning. A very important portion of the debriefing at the end of the simulation is the discussion of who won, what it meant to win, what each individual's and team's goals were at the beginning, how they were modified by the process.

CONTENT—THE VARIATIONS OF *CLUG*

I said at the beginning of this essay that I have played *CLUG* only once. I will now say that I have *never* run *CLUG*. In my use of this simulation, I find it advantageous to make the model as realistic as possible, and basic *CLUG* starts off with a clean board where everyone starts from zero. In looking at the urban development problems of America, we find few situations in which cities were built on land that was used for absolutely nothing else—such as the clean-slate, basic version which builds a city in a vacuum.

Clug-Alum

If you are working with a design group that is specifically interested in the economic interface with some other aspect of city development and you are trying to find the best path of development given some economic realities, the basic *CLUG* might be your cup of tea. We at the Center, however, have found that even for the introductory run of *CLUG* to participants who have never seen the model before, the *CLUG-ALUM* version (*Agricultural Land Use Modification*), which begins with some preurban economic interest, gives a much more economically realistic vision of where cities began in this country.

Other Variations

Like the *ALUM* version, most other variations on *CLUG*, have attempted to increase its verisimilitude to the real world. Many of these variations have been excellent. Allan Feldt's *CLUG* playing manual explains several that are fine examples of such adaptations.

One of the easiest can be used to emphasize certain aspects of urban development that are missing from the basic economic model. This is done by introducing a political sector, as the Center for Simulation Studies has done in its POLIS version. This includes public facilities as well as an external economy modification to show variation in industrial income due to the attachment of the community to the larger national economy. This version, along with *CLUG-ALUM*, is in Feldt's book.

Many other modifications can be made to the *CLUG* game by putting geographical limitations on the playing board. A great deal can be done to model the geography of a particular area simply by locating hills, rivers, bays, or other geographical features that place land-use limitations on the board.

Table 1 explains some of the modifications possible with *CLUG*. By modifications we generally mean additions to, rather than changes within, the economic model. Never try to use the more complex modifications in the initial game with a group. It is far better to have participants first play basic *CLUG* or one of the simpler modifications. After they have mastered that, they can address a specific subject with one of the more complex versions.

Most of these complex versions appear in Feldt's manual. Those I have listed in the table I know personally to have been well thought out and well worked out. All game operators are inventors by nature and should feel free to experiment with *CLUG*; but I would like to warn those who think it would be easy simply to change one or two variables to make something that more closely fits their needs. As I have already pointed out, the model has been extensively worked out to make a realistic economic balance. Any modifications that are attempted must be scaled to yield realistic effects. For instance, in the *ALUM* modification, which introduces farms, the cost of the farm house, the income from the farm, the amount of land to maintain the farm, and the cost of transportation of farm goods to the market, all had to be worked out in dollar values that would fit the *CLUG* model.

TABLE 1 Variations on CLUG used by The Center for Simulation Studies

Variation	Subjects Added to the Model Listed Above
Basic CLUG	• Economic interactions in the private sector of labor, industry and commerce • Economic interrelation of land use, location, community growth (economic, physical, and financial), and taxes
Topographical Modifications	• Geographical limiting factors and their influence on land use, physical growth, and urban economics
CLUG-ALUM (Agricultural Land Use Modification)	• Effect of farming (rural land use) on land valuation and urban use
External Economy Modification	• Effect of a variable national economy on the physical and fiscal life of a community • Introduction of "Headlines" as elements of chance that impose unpredictable events the community must deal with
POLIS	• Introduction of politically differentiated power among teams • Existence of public land uses (schools, etc.) • Election of a "mayor" from among the teams • Problem of pollution as a byproduct of industrialization • Suburban development
Richland	• Welfare and unemployment as a community expense • Population increases by a probabilistic table (out of team control) • Economic differentiation of teams (not all start with equal resources)
Inter-regional Relations	• Interactions among several such communities

Repeat Performances

CLUG has the advantage of being a simulation that can be played over and over without becoming stale and without being easily psyched-out by participants. *CLUG* has no secret rule or twist that make repetitions less meaningful than the original play. (The classic example here is that excellent simulation *Starpower* by my friend Garry Shirts, which can be played repeatedly; but it suffers in subsequent plays if only some of the participants have played before. All plays of this simulation except the first provide participants with an entirely different experience: In the first, the shift of power from the game operator to one group changes the whole nature of *Starpower*.) Even if some participants have played *CLUG* before and others have not, it is very difficult for those who have played before to skew the game to their advantage and to the disadvantage of the others. This is due both to the system's complexity and to its openness, where all rules are available to participants whether or not they have played the model before. Because of the nature of the interaction and the interdependence of all participants and teams, those who have never played before can even find themselves frustratingly dependent on people who have never played. They may find it

almost impossible to convince others that they, the experienced players, know what is best in a particular situation.

RUNNING *CLUG*

CLUG is not the easiest game to run, and the variations invariably increase the responsibility and the activity of the game operator to the point that some of the more complex versions require as much from the game operator as they do from all other participants. My suggestion for anyone who wishes to run *CLUG* successfully is to play it and play it until you understand it. There is great internal logic to the rules, so once you can comprehend it all as a system you should have no difficulty in presenting it to other people. This ability to comprehend the system and the interactions of the parts is useful not only in advancing the flow of the simulation but in recognizing significant lessons that can be fed back to the group in debriefing.

As with many simulations, *CLUG* tends to take on the flavor of how the game operator is running it. I would like to emphasize that an interventionist, didactic style is not necessary. The game is self-explanatory and very logical. All of the rules are available to all of the participants. There are no tricks. The most successful style I have encountered for running *CLUG* is to be a walking instruction manual.

The game operator's role in *CLUG* is that of bank, construction company, transportation company, tax collector, state government, and mother nature. But with all those tasks it is still possible to maintain a low profile. In fact, it is important to do so lest you seem to be manipulating the group even though you are only providing a vehicle to maintain the flow of activity.

Introducing *CLUG*

The number of rules and the lengthy introduction can be rather intimidating to participants who suffer from information overload before starting to play; some tend to turn off. The only participants I have ever had not enjoy *CLUG* were those who could not "buy into" the system and, as it were, suspend reality to take on the simulation. This is not difficult for most people to do because the "gaminess" of the model gets them through the process of assimilating the rules, but a game operator must be particularly sensitive to participants who do seem to be turning off. Those who cannot buy into the system truly miss an opportunity.

I suggest dealing with *CLUG*'s intimidating complexity in the following ways:

(1) Present all of the information available in the manual as an overview during the introduction.
(2) Reinforce the notion that all this information is readily available in the manual.
(3) Assure participants that the simulation will proceed step by step and there will be ample time for questions at each step in each round.
(4) Reassure participants that the game is repetitive; if they miss something in one round they will get it in a future round.
(5) Stress the logic of the system and emphasize that if all else fails participants should simply ask themselves what this means in the real world.

Most participants do buy in, and they are almost unanimously sold on at least the play of the game. The suspension of reality and the creation of a simulated reality in which things have importance are very powerful in *CLUG*. The end of each game is often punctuated with groans from those who want to play on. I measure the success of a simulation partially on its fun, and I measure fun on the ability of participants to really get into the activity and care about what is happening. To me, any simulation that can take a group of intelligent adults and cause them to wheel and deal, care and cry over a handful of paper money and a pile of wooden blocks for seven hours, has something going for it.

Time

Timekeeping is a very important and often very controversial task for the game operator. *CLUG* is a long simulation. Though many runs of the game have been broken up into smaller time periods, I have still found that the best lessons come from playing it continuously for a period of five to seven hours.

The more rounds you play, the more time you are playing through. The city grows up and older as you play. The more rounds you play, the more city you have, the more decisions you can look at, the more history you have lived through. Thus at the end of a long continuous play of *CLUG*, while all of the decisions that have been made are still fresh in everyone's mind, participants can look back over their history, chart decisions through the growth of the city, see how early decisions affected the simulation later on, and have physical proof of how their own decisions limited or provided opportunities for future activity.

The biggest problem for people who are running and playing *CLUG* is the time it takes. But given the complexity of the system that is being simulated and the completeness with which the problem is addressed, such a time commitment is the price you must pay. I have successfully chopped the game up into shorter periods, though something is always lost in the break in continuity. It is important, whether the game be played in two three-hour periods, in a succession of fifty-minute classes, or in whatever time available, that you play through the full number of hours (if not more to make up for time lost in restarting for each period). A good guide for basic *CLUG*, as well as for some of the more basic adaptations, is to try to get through ten rounds. This allows you to accomplish two renovations (which come up every five rounds) and establishes enough development so there are truly some patterns of decisions to discuss. By all means get through at least the first renovation (round five) and a round for "recovery."

Pace

In discussing the time frame of *CLUG*, one must talk not only of the length of time for running the whole simulation but also the pace maintained throughout. It is up to the game operator to maintain the pace, and that pace has a direct effect

on the simulation's outcome as well as the players' understanding of the simulation. By varying the speed at which *CLUG* is played, you can affect the actual product of the game simply by changing the mood in which participants feel they can attack this system and deal with problems.

At one extreme, if *CLUG* is run slowly and reflectively, participants can experiment with it, try some types of urban planning, and play out alternatives they have discussed and would like to try with this simulated system. At the other extreme is what I call the free market *CLUG*. The game operator constantly presses participants to make quick decisions. Thus, the additional pressure of time forces participants to make immediate decisions with limited information. While it is possible to rush participants too much, some time pressure is necessary to explore how decisions were made as cities began in this country. The simplicity of the decisions on the *CLUG* board in relation to the real-world demand that a much shorter time span be allowed for those decisions than in real world.

If you wish to simulate the passage of time and create a dynamic system, you must remember that time never stops, and if you are playing *CLUG* in a "realistic" time frame there cannot be any time-outs for planning or organization. Those activities are good, but they should be carried within the realistic time frame you are simulating in the game. In other words, if some of your team has gone to do some physical planning for the game board and they come back two rounds later and find that people have built things that had not been planned for in the new master plan—well, that is realistic.

Leadership Style

Aside from this, all that the game operator can do to facilitate the smooth running of *CLUG* is to know the model extremely well. This includes not only running it a number of times but also playing or at least studying and playing it by yourself.

I will not attempt to minimize the difficulty in trying to introduce and run *CLUG*. The process is so complex and the possibilities of interactions are so many that it is difficult to keep everyone's attention while you try to introduce any particular part of it. This is not meant to scare anyone out of running the simulation but only to advise you to stay cool if you find yourself explaining the same thing twenty-five times. A number of the participants are learning a whole new language, and what you say may seem to be slightly different in a different context even though you are essentially explaining the same thing. I usually reach a point at which I get out of the expert business and simply refer participants to the proper page or table in their instruction manual. Then they may take some active role in seeking information. Then I verify it with them to make sure they got the right information.

This may sound negative, but I cannot repeat too often that the rewards in using *CLUG* are so great that they far outweigh the difficulty you might find in introducing it, or the difficulty participants might find in first getting into it. They will (trust me) really get into it and eventually figure most of it out.

CLUG—A GAME?

CLUG and Monopoly

I have gone through several stages in my maturity with *CLUG*. One of the hardest things to get over was getting upset when somebody would, before or after playing *CLUG*, shrug it off and say, "It's just a big game of *Monopoly*." I went through a long period of defending *CLUG* against such slander. *Monopoly* is not a bad game, but it is different from *CLUG*.

First, if we go back to our spectrum of games from the closed to the open model, *Monopoly* would definitely fall near the closed end; most of its activity is conducted through chance (the roll of the dice or picking cards). The only free and open activity that can take place is bargaining to trade land and to build monopolies. *CLUG*, on the other hand, is a much more open game, and the economic activities simply become the setting within which all sorts of free interaction take place among participants.

Goals

The basic difference between *Monopoly* and *CLUG* is the more mathematical distinction that *Monopoly* is a zero-sum game in which participants play over the rules to beat each other. *CLUG* is a nonzero-sum game in which participants play over each other to beat the rules. In a zero-sum game the object is to win and defeat other participants. In a nonzero-sum game the object is to beat the "system," the limits of the game.

The clear test for this is to ask, "What is the goal of *Monopoly*?" The answer, which is printed right on the inside cover of the box, is to "*win*"; more specifically, to beat all opponents by ending up with all the money and property. On the other hand, if you were to ask, "What is the goal of *CLUG*?" the answer is not so easy. But it is clearly not the same. The goal may very well be to see the process, to look at the types of things that happen. The most likely goal is to build a city, and building a city is not the same as vanquishing all the other players and ending up with a monopoly. Even if the teams admit that their goals are to make as much money as possible, it is not the same as gaining a monopoly, for it can be proven within the model that monopolistic practices may cause one to make less money than other modes of behavior.

In *CLUG* as in all nonzero-sum simulations, you are trying to maximize your resources (money, power, property, or whatever else the game is being played about). Because the source of resources in *CLUG* is not the other teams, and your income is derived primarily from industrial and farm income (paid to you not by other teams but by the bank, the outside world), you will not maximize your resources simply by vanquishing other teams. In fact, if you do vanquish them, their money simply disappears from the community.

What happens in a nonzero-sum game is that while you pursue your goal of maximizing your resources (and other teams are doing the same), you may get in each other's way, but at other times you may find each other helpful. You are playing not against each other but against the limits of the game, whatever factors determine how you can go about

maximizing your resources—how much money you can get for this or must pay for that. You are playing against the model. You are playing against the economic reality that says you can only get $22,000 per round for partial industry. So if you want to make more you have to have more partial industries, and they cost $48,000 each. The *Monopoly* mentality gets into *CLUG* when people start playing *CLUG* as a zero-sum game to vanquish other teams. They will find eventually, if not during the game then certainly during the debriefing, that with this strategy everyone loses.

But for all these theoretical distinctions there is something about *CLUG* that reminds people of *Monopoly*. I think it is the money. When I first started running *CLUG* as a computerized version, we did not have the paper money. But when we discontinued use of the computer and introduced paper money we found that as it greatly enhanced the interaction among the players, it also gave *CLUG* the flavor of *Monopoly*.

The *CLUG-ALUM* version contains an arbitrary ruling that has no logical, economic foundation within the model. Each team is allowed to bid on only three squares of land each round. Though I can find no logic for that within the economic foundation of *CLUG*, it is a very good rule and I suggest using it in all versions of *CLUG* because the *Monopoly* tendency in players is so great. I have played basic versions without this ruling in which a team, given $100,000, spends $85,000-$90,000 on land because its members take a look at the board, they take a look at the money, and they say to themselves: "Aha, *Monopoly*!" and try to buy up the whole board. But there are 196 squares on the grid, and it is very difficult for any team to "own" the board, particularly early in the game. In fact, when teams do spend all their money on land we simulate how cities did *not* grow and develop in the South of the United States at the turn of the century because everybody was so land poor they could not invest in anything else. Obviously, if all teams invest ninety to ninety-five percent of their money in land, little construction can take place. The arbitrary rule of a three-square limit, then, gets participants into a game without the Monopoly mentality of blowing all of their resources in the first few minutes

I think my greatest reason for being upset when people say *CLUG* is just like *Monopoly* is that it short-changes *CLUG*, which has so much more to offer than economic aggrandizement. Granted there are many similiarities. it is an economic game, it is a game involving property and the use of land. Different teams seem to be competing, and all have paper money to spend. But *CLUG* proceeds very differently. There is no automatic rejuvenation as there is in Monopoly, no passing "GO" and collecting $200, no chance or community chest cards to give you more money. In fact, the money you start with, which varies depending on the version of *CLUG*, is all you get for the whole game. The only way you get any more is by investing it in a way that returns a profit.

The only advice I can give others who run into participants who say, "Oh, it's just like *Monopoly*," is that it might be worthwhile to explore what they mean. They may be comparing *CLUG* with *Monopoly* simply because they are unable to compare it with anything else they have played. If a participant is playing as if *CLUG* were *Monopoly* or claims to have used that strategy throughout the game, you can always ask whether or not he or she "won" and if the *Monopoly*-like strategy worked. Due to the complex interactions among teams, if everyone played with a *Monopoly* mentality you would have a classic no-win prisoner's dilemma.

The Element of Chance

Chance has some role in *CLUG* to account for the unforeseen in this model of reality. Dice are used as an indicator of chance For things that operate by chance, the *CLUG* manual provides a probability table that gives the corresponding percentages of the chance that certain numbers will come up on the dice to the probability that an event will happen.

In basic *CLUG*, chance occurs in only a few specific places One that causes considerable concern is renovation. As we play through time, buildings grow older. This is represented primarily through the depreciation of building values. Every five rounds players get a chance to pay to "renovate" buildings. They then have to roll dice and determine, according to a probability table, whether that building was destroyed by some disaster. The game assumes that as buildings grow older their chance of being destroyed increases.

Because buildings depreciate at five percent per round the chance of losing a building increases by five percent per round. Various numerical combinations that come up on the dice can be placed in a table so that for a building of any age there are always certain losing numbers that correspond to the percentage of probability.

Though this activity can degenerate into a crap shoot with little thought or meaning, I think that renovation is a critical and necessary part of *CLUG* and can be justified on several grounds:

(1) Remember that *CLUG* rounds equal several years, so the depreciation of a building over twenty rounds is not twenty years but more like sixty to one hundred.

(2) Because renovation is the only time since construction that any money is spent on buildings, there has been no maintenance expenditure in those years and their deterioration would be significant.

(3) Understand that chance, seemingly so important in renovation, is almost completely at the team's control. Only 5.7 percent (the remaining probability of loss on a fully renovated building) chance is not controllable by the teams

The devastation of renovation is excessive for several reasons. First, it all comes at once, every five rounds. That is probably unrealistic but most practical for running the game (and, significantly, for teams who know exactly when fate will take a hand). Second, there is no seeming protection from the loss (insurance), but I always point out that just because the game does not provide insurance doesn't mean a team could not do it for other teams. However, if I were an insurance company I surely would charge high premiums for those who would not maintain their buildings. Last, I'm afraid we are not in a generation of crap shooters The most common tactic I

hear is. "Let's bring it down to round two so we just can't roll *one* number. Why spend more money to change that one number?" Even though *CLUG* renovation tables clearly list the percentage of probability of loss for each age, players continue to look only at the number *not* to roll. It does not register with players that that "one number," if it is a seven, is three times easier to roll than the "one number" if it is a three.

The best way to handle renovation is to make sure it is not a surprise. Players are too overloaded with information at the beginning to think about renovation, but by round four they should be pretty comfortable with their tasks You can bring it up then and give them a full round to plan and save for it.

I don't think you can ever completely overcome the crap shoot mentality that takes place around renovation. People are going to take chances until they get burned. This is why I always like to play *CLUG* long enough to get through two renovations, because by the second those who were burned by the first will have learned their lesson and will take a more realistic view. Those who got away without renovations the first time and let their buildings get older find that by the second renovation their property is so old that the probability of loss is very high unless they relent and renovate.

Renovation should not be overlooked during debriefing because it is a good place to point out group decision-making and its affect on the future activities of the team and the community's well-being.

As modifications are added to *CLUG* to accentuate a point or to make the game more realistic, the element of chance usually increases, if you expand the role of the outside world, which is beyond the players' control. For instance, in *POLIS* we add an "External Economy" (chosen by the roll of dice), which determines industry income; air pollution alerts, whose probability increases with the number of industries (and is determined by dice); and "headlines" or government/social actions from the outside world that affect the game. These and other chance factors can contribute to the reality of the game but do increase the (perhaps realistic) feeling of manipulation.

One area I have been toying with for years that *should* be determined by probability, at least for *CLUG* models that purport to simulate modern America, is population. Most *CLUG* models are "factory towns" where there is complete control of the population according to how many residences are built. I believe it would be more realistic to have some Malthusian type of table that determines the population growth each round according to the number of team residents in previous rounds.

TROUBLESHOOTING *CLUG*

For those of you who have not played *CLUG* but have become interested in it through this essay, I suggest that the best first move is to find a place to play *CLUG* under the leadership of someone who has run it before. I am confident that you can pick it up from a book and eventually run it yourself, but because the model is so time consuming to begin with (not to mention complex) I would not advise your spending days struggling with the model when it is much easier to grasp by seeing it operated properly.

For those of you who have run it before and have been dissatisfied or who have used it infrequently because of its complexity, let me suggest a few hints to perhaps make it run better:

(1) Have everything set up before the participants arrive so that as the game begins you can concentrate fully on explaining it.

(2) Make sure everyone is present before you go through the introduction.

(3) I have found in most circumstances that it is *not* beneficial to hand out the explanatory material ahead of time because it tends to confuse and intimidate people. Introduce all of the factors involved in the model quickly and without questions before play, and end that discussion with a run-through of all the steps in a round. At that point answer questions, but leave answers to basic "how to" questions for the appropriate point in the first playing round.

(4) Remind participants that they are playing in teams and that the most efficient and effective way to operate will be to have some division of labor.

(5) Suggest that teams make notes and keep records for their own benefit.

(6) Allow participants the freedom to play the game as they will. If they are making some obviously stupid mistake, question them about whether or not they really want to do that, but if they do, let them go ahead. This is a learning experience, and they will learn more by making this mistake and having to live with it, than they will if you save them at the last moment.

(7) Stay steady through the whole game. If you assume one mode of leadership, keep that mode throughout the whole game so people will not expect the other shoe to drop at any moment.

(8) Take every step in each round in order, and always stay in that order. Within each step, allow teams to proceed in an order, and stick to that order. For instance, start construction in the first round with the blue team, then move to green, orange, red, and yellow. In the second round, start with the green team, then orange, red, yellow, and blue. Rotate them but keep the same sequence so everyone knows in what order things will be done.

(9) Decide which economic decisions are most important for your run of the game and feel free to simplify other procedures as long as you do not change economic values. For instance, in the basic game, property value is determined by the price paid for a square of land, plus the price paid for the four adjacent squares of land divided by five. I usually just value the price of land at the original price paid for that land because the change in the assessed evaluation yielded by the very time-consuming process of averaging adds or subtracts maybe four or five hundred dollars in a five hundred thousand dollar city evaluation. Over ten rounds it is not worth that extra effort. Likewise, unless you are investigating competition in commercial enterprises and the value of consumer goods, it is convenient and perfectly acceptable to have stores set one price for everybody and hold to that price for five rounds, if at the same time you advise shoppers that if they agree to shop at a store they must also stay with it until the fifth round.

(10) And, finally, just stay as cool as possible, keeping your suggestions for what the city should do at a minimum so that at the end of the game it is their city and not yours. For this reason I suggest you play CLUG a few times to get it out of your system. It can be fun to run, too, but if you are running it you should not also be playing it.

Best Uses—How to Get the Most Out of Your *CLUG*

As I stated earlier, I have run *CLUG* with every imaginable type of group. While I can't think of a single instance in which the game was not appropriate, it was clearly more successful with some groups than with others. There is only one type of group I would suggest *not* playing *CLUG* with, and that is social group that is getting together for fun. While *CLUG* is fun, it is also a lot of work, and unless there is some commitment that keeps people's attention, the simulation will fall apart.

Assuming that you have people who are there to learn something, *CLUG* can be appropriate in at least the following areas:

(1) groups of all ages and backgrounds who are interested in basic economics on an urban or national level and in the relation of supply and demand;

(2) any political science (or other) group interested in urban affairs and the urban political process;

(3) planning, architecture, and design groups interested in the special setup of urban areas;

(4) any groups interested in the history and development of urban American;

(5) any group of practioners in the political system who are citizens interested in learning the problems of urban America on an area-wide basis;

(6) any group interested in systems and systems dynamics;

(7) any group interested in decision making, problem solving, or negotiation skills;

(8) any group interested in group dynamics, goal setting, or value orientations and looking for a reality check.

Mixing groups or types will not destroy the game but of course will mean that teams or individuals will be playing with different goals in mind. Sometimes this can be useful, but sometimes it can be counter-productive.

People need no special expertise or background to play *CLUG*. As a rule of thumb I ask that people be at least eleven or twelve years old, not only because the game takes a long time and requires a long attention span but also because a player needs to feel comfortable with numbers. People do not have to be good at mathematics (for the most part, *CLUG* involves only simple addition and subtraction), but an ability to internalize numbers and to think in numbers is essential in playing *CLUG*. There is no maximum age nor any minimum educational requirement for adults to play this simulation.

I do require that everyone who comes to the simulation must play. Not only is it nerve-wracking for a game operator to have people watching, but it is also boring to sit through the game for six hours and not really understand what is going on. As I pointed out earlier, what people can get out of the model is strictly what they put into it. To get the most out of *CLUG* you definitely need a commitment from the players to go through the whole process and to take it seriously. This doesn't mean that it has to be work and not fun, but people must make a commitment not to leave before the end. It is always good at the beginning of the simulation to get this verbal commitment again from participants so they realize the length of time and the other requirements that are going to be asked of them.

Beyond that, the only other suggestion I can give game operators for getting the most from their model is to be observant of what is going on, and, if necessary, to take notes on things you notice happening between teams and within the game. Finally, spend an extended time debriefing the model so you can discuss the many facets of the game and the many areas it touches. The emphasis of the debriefing will, of course, vary with the type of group, their goals, and their reason for coming and playing the game.

Conclusion

If it is not clear yet, I believe *CLUG* to be a most fascinating, flexible, and useful simulation. It has aged well, while others have shown markings of their era of development. Despite its length and complexity, is a sterling example of one the best learning tools in the field of simulation.