The Global Dilemma: Guns or Butter

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Overview 1

The Global Dilemma: Guns or Butter is a game about macroeconomics. Your goal in this game is simple: to conquer the entire world. Sound like fun? There's one small problem: just how are you going to go about conquering the world? Answer: with armies. Where will you get these armies? You will build them. At least, you will build the weapons needed to arm your troops. Where will you build these weapons'! In weapons factories. Of course, weapons factories need laborers. They also need supplies of raw materials and intermediate materials such as high-grade steel and explosives. Where will you obtain these intermediate materials? In factories, of course-factories that you will have to build, populace with laborers, and supply with raw materials. And then there are the mines and other facilities that produce raw materials-you'll have to set those up, too. You're going to be very busy getting all this working. Conquering the world isn't as easy as it used to be. Let's get started.

One quick note: there is a Help facility in this game. It's the first item in the Game menu (**alt-H** from the IBM keyboard). You can select it while you are in any display and it will point out the different elements of the display and explain each of them.

Macintosh Installation Instructions

What You Need

- Macintosh Plus. SE or II computer
- One 800K disk drive

Note: If you plan to run **The Global Dilemma: Guns** or **Butter** under Multifinder, you'll need to increase the memory allocation to 1.5 meg under **Get Info** in the **Desktop.**

Playing **The Global Dilemma: Guns** or **Butter** from the Floppy

1. Boot your Macintosh with a **System** disk.
2. Eject the **System** disk once the machine has fully booted.
3. Insert the disk **The Global Dilemma: Guns or Butter** in the drive.
4. Double-click on the **Global Dilemma** icon to begin the game.

Installing on a Hard Disk Drive

The Global Dilemma: Guns or Butter is not copy-protected. You may copy the contents of this diskette onto your hard drive. However, there are some technical constraints. You must preserve the file structure of the diskette. That is. all the files on this diskette must be grouped together in the same folder on your hard disk. The best way to do this is to simply copy the folder "(Guns Or Butter)" directly onto your hard disk. If you mess around with the file structure, you can cause the program to fail. You should not rename any of these files, or move them out of the "Guns Or Butterf' folder, or modify them. Just use them the way they are and everything will go just swimmingly.

To play the game, just double-click on the **Global Dilemma** icon. Later on, if you want to resume playing a previously saved game, just double-click on the saved game icon. You will recognize it by its name and the fact that it has the soldier and the farmer standing inside a document icon.

IBM Installation Instructions

What You Need

- IBM, Tandy, or 100% IBM compatible
- Color or enhanced graphics adaptor
- 512K for CGA mode
- 640K for EGA, VGA, or MCGA mode

Note: If you would like to take advantage of the option to save your game, you'll need to format a blank disk to use for saved games before you begin.

Playing the Game from Floppies

1. Insert a DOS disk (version 2.1 or higher) into Drive A.
2. Turn on your monitor or TV and computer.
3. When the **A>** prompt appears on the screen, replace your DOS disk with the program disk **(Disk 1,** if you are using the 5.25" version of the program).
4. Type **GB** and press **ENTER.**
5. You will be asked to select one of five video modes:
   CGA 640 X 200 Monochrome
   EGA 640 X 350 Monochrome
   MCGA 640 X 480 Monochrome
   EGA 640 X 350 16 Color
   VGA 640 X 480 16 Color
   Choose the video mode that's right for you by entering the correct number.
6. Next, you will be asked to designate the drive to which the game will be saved at the end of each turn. You also have the option of playing the game without saves; in the event you choose to play without saving the game, the **Undo Turn** option will not be available.
7. The video mode and the "save drive" information will be saved to the program disk. In the future, should you wish to change either designation, type **GB** S at the system prompt when you load the game.

Installing and Playing the Game on a Hard Drive

1. Boot the system, if necessary, and log onto your hard tlrivc (for example, C :) .
2. To install the program, insert the program disk **(Disk** 1 if you are using the 5.25"version of the program) into a floppy drive (for example, Drive A). At the **A>** prompt, type **INSTALHD.** The program will be installed onto Drive C in a subdirectory called **G&B.** To install the program to a hard drive other than Drive C (for example, Drive D), type **INSTALHD D:** (or the appropriate hard drive designation) at the **A>** prompt. Follow the on-screen instructions. (If you are installing the 5.25"version of the program, you will be prompted when to insert **Disk 2.)**
3. To play **Guns or Butter,** log onto the hard drive directory **G&B** that contains the game's files. At the DOS prompt, type **GB** and press **ENTER.**
4. Follow steps 5 through 7 above under **Playing the Game from Floppies.**
5. To remove **The Global Dilemma: Guns or Butter** from your hard drive, simply delete all of the game files.

IBM Keyboard Controls

To Select Pulldown Menus:

G Game
K Kingdoms
A Affinities

Under the Game Menu:

alt-H Help
alt-Z Undo Last Turn
alt-S Turn Sound On/Off
alt-N Next Phase
alt-U Skip Unions
alt-Q Quit

Cursor/Arrow Movement:

Key board	*Numeric Keypad- Num Lock* ***Off***	*Movement*
Up Arrow	8	UP
Down Arrow	2	Down
Right Arrow	6	Right
Left Arrow	4	Left
Page Up	9	Diagonal (upper right)
Page Down	3	Diagonal (lower right)
Home	7	Diagonal (upper left)
End	1	Diagonal (lower left)

Holding down the CTRL key with any of these keys will cause the cursor to move in smaller increments. Pressing the 5 key on the numeric keypad will move the cursor to the center of the screen. Press the **Space Bar** to "click" the mouse button. Use the INS key as a toggle to "hold" the mouse button. (This is used to set troop movement numbers and troop movement directions. It is also used to adjust the scroll bar on the labor allocation screens as well as other scroll bars in the game.)

Note to Tandy 1000 users: If you are using the numeric keypad, you must have **Num Lock** on.

Initial Dialogs

Fire up the game; it will hit you with a dialog box that asks for the name of the continent on which you will play. You can name any continent you wish; the computer will create the unique continent with that name. If sometime in the future you want to play a game with the same continent, just use the same name. For now, let's just use the default continent, Kittycat.

Note to IBM users: Continent names may contain only letters- no numbers or other symbols, including spaces.

The computer will also want to know whether you wish to play at the Beginner level, the Intermediate level, or the Expert level. As you might imagine, the Beginner level is the simplest, while the higher levels are more complex. We will stick with the Beginner level for now. Press **RETURN** or **ENTER,** or click in the "Proceed" button.

Now the computer wants to know your name. Type in your name. If your name is longer than eight letters long, you're in trouble, as it will only use the first eight letters of your name. Unless you want it to call you DorkHead, type your name, then press **RETURN, ENTER,** or click on the "Proceed" button.

Terse Rules for Impatient Players

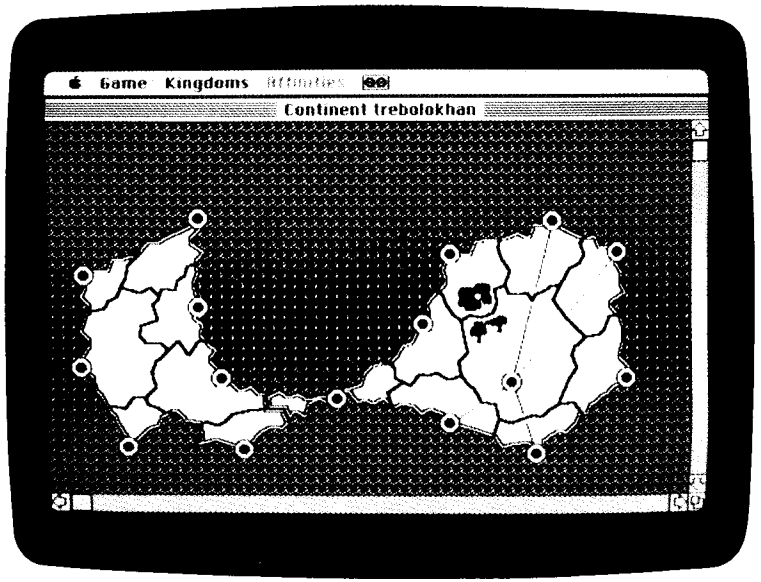
After examining the map, select "Next Phase" to go to the Production phase. It lists your total production of each commodity. Click on the name of a commodity to look at its production diagram. Adjust the labor scroll bar to change its production. Note how the total flow of goods from one factory to another changes. Make some agricultural tools to make food and some weapons for your armies.

Select "Next Phase" to go to the military orders phase. Click and drag on the white dot inside the tiny gray scroller bar in the center third of the provincial square and drag to a target province to assign a military objective. When satisfied with your orders, choose "Next Phase." Watch your orders being executed. Next will come the Rankings phase, showing how well you are doing. Select "Next Phase" to begin a new turn.

Each phase has a "Help" item in the Game menu that explains what to do.

The Mao

The computer will create the continent on which the game will be played. This process will take a few seconds. If this delay irritates you, remember the old saw about Rome not being built in a day. Through the wonders of computer software, we are building an entire continent in just a few seconds. If only those Romans had had an accelerator board.. . .

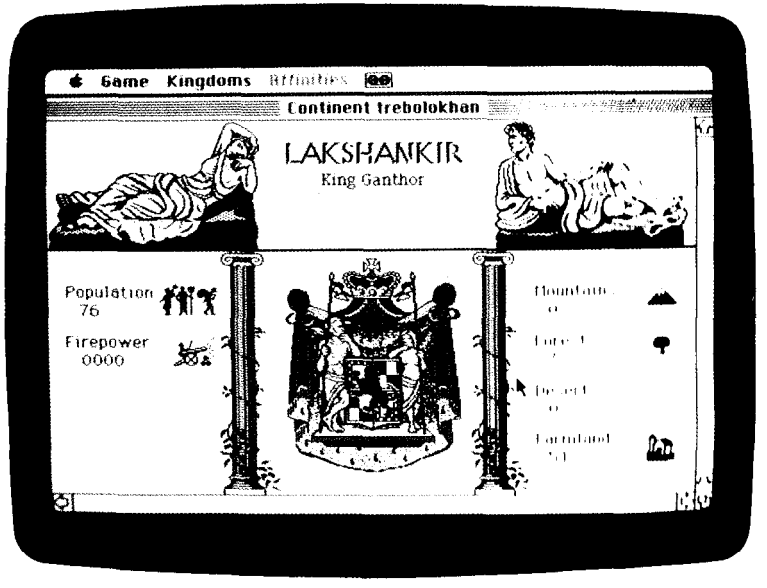


Note to IBM users: On slower machines, EGA graphics may take up to five minutes to load. You may wish to consider running the program in CGA instead to reduce this load time.

The completed continent consists of several parts. The most easily recognized are the straight roads connecting the towns. The towns show up as circles. There is one town inside each province. A province is an irregular-shaped region surrounded by a single black border. A group of provinces together make up a country. A country is surrounded by a double black border. There are two countries in the Beginner level game: yours and Kublai's. Kublai is the computer-controlled opponent whose country you will try to conquer.

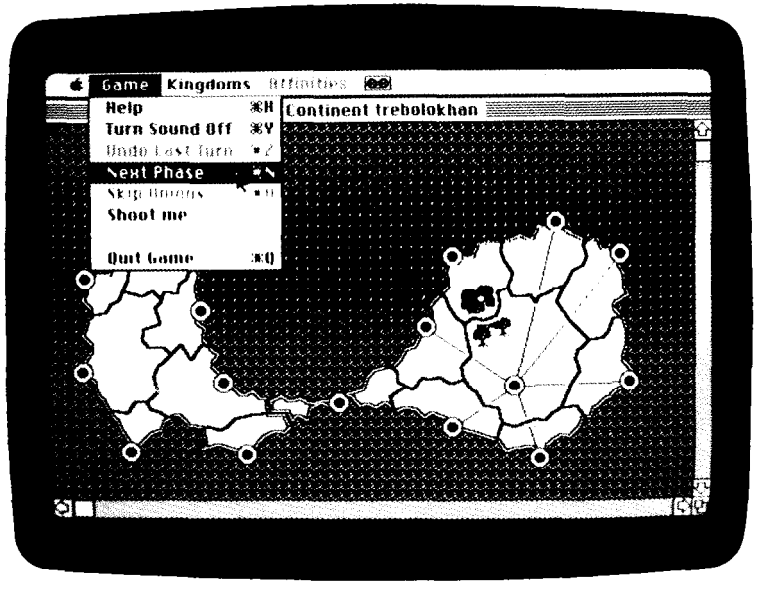
The map might also include forests, marked by trees, deserts, shown as collections of tiny dots, and mountains, indicated by triangular mountain symbols. These terrain features really do have an effect on the game, but we'll come back to them later.

You can find out more about a province by the simple expedient of clicking on its town. With a "whoosh:' you'll be presented with a display telling you about that province: its name, owner, the military forces present in the province, the population, and the terrain present inside the province. Click the mouse button when you are satisfied.



If you didn't like the "whoosh' sound when you opened the province, you can turn off all the sound effects by using the second menu item in the Game menu **(alt-S** from the IBM keyboard). Of course, if you do this, you'll miss out on all the great sound effects created using the revolutionary new Crawford Oral-Nasal Audio Generation Technology.

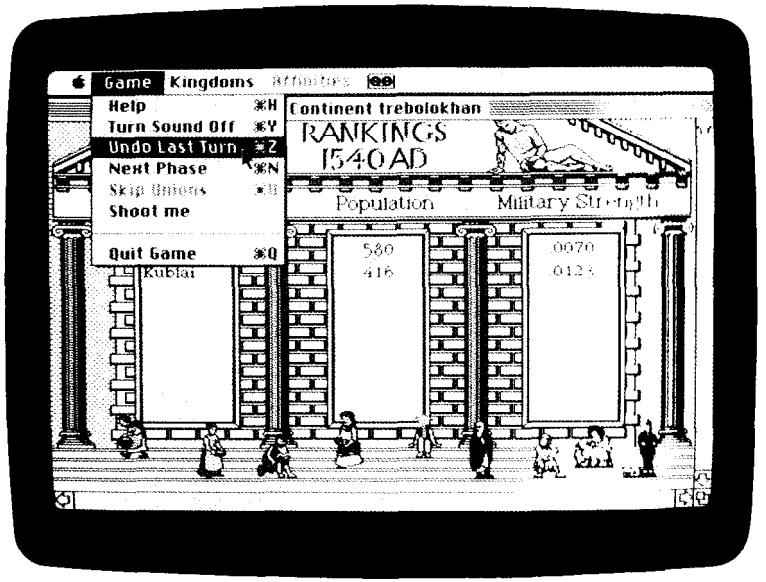
After you have explored the map to your satisfaction, select "Next Phase" from the Game menu. (Mac users can just press **Command-N;** IBM keyboard users can press **alt-N.)**



Phases

This is a complex game. There are many tasks for you to perform. To make it easier to understand your many responsibilities, I have arranged them in a sequence. The game requires you to do one thing at a time before moving on to the next task. This has the advantage of simplifying a very complex game. It has the disadvantage of preventing you from going back and changing something once you have completed its phase. Remember this well: don't ever select "Next Phase" until you're certain that you've finished your work in that phase. Once you choose "Next Phase:' you can't go back.

Fortunately, I have provided another feature that ameliorates this harsh constraint. The game automatically saves itself at the end of each turn. It does not even ask you for the filename under which to save itself. Instead, it uses the name of the continent you chose and the level of the game. This allows you to undo an entire turn. Just select the "Undo Turn" option from the Game menu. Unfortunately, there's a catch: you can only undo a turn at the end of the turn, during the Rankings phase. Call this another one of those "wonders of computer software."



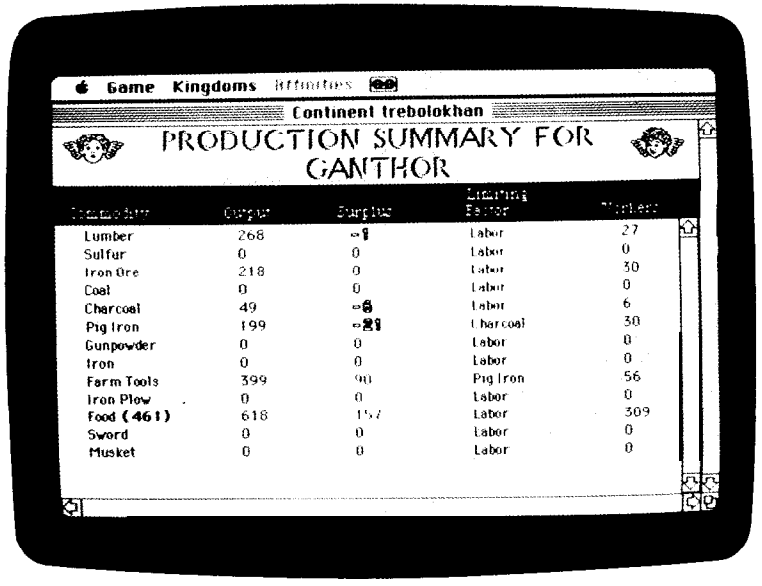
This auto-save feature also allows you to quit the game unfinished and return later to resume playing. Of course, since it saves the game at the end of the turn, if you quit halfway through the turn, the moves that you made during that turn will be lost. The best time to quit the game is during the Rankings phase. If you want to quit at any other time, the program will allow you to do so, but remember that all of the moves that you entered during the aborted turn will be lost. The computer will remind you of this before allowing you to quit.

If you're playing on a Mac and you choose to restart a previously saved game, you have to double-click on the saved game icon while in the desktop. There is no way to load a previously saved game from within the game. If you mistakenly try to load a previously saved game by typing in its name when it asks you for the name of the continent, you will instead erase the saved game and replace it with a new one! So don't make that mistake! Also, if you are playing the game from a floppy disk instead of a hard disk, remember that you have room for only a few saved games, so try to clear off old saved games.

If you are playing on an IBM PC and you choose to restart a previously saved game, type in the name of the saved game when the continent dialog box comes up at the beginning of the game. Make sure you select the appropriate level of play for the saved game; then select "Use Saved Game." (Your disk with the saved game file should be present in the drive that you have designated for saved games.) Press ENTER, or click on the "Proceed" button. (NOTE: The program saves CGA games in a different format than it does EGA, MCGA, and VGA games. You cannot load a saved VGA game into CGA, or vice versa.)

Phase 1: Production

The first phase is the Production phase. In this phase you will allocate your workers to factories to make things. The main screen for this phase shows an intimidating table called "Production Summary."



Here's what it means:

The first column is labelled "Commodity." This column lists the various commodities that you can build in this game. Some are raw materials such as lumber and coal; some are intermediate materials such as charcoal and pig iron; some are agricultural products such as farm tools and iron plows; and some are weapons such as swords and muskets.

The second column shows the output of your factories. You will note that some of your factories are already making things. That's good, but it could be better. You want to see lots of big numbers in that output column.

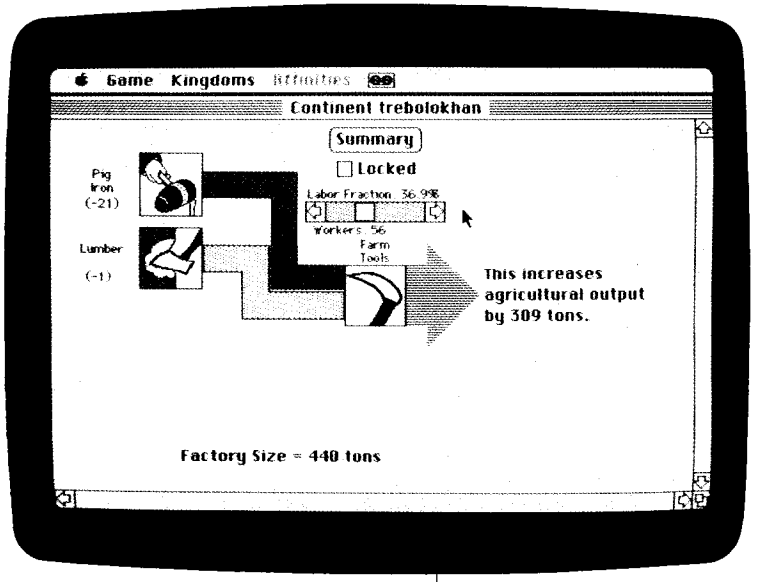
The third column shows the surplus of each commodity. This is the amount of commodity that you are not using. If, for example, your lumber yard is producing ten tons of lumber, but your farm tools factory is using only eight tons of lumber, then you will have two tons of surplus lumber. If you have a shortage of a commodity, the surplus will be shown as a negative number in outline form, which should be striking enough to leap off the screen, slap you in the face, and demand, "Fix me! Fix me!" You do NOT want any of those numbers.

The fourth column shows the "Limiting Factor." This is the factor limiting production of the commodity in question. Most of the time it will be labor, meaning that you need more workers to make the factory bigger. However, if your production of, say, muskets is held back by shortages of iron, then iron will be listed as the limiting factor for muskets. This makes it easier for you to figure out what you need to fix.

Food production is a little different, in two ways. First, there is a number posted in bold letters next to the word "Food." This is the minimum amount of food you need to keep your population intact. If your food production falls below this value, some of your people will starve to death. Second, you cannot adjust the number of agricultural workers- but the computer will explain this to you if you try.

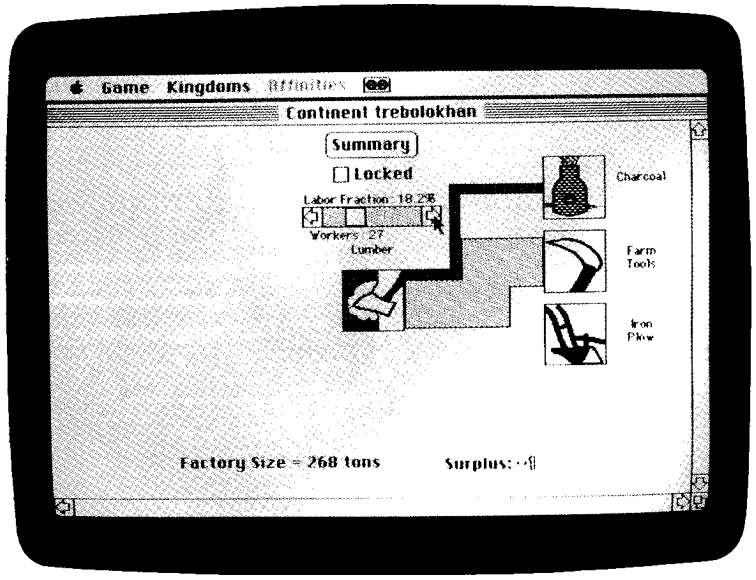
Settina Production

OK, it's time to do some work. Click on the words "Farm Tools:' then release the mouse button. Through the magic of computer programming, a new screen appears. This screen allows you to control the production of farm tools. You will note the farm tools icon in **the center of the** screen. On **the left side of the** screen are the **icons** for **lumber** and **pig iron; they indicate that lumber** and **pig iron** are **required inputs for making farm tools.** Just **above the** farm tools **icons is a scroll bar. This scroll bar allows you to allocate workers to the farm** tools factory. There **should already be some workers assigned to the farm tools factory. Play with the scroll bar. As you** change it, it will show two things changing in response: what percentage of the work force is allocated to the farm tools factory, and how many workers are working there.



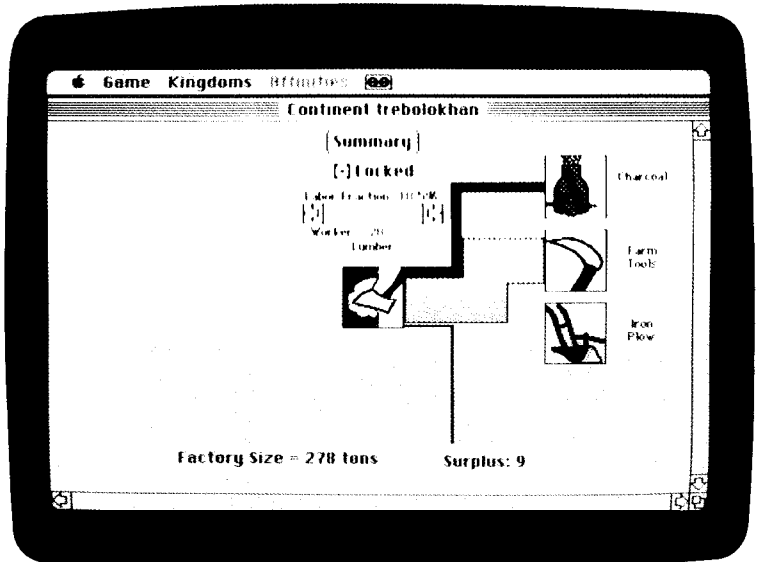
The important thing to notice is the notation at the bottom of the screen: "Factory Size: XX tons." This tells you the capacity of the factory, the amount of stuff it will make IF it gets all the raw materials it needs. Notice how the factory's capacity changes as you change the workers. If you double the workers, the capacity more than doubles. **THIS IS IMPORTANT!!!!** It is called "economy of scale:' and it means that bigger factories are more efficient than smaller factories. The entire game turns on this simple fact, in some very subtle ways.

OK, for now, set the scroll bar somewhere in the middle, so that most (say 80%) of your workers are in the farm tools factory. You'll make lots of farm tools that way, right? There's only one problem: you need lumber and pig iron for the farm tools, and you will notice that they both show a negative number in parentheses underneath. That's the number of tons of lumber and pig iron, respectively, that you arc short by. How do you fix this problem? Simple-click on the lumber icon.



You are instantly transported to the lumber factory screen. It looks much the same, except there are no input commodities on the left side of the screen. Lumber is a raw material; you don't need any inputs to make lumber. All you need are workers. There ***are*** outputs along the right side of the screen, factories to which the lumber might go. One of these is the farm tools factory.

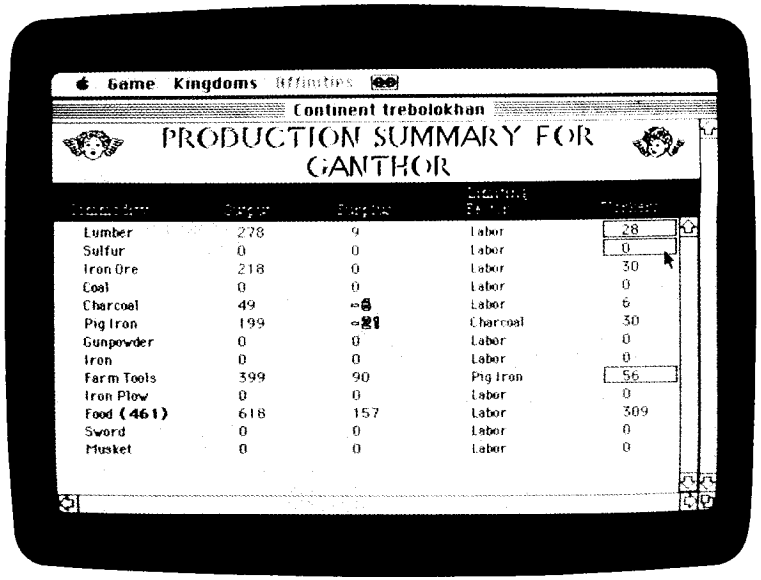
Go to the labor scroll bar and click, for just a second or two, on the little arrow on the right side of the scroll bar. This will increase the number of workers assigned to the lumber factory. If you don't get anything at all, click again until you get some output from the lumber factory. You will know because you will see a river of lumber flowing out of the lumber factory and into the farm tools factory. The amount of lumber is specified by the "Factory Size" label at the bottom of the screen. You will know whether this is enough by checking the "Surplus" label on the lower right side of the screen. If it is positive, then you have a surplus of lumber. If it's negative, then you don't have enough lumber. So all you need to do is keep increasing the number of workers until your deficit or surplus is small.



Where do all these workers come from? They are automatically stolen from any other assignments you had previously given them. Now some of them have been reassigned to the lumber factory. This system of automatically moving workers around cuts down on the amount of busy work you must do. But it is definitely confusing to beginning players. For example, when you reduce the workers allocated to a factory, the excess workers are distributed among the other factories on a prorated basis. This means that you can completely obliterate your carefully considered worker allocations by simply putting all of your workers into a single factory. This can be a real mess. So don't do that unless you want to wipe out all your worker allocations! (Appendix A provides a detailed explanation of the allocation system, if you must know.)

This mysterious and confusing worker allocation system makes it easier to adjust all your worker allocations. When you see a factory that has too little or too much output, just change the worker allocation until the surplus is close to zero. The labor shortages or surpluses you thereby create will be smoothly distributed through the entire economic system. Then flit through the rest of the economic system, performing touch-up re-allocations to get everything balanced out just right.

I have provided a feature to help you simplify the complications of this automatic worker allocation system. It is the "Worker Lock" checkbox just above the labor scroll bar. If you click this checkbox, the worker allocation for that factory will be locked. You will not be able to change it, and neither will the smarty-pants algorithm. It will stay just the way you left it. When you are juggling umpteen different factories and you finally get one just the way you want it, you can lock it and rest assured that the workers will stay put. You can always unlock it to change it. You can also lock and unlock factories from the "Summary" screen by simply clicking on the worker allocation number; a locked factory is indicated by a box enclosing the worker allocation number.



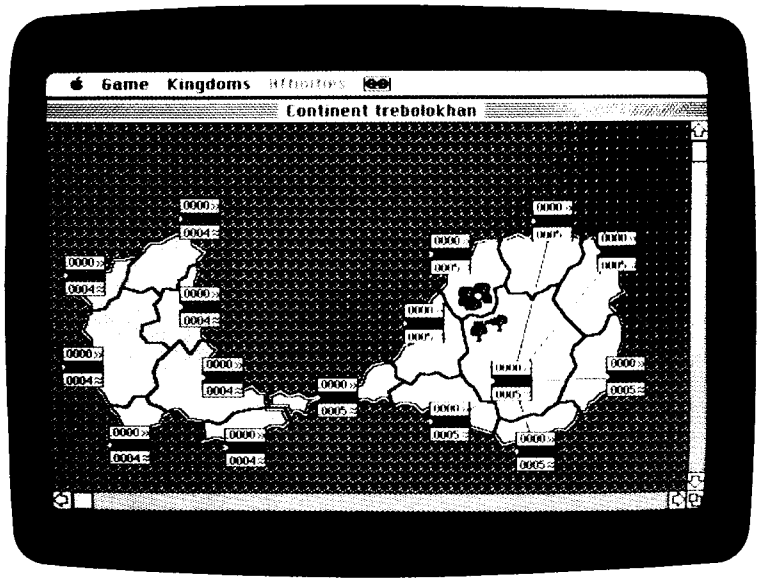
Now click on the farm tools factory icon on the right side of the screen. You are magically transported back to the farm tools factory. Note that it has fewer workers now than when you were last here. Remember, you took some workers away to labor in the lumberyard. Note too the river of lumber flowing into the farm tools factory. It also shows an output in the form of an announcement that these farm tools are increasing agricultural output by a certain amount. Good! You are making things now! Of course, your pig iron supplies are probably off, so click on the pig iron icon and go fix things there.

Return to the "Production Summary" chart by clicking on the "Summary" button at the top center of the window. Note whether there is now a food surplus. This is very important! Surpluses of food are the basis for population increase. You see, if you put extra food into people's mouths, babies will come out. At least, that's how it works on the large scale. I think it's different at smaller scales.

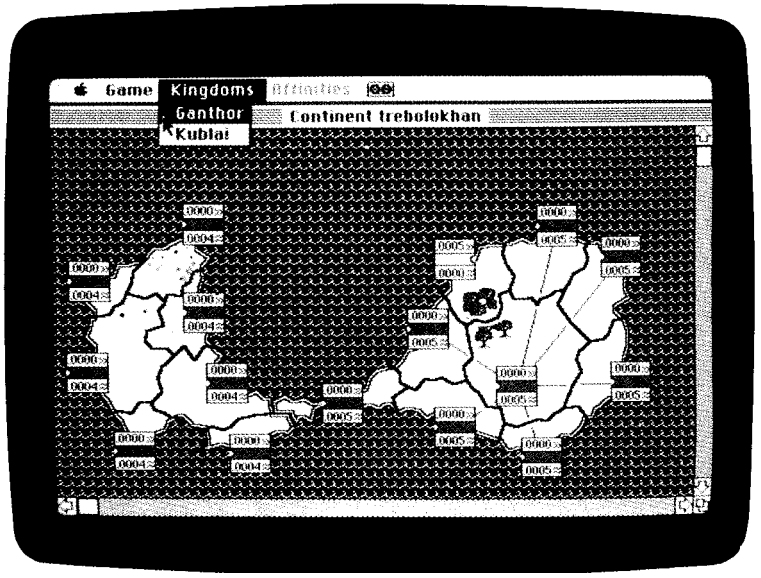
Now click on the word "Sword" and look at your sword production. It is probably zero. That's not good-you need swords to deter your opponent from engaging in aggression against your peace-loving people. Besides, without swords, you can't conquer the world. Increase the worker allocation so that you make some swords. Of course, now there probably isn't enough pig iron to go around, so you'll need to adjust that upward, and you'll probably need some more pig iron and lumber and charcoal and iron ore. You'd better get busy! When you've got everything balanced out just right, select "Next Phase" from the Game menu and proceed to the next phase.

Phase 2: Military Orders

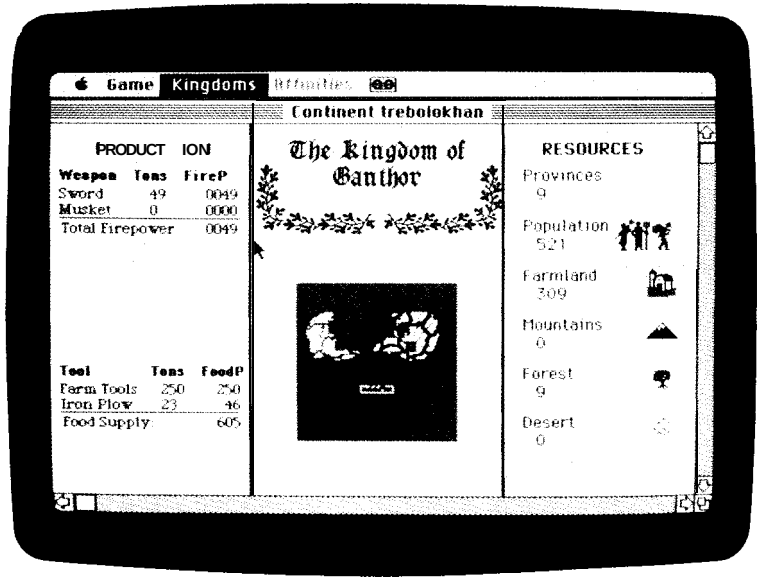
In this phase, you give orders to your troops. You will see the map on the screen, except that the towns have been replaced by large shaded boxes. Those boxes allow you to give orders to the troops in each province. There are two numbers in each box, with a horizontal bar between them. The upper number is the amount of military power (I call it "firepower") that is marching off to war. The lower number is the amount of firepower that is staying home this turn.



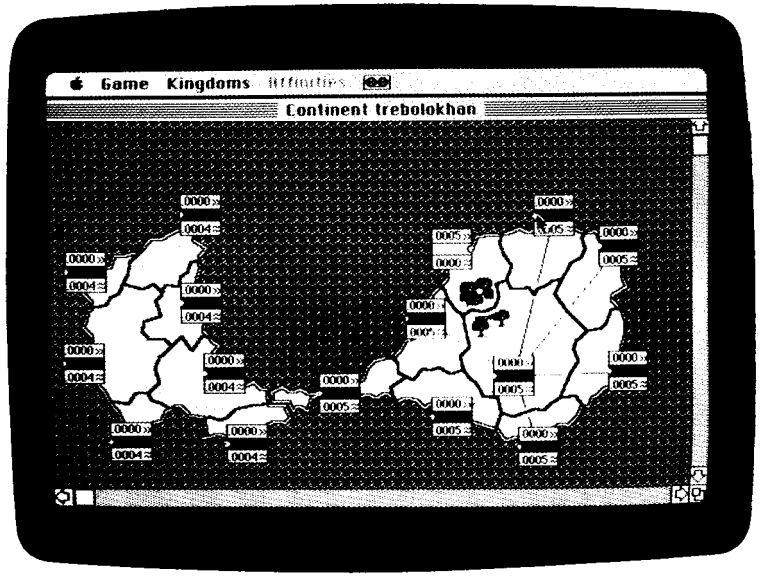
Select one of your own provinces. If you have problems remembering which provinces are yours, just select the first menu item (your name) from the Kingdoms menu to look at a reduced-scale map showing your provinces in outline. When you are done looking at it, just click on the



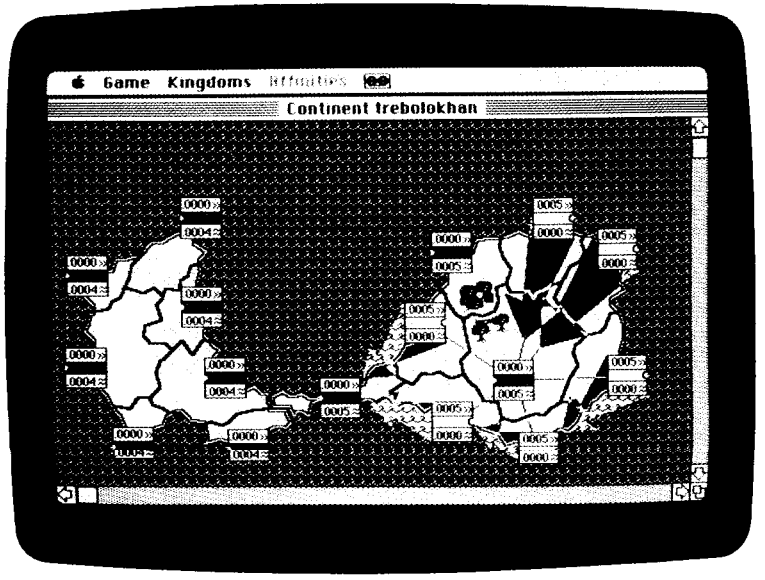
mouse button. Another approach is IO **click on the lower third of the** square for the province; that **will generate a closeup** display of **the** province that will tell you who owns that province.



OK, so you've got your eyes on one of your provinces. Mouse on over to the military box for that province. Notice that there is a tiny white dot in the center of the left edge of the box. It's a little white bump on the left side of the gray bar. Click and hold on that little bump. Notice that the cursor disappears. That's good- you've got it! Now, still holding the mouse button down, drag the mouse toward the right. See how the little white bump follows you? As it does, it changes the gray slider. It also changes the distribution of firepower that is going and firepower that is staying. If you slide the slider all the way to the right, then *all* your troops will march off and none will stay behind. If you put it in the middle, then half will march and half will stay. Release the mouse button when you've got it where you want it. This device is a tiny scroll bar for allocating your soldiers. Clever, no?



OK, so you have set some of your soldiers to march off. To where are they going? Once again, you use the mouse to set their orders. Mouse to the top third of the military box, the section with the number showing how much firepower is marching. Click down and hold. Now drag the mouse to an adjacent province. A big black arrow will appear. That arrow means that the troops will march on that province. If you continue to move the mouse around, the arrow will jump to any other adjacent provinces the mouse enters. When you release the mouse button, the orders are frozen. Of course, you can always go back and re-enter orders while you are still in the military orders phase.



Give orders to all your troops to move all over the map. Make sure that some of them cross the border to attack Kublai's provinces. Then brace yourself and select "Next Phase."

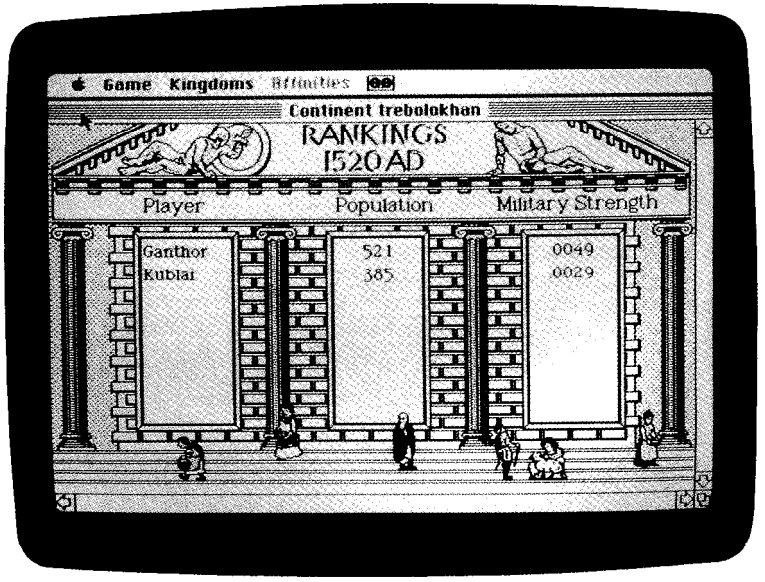
Phase 3: Military Execution

Things will happen fast now. The computer will execute all your military orders. First it will execute the simple troop transfers, in which your troops march from one friendly province to another. You will see arrows marching around the map, and hear the sound of their little feet going pitter-patter on the dusty roads. Perhaps you might want to sing a marching song along with them. Sing fast.

If you gave any of your troops orders to march into enemy territory.. .well, that's different. You will see your troops march toward their objective, then you will see a violent battle with the sound of men shouting and cursing, and then you will lose the battle. Your army will fade away with a despondent whistle. Well, what did you expect, you nasty aggressor, you? You don't think that you can win battles with puny armies, do you? If you want to conquer the world, you're going to need some ***real*** firepower, the kind that you make in factories (hint, hint!).

Phase 4: Rankings

When the Military Execution phase ends, the game automatically jumps to the Rankings phase. This modest little display shows you where you stand in the world. The primary measure of strength is population. If you are Number One, then you are winning. If not, you know whom to beat. If that last turn went particularly poorly, and you now regret the errors of your ways, then now is the time to select "Undo Last Turn" from the Game menu.



When you are done with the Rankings display, select "Next Phase" and you will be back to the Production Summary display that you began with oh so long ago. You have just completed one turn. But wait! You must now cope with an avuncular fellow smilingly inquiring into the status of your paperwork. You will indulge him, won't you? I assure you, he won't take no for an answer, And if you do satisfy him, he won't bother you for a while.

Doina It Aaain

Now you must repeat the cycle. Each turn, however, your population will have grown because of the food surplus you created-at least, that's what ***should*** happen, if you are playing well. A greater population means more workers to put into the factories. More workers in the factories means greater efficiency (remember "economies of scale"?). After a few turns you will have enough workers that you will be able to start building iron plows instead of farm tools. Iron plows are twice as productive as farm tools. But you will need iron and coal to make iron plows. and that will take more workers.

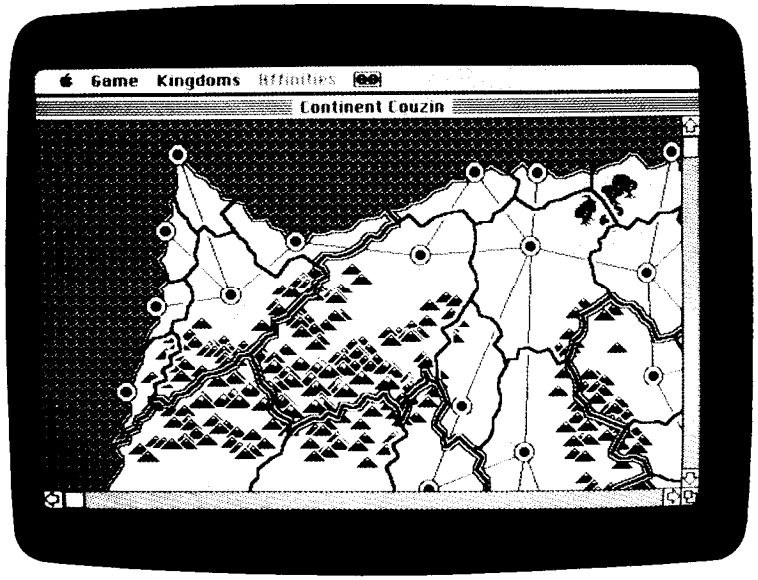
While you're building all these wonderful agricultural tools, you might also want to build some weapons for your armies. If you don't, Kublai might just build some weapons himself and invade you. Of course, when you build weapons, your production of agricultural tools is diminished, and your food supply is consequently reduced. This, in turn, will cut into your population growth. So, what will it be-weapons or agricultural tools? Guns or butter?

The game ends when one player conquers the world. As is ***de rigeur*** with computer games, your victory or defeat will trigger a cute but useless animated display meant to reward your success or failure. Enjoy it. A small pellet of rat chow will also be released from the chute on the side of your computer.

You should find it easy to defeat Kublai on continent Kittycat. That's because you start the game with a bigger country. If you want more challenge, you might try playing the Beginner level game with a different continent. Be creative in choosing a name for a continent-with two billion possible continents the odds are very high that you will be going where no player has gone before.

INTERMEDIATE LEVEL GAME

Once you have mastered the Beginner level game, you will want some more challenge. I am pleased to tell you that you have only scratched the surface of the possibilities of this game. Start a new game, and pick the Intermediate level game option in the initial dialog.



The Intermediate level game has four players instead of two. That makes for a more complex set of possibilities. It is played on a larger map of the world. There are also more advanced commodities available for you to build.

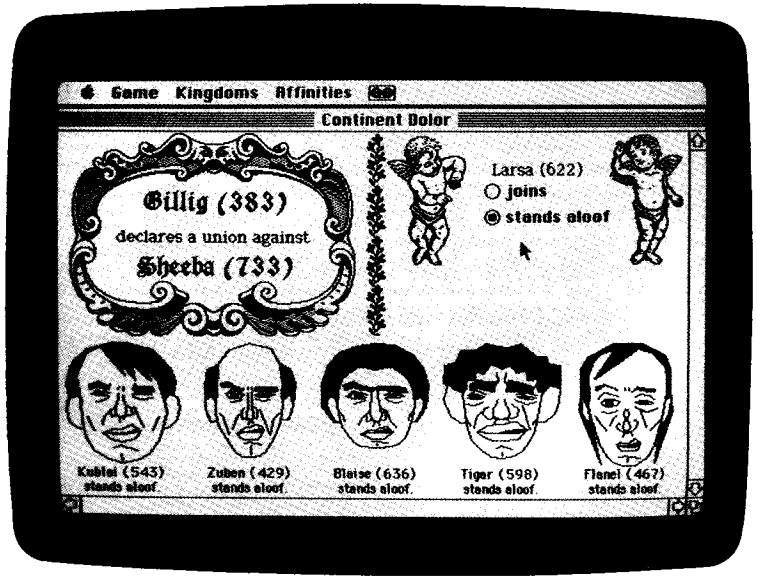
Terrain Counts Now

In the Beginner level game, terrain (forests, mountains, and deserts) didn't mean anything. Now it does. If you want lumber, you can always get it, but you'll get it a lot more cheaply if you have some forest land. Mountains are the place to go for iron ore, coal, light metals, and heavy metals. Deserts are the prime source for sulfur, nitrates, and petroleum. Mind you, you can still get these things even if you have no deserts, no mountains, and no forests, but it will cost you a lot more workers to get the same amount of stuff. So if you find that you have no mountains at all, and one of your neighbors has a lot of mountain land, then perhaps a little military expedition to liberate those resource-laden mountains might be in order.

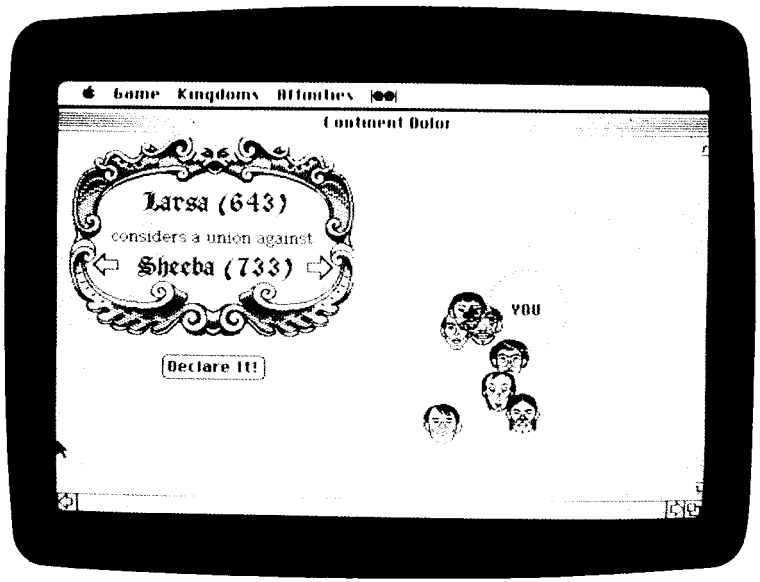
EXPERT LEVEL GAME

OK, once you've mastered the Intermediate level game, you are ready to take on the biggest, meanest, orneriest level of The Global Dilemma: Guns or Butter: the Expert level. The Expert level is the real game; the lower levels are just training-wheels versions of the game. In this level, you get to play against seven computer-controlled players. The world is accordingly larger, making the game bigger and more complex. And, to add to your headaches, the list of commodities that you can build is even longer than before. Now you can build cannons or irrigation systems, or tanks, or tractors. All this will, of course, require even more resources and more careful allocation of your precious labor supply.

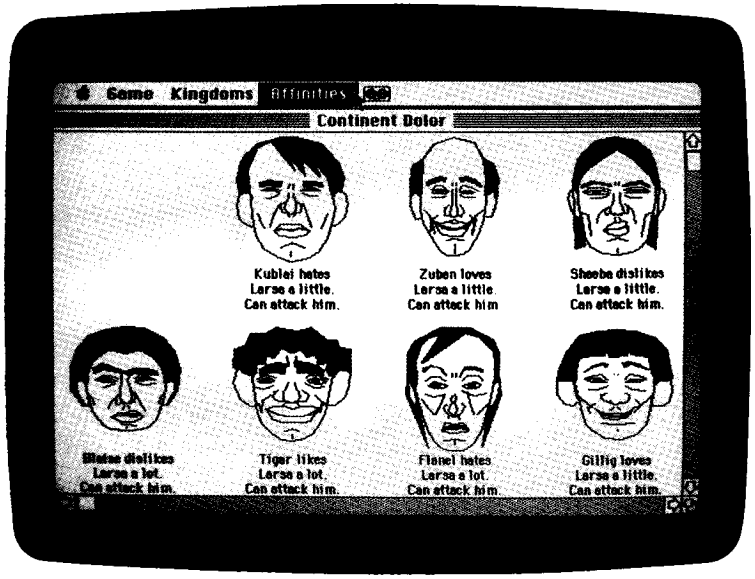
There is a new phase in the Expert level game: the Economic Union phase. It allows you to create economic unions with other players. This phase takes place before the production planning phase. The weakest player in the game will declare a union against his worst enemy, and you will have the option to either join the union or stand aloof. In these displays, every player's name is presented along with his population, the all-important measure of a player's true strength. If you wish to join, click on the "joins" button. When you have made your decision, select "Next Phase." There may be other unions formed, and you will again need to decide whether to join or stand aloof. If you do not join anybody else's union, you will have the option of declaring your own union.



If this case arises, you will see a display stating that you are considering a union against another player. You can change the player against whom you wish to declare by clicking on one of the arrows next to the player's name. The display on the right side of the screen shows you the diplomatic relationships that will determine who joins your union. The person against whom you are considering declaring a union will be placed directly below your icon (the one in the center of the dotted circle); his distance from you will be proportional to his dislike for you. The other people will then jostle around like participants in a cocktail party, edging away from people they don't like and toward people they do like. You don't recognize them from their faces? No problem! Just click on a face and it will tell you who that person is, how many people he has, and whether he is free to join your union. Any free agent who falls inside your dotted circle will certainly join your union (except, of course, the person against whom the union is declared). You can declare a union by clicking on the "Declare It" button, or waive your option to declare by selecting "Next Phase."



If you join somebody else's economic union against a third player, the founder of the union will take control of your economy for that turn, and all the members of the union will enjoy the economic benefits of the larger population base of the union. You will also be constrained in your military attacks: you can only attack the enemy against whom the union was formed (or anybody who is part of a union declared against you). If you form a union, and people join your union, then you will be able to control the joint economy of the union for that turn. Your labor supply and terrain base will be enlarged by the other members of your union. Remember, this is all heavily diplomatic, so pay attention to the diplomatic affinities expressed in various ways in the displays. You can look up diplomatic relationships directly with the menu entitled "Affinities." You can also see the current set of unions with the menu item "Show Unions."



Appendix A

Some Fine Points on Production

The production system used in The Global Dilemma: Guns or Butter has some idiosyncracies. First is the fact that nothing is accumulated. Any unused materials are swept into the rubbish at the end of the turn. Use it or lose it!

Much trickier is the method used to allocate commodities to factories. The economies in this game are demand-driven rather than supply-driven. That is, a farm tools factory with a capacity of 100 tons will demand 50 tons of lumber and 50 tons of pig iron. Now, suppose that you had 50 tons of pig iron and only 40 tons of lumber. You might think that the farm tools factory would recognize that the shortage of lumber will limit its output to 80 tons of farm tools, and would therefore graciously release the 10 tons of pig iron that it cannot use. No such luck! The farm tools factory manager says, "I need 50 tons of pig iron and 50 tons of lumber, and I will hold onto my 50 tons of pig iron:'

There is also a priority system for allocating commodities. The general rule is this: simple factories have higher priority than complex ones. Consider the previous example. Suppose that the lumber factory was making 50 tons of lumber, but the charcoal factory wanted 10 tons. Remember, the farm tools factory wants 50 tons, so the demand (60 tons) exceeds the supply (50 tons). Who gets short shrift?

The program automatically answers this question for you: the charcoal factory has higher priority. Why? Because charcoal is lower down on the production sequence, and its failure would ripple more widely through the economy. If all the lumber went to the farm tools factory, then there would be no lumber for the charcoal factory, hence no charcoal at all. With no charcoal, the pig iron factory would not be able to make any pig iron, and with no pig iron, the farm tools factory would not be able to make any farm tools.

All this is handled automatically by the computer. Isn't that nice of me to do that for you:' Of course, if you don't realize that this is happening, you might get confused when things don't go as you expect, and then you might become cross with me. Please don't.

Appendix B
How to Win

Production

First, optimize your production. Ferret out waste in your economy. Make sure that any production surpluses or shortages are tiny. You don't have to get them down to exactly zero; that is often impossible. Just make sure that surpluses or shortages are small. Remember, production surpluses are not saved over for the next year- they are thrown away. So don't create any in the first place. If you have a shortage somewhere, you must decrease something else to free up the workers you'll need to eliminate the shortage. The high-tech term for this concept is "lowered expectations."

By the way, you ARE making the right things, aren't you? Each technology has its optimum range of applicability. For example, it is foolish to build tractors at the beginning of the game when your population is small. You really can't afford to build tractors until you have a large population. By the same token, you can't keep building the same old technology as you grow. You've got to move on, advancing to new and more powerful technologies as you grow. Remember, your farmland acreage imposes an upper limit on the amount of agricultural tools you can use. If you have 300 acres of farmland and you are making 500 tons of iron plows, then you are wasting 200 tons of iron plows. It's time to move up to combines.

The algorithms are set to provide crossover at 342 tons. That is, when you are making 342 tons of any given agricultural tool, it should be just as productive to make 171 tons of the next higher tool. Of course, your mileage may differ depending on the terrain in your country..

The same thing goes for weapons. Sure, you could keep on building swords till the cows come home, but muskets are, ton for ton, twice as powerful as swords. At a certain point you really should move up to muskets. Moreover, you should remember the economies of scale. If you are building iron plows with iron, and swords with pig iron, then you are losing out on the economies of scale that would arise from having a single larger iron mill. If you abandoned swords for muskets, then you could eliminate pig iron production entirely and expand the iron mill, achieving greater efficiency. Of course, you'd also need to open up a gunpowder factory and a sulfur factory.. . .

Military Strategy

OK, you're doing a good job building weapons, but you just don't seem to be able to beat the enemy on the battlefield. Why not? Well, there are several possibilities. You are concentrating your troops at the danger spots, aren't you? After all, it does no good to have all your troops lounging around back in the rear. Get 'em up front where they do some good!

On the defensive, try to anticipate where a potential enemy might attack. If you have a province that is lightly defended, and the enemy next door has strength, you might be able to win a big defensive victory by shuffling troops into the province before his troops arrive. Remember, troop reshuffling always takes place before battle, so you can really frustrate your enemies by reshuffling your troops in such a way that they always end up hitting you where you are strong, and missing you where you are weak.

The first rule for attacks is to attack down roads whenever possible. When you attack across anything other than a road, your forces suffer an additional 75% casualties after they reach the battlefield and suffer an initial lo-point loss! You should attack only down roads unless an attack on other terrain is unusually opportune.

Once your forces reach the battlefield, they suffer an outright IO-point loss. and the defender is boosted by 10 firepower points. Then the defender's strength is subtracted from the attacker's strength. lf there are any attackers left after all this, then the attacker wins the battle and captures the province. Thus, if you arc attacking down a road, you will need at least 20 firepower points just to capture a province with no defenders at all. If you are attacking across other terrain, you will need at least 50 firepower points to capture a province with no defenders at all.

Diplomatic Strategy (Expert Level game only)-

Diplomacy plays a larger role in the Expert level game than anything else. Every act you take affects people's opinion of you. Join an alliance, and the founder will appreciate you more, but the victim of the alliance will resent you. Declaring an alliance against somebody will not endear him to you. And the only thing worse than attacking another player's province is winning the attack.

Diplomacy is important because it determines who will join whose union against whom. If you are well-regarded by the other players, they will not form unions against you, and will instead flock to join your unions. If, on the other hand, you arc roundly hated, then they will rush to join unions against you. They will assail you on all sides, they will take your provinces, and you will die a miserable and lonely death. So be nice.

These players are not fools. If you pull ahead of them, they will gang up on you. Find a firm friend and stick with him through thick and thin-until the two of you have bumped off everybody else. Then have the knife ready in hand as you embrace him.

Appendix C

Designer's Notes

This game took me eighteen months to complete, longer than my other games. I enjoyed the benefit of the best development tools I have ever used; hence it is safe to declare this to be the most splendiferous product I have ever hammered together. At least, there is more "programmery stuff" in this game than in any game I have done yet.

Now, a player might not notice all the snazzy-keen things I stuck in. One reason that you might not have noticed them is that they're not there! I ended up taking out much of the neat stuff I had once put in. Yes, it was painful, but there is a whole pile of stuff that was here yesterday and is gone today.

The best example is trade. I had an entire subgame devoted to trade. You could buy and sell your stuff to other players, deciding how much stuff you wanted to sell, haggling over the price, seeing what kind of deal you could make. And there was a "company store" that would buy your surpluses or make up your shortages, for the right price. There was money that you could accumulate over the course of the game-it was all quite elaborate. And two months before finishing the game, I ripped it all out. Egad!

Why, you may wonder, would a game designer rip out perfectly good stuff? Especially when that stuff is what marketing types like to call "fee-tyures," the kind of things that they put on the back of the box in bulletted lists. So why did 1 do it?

The answer is simple: it wasn't fun. Remember fun'! That's the stuff I'm supposed to be selling you. Trade worked. It provided a useful function in the game. But it did not really advance the "gaminess" of the game. It didn't make the game any more fun. So out it went, and with it two months of hard work. That's the games biz.

There were many other things deleted from the game: transportation (you could build railroads, ships, wagons, etc. to move your stuff around); factories in each province; factories as capital assets; military power divided into infantry, cavalry, and artillery; nifty pie-chart controls for allocating workers (they weren't fast enough); and lakes and seaports.

Then there are the features I put a lot of time into that few players will notice. Call it bad prioritization on my part. Consider, for example, the continent generation. My algorithms put together a map that has mountains, deserts, forests, roads, towns, and provinces. What is really surprising about this is that it actually works. Take it from a programmer who spent two months discovering every possible way that algorithms could create nonsensical continents. Provincial capitals floating in the middle of oceans. Provinces that are too big or too small. Mountain ranges that extend into the ocean. Roads leading nowhere. It was rough, but the final result is pretty good. You might occasionally see a provincial capital clinging right on the very edge of a continent, but otherwise the algorithms run well. My only regrets are, first, that the continents are a little too conservative-always boxy and simple. Second, the algorithms take far too long to build the continent. Try as I might, I could not speed them up enough. Ah, well.

Another cute stunt was the algorithm to create province names. Did you notice that each and every province has its very own name? And that there seem to be gazillions of different names? And that they all seem to have a certain flavor to them? Well, that's because I worked long and hard on a clever little algorithm to create province names. It has some flaws in it, but it does work fairly well. But how many people will notice?

Lastly, there's that face-display algorithm. In the Expert level game, the faces of the different players display a variety of different emotions. This is important stuff, because the human face is a fundamentally important medium for human communication. Until now, all we game designers could do was copy pre-drawn faces onto the screen. Since a pre-drawn face consumes a goodly amount of RAM and disk space, we could never afford to have many such faces. What we really need is a way to slap any given expression onto any given face That's what this game has. Look for further developments in this area; it's important.

Well, I have boasted enough, so now it's time for a mea culpa. 1 will freely admit that the implementation of color leaves much to be desired. What every owner of a color display wants is a full-color high-resolution display. This creates major design problems. How does one create displays that work well with both color and black & white displays?

My solution was to colorize existing black & white images, instead of creating true color images. All the basic graphics are designed for black & white, but on the color display, color is added. This is bad enough (I call it "Ted Turner color instead of Walt Disney color") but it gets worse. The map (on the Macintosh II) is still in black & white. I went to the trouble of making a full-color map, but it consumed huge amounts of RAM and the scrolling was abysmally slow. I felt that the slow scrolling interfered with the game, so I axed the color map. Sorry about that.

Lastly, I would like to acknowledge the many people who helped with this game. It's amazing how many people influenced this game one way or another. At a phenomenal meeting in September 1988, Dan Bunten made a suggestion that profoundly simplified an otherwise convoluted design. Dale Yocum made many suggestions on user-interface issues throughout the design process. Eric Goldberg weighed in with his comments on the overall game structure. Peter and Caitlin Mitchell-Dayton created magnificent artwork for the game (the cherubs are their favorite part). Amanda Goodenough drew the artwork for the appendix that follows this one. Carol Balkcom

kept my feet within striking distance of the ground with her many common-sense suggestions. Susan Lee-Merrow and Gregg Williams playtested the game. Dave Menconi carried out in-depth playtesting and QA testing. And Kathy, my wife, suffered through hundreds of hours of creative angst, hand-wringing, and foaming at the mouth, all with good grace and a readily bent ear.

I'm really glad this project is finally over.

A Weird Appendix

In which are presented the concepts behind the game

After-Dinner Conversation

"That was an excellent dinner, Florin. Please congratulate your chef for me."

"Thank you, Embert. He certainly did an impressive job tonight?

"That wine-it's Rhenish, isn't it?"

"I have no idea; I have never pursued oenology. YOU are the man of wealth and taste."

"So I have been called," Embert laughed. They had reached Florin's study, a simple room with two very comfortable chairs, no decorations, a desk and table, and a fireplace that was not in use. Florin swept up her robe with her arm prior to scating herself.

"So tell me, Florin, have you reconsidered that silly theory of yours?"

"To which silly theory do you refer, Embert? I have so many?

"I have in mind your latest perambulations on the economics of cultures?

"Oh, yes, THOSE! Yes, those ideas are particularly pretty, aren't they? I must admit, I do take special pleasure in the cleverness inherent in those ideas."

"I will surely concede their cleverness-you have always been a dazzlingly creative thinker. But the undeniable cleverness of the conceptual structure in no way alters the simple fact that they are flat, dead, wrong. Impressively clever, yes, but still wrong:'

"Well, then, Embert, you will be frustrated to learn that I have indeed reconsidered the matter (largely at your behest), and that I have further developed and even extended the conceptual structure."

"Oh, no! I should have known. Ah well, I suppose that it will supply grist for tonight's discussion. Where **did** we leave off last time?"

"As I recall, we had reached an impasse over the role of technological innovation. To plunge right back into it, I reiterate: technological innovation plays no primary role in the economic development of a culture. I know that you find that assertion incredible, but let me develop the point:

"I am not arguing that technology itself has no impact on economic development; that point should be patent. Rather, I focus more narrowly on technological innovation. Suppose, for example, that we were to inject the knowledge of, say, plows, plowshares, the tri-annual rotation system, and so forth into a Stone Age tribal culture. What good would it do them? They couldn't use the knowledge if we gave it to them. Even if some Stone Age Einstein were able to figure it out for himself, to single-handedly invent plows and harnesses for oxen and the techniques of long-row plowing, it would do no good whatever. A tribal group of a few dozen individuals couldn't afford to use the technology. Who would build the harnesses for the oxen? Who would care for the oxen? Who would make the storage bins for the grain? Who would maintain the calendar so necessary for successful agriculture? It just couldn't be done by a group that small."

"But Florin, you take your argument too far. You argue that technological innovation has no impact on economic development. What about the myriad serendipitous discoveries that have changed so many histories? What about Oersted reversing the wires, or that Phoenician fellow who discovered glass in his campfire, or Smith and penicillin'! Surely you will not relegate these acts of intellectual heroism to some statistical dustbin, dismissing them as 'fluctuations"?"

"Indeed I shall, Embert. I readily concede that some discoveries came earlier than they should have, but it is equally true that some came later. The decisive factor was not the earliness or tardiness of the discovery, but the receptiveness of the culture to the discovery. To cite an easy case, the Vikings discovered the New World 500 years before the Spanish, but their culture was not receptive to the discovery, and so nothing came of it."

"But **why** were the Vikings unable to exploit the discovery? (I shall overlook for the moment the fact that it was not strictly a technological discovery.) Was it not because their culture was simply not attuned to colonization, and instead pursued other goals?"

"But is not colonization itself an expression of population? An underpopulated culture does not think in terms of colonization. Only when a culture reaches a certain population density does colonization acquire any value. Had Viking culture been more populous, perhaps they **would** have initiated colonization of the New World. And this argument brings us straight back to my central thesis about population and progress."

"Ah, yes, Florin's direct equation: progress through population. Better living through procreation. I cannot believe you would entertain a hypothesis so easily countered. What about China, a nation swimming with people for so many thousands of years? Or India, a nation equally blessed? What about the Third World nations of the twentieth century? Their exploding populations should have guaranteed sensational economic progress, but in fact the reverse happened. Moreover, the hypothesis cannot even be held to be original; Marx himself zeroed in on expanding markets as the underpinning of capitalism."

"Well, I think that we should dismiss Marx right now. I've never understood the man's theories, especially after the French got ahold of them."

They both laughed.

"But to address your historical observations: yes, you have a good point about excessive populations. But remember that China's failure was a very near run thing. They were making excellent progress' there for a long time, and I really held my breath when they sent that expedition to East Africa in the 1400's. They came so close, but they lost it. I was really rooting for them. But the Europeans beat them to the punch."

"Yes, I really got you on that one, didn't I? Your genteel Chinese couldn't quite pull it off. They turned inward and lost their edge, overpowering with their stultifying self-assurance even the invading Mongols and Manchus. Your theories certainly fell apart there! Meanwhile, my feisty Europeans set about taking over the globe."

"Yes, you nailed me on that one. What did that cost me? A dinner?"

"A dinner **and** that black obsidian orb of yours. I keep it in my meditation tower."

"'Ah, yes, I miss that orb. Ah well, I deserved to lose-1 was wrong. But this time I am not wrong. I am quite certain that population growth is the primary factor in economic development. I concede that there are many qualifying considerations, such as the degree to which population expansion creates a labor surplus, but I will insist that the core issue in a culture's economic progress is population growth."

"You insist, eh'! Do I detect a challenge in that word'! Are you leading up to something?"

A wry grin spread over Florin's face. "'Actually, no, I wasn't leading, but now that you mention it, I think that I would be willing to try another experiment with you. What will be the stakes?"

"If I am right, I want that perfect feather quill that you keep by your table."

"And if I win, I want my black obsidian orb back."

"Done!"

"Very well, Embert, let us design our experiment. I shall create a planet with four billion different continents."

"Why so large?"

"Because I want a proper statistical foundation for our work. I've always felt cheated by the way things came out on Earth. You must admit, it really was a fluke."

"A fluctuation, you mean? I thought fluctuations didn't matter."

"They shouldn't matter. Really, didn't the denouement of that experiment leave you feeling dissatisfied?"

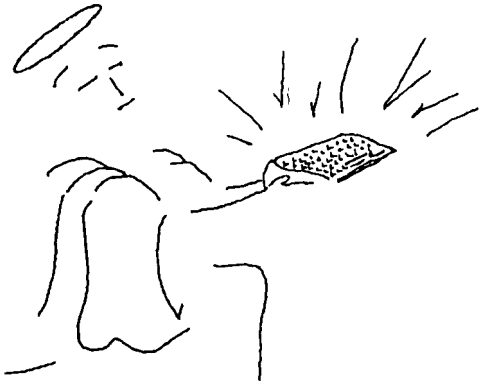
"Not I, old friend; I can understand your frustration with an ending that you would characterize as startling, but I found a reassuring irony in it. It was so, so.. . [he paused, searching for the word]. . . so very true to form for them."

Florin laughed. "Indeed it was. Although I must say, the line I shall always remember was Hitler's"

"Which one was that? There were so many memorable ones."

"I refer to his comment upon learning that he had just triggered World War II: 'What do we do now?"'

Embert howled uproariously, slapping a thigh. "Oh, yes, yes, that was choice. That was the best." He wiped a mirthful tear from his eye. "You know, I truly outdid myself with him. I zeroed in on the essence of those people, their psychology. He certainly proved a lot of my arguments. Yes, I don't think I've every done as well as with him. But I digress. We were discussing your new planet. You shall have four billion continents. That is acceptable to me. Why don't we begin immediately with that?"



"Capital idea, Embert." Florin leaned up from her seat and called into the next room: "Gabriel! Bring me my keyboard!"

Gabriel appeared bearing The Keyboard of Creation. With an overly theatrical flourish he placed it on the table in front of Florin. "Will there be anything else, madam?"

"No, thank you, Gabriel. You are dismissed."

"Very good, madam."

Designing a Planet

They set to work, Embert crowding over Florin's shoulder as she fired up the machine.

"Now then, good Embert, what shall our continents look like? Shall they have mountains and forests and deserts and islands and lakes and other good terrain features?"

"Yes, I do think that you should include the mountains, forests, and deserts, as we can make them the choicest locations for acquiring certain resources. Some areas will be well-endowed with crucial resources, while others will be cursed with shortages of resources. That will force our protagonists to cope with one person's surplus and another person's shortage. What a lovely way to encourage lively competition!"

"Hold a moment, my warmongering friend. I agree that we do need to encourage territorial disputes by distributing natural resources unevenly, but we must not take it so far that a particularly unfortunate mortal would never be able to get his economy started. We must provide that the mortal cursed with poor terrain still has enough resources that he can get started."

"Ah, my bleeding-heart friend, why must you always soften the harsh realities? If some mortal is cheated by territorial circumstances, why would you want to reverse that verdict?"

"Because it would ultimately make the game less interesting. Do you really want the outcome to be determined by the mere luck of the random number generator? What would that prove? Don't we want to see how cultures interact economically'! How could a connoisseur of war like yourself take any pleasure in the sight of a rich and powerful nation squashing a poor and weak one?"

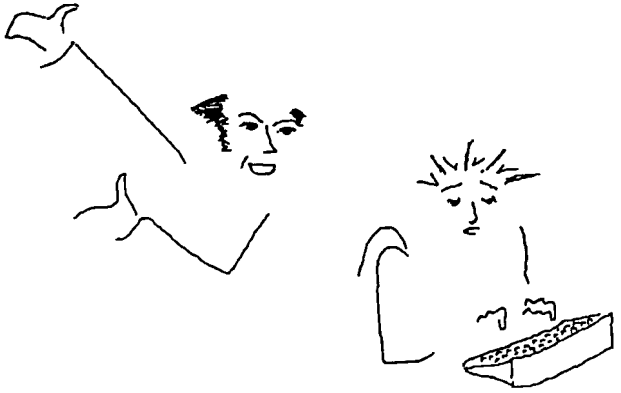
"You are right, of course. Thank you for correcting me. Let us provide a modicum of natural resources to each mortal, augmented by a bounteous supply for those blessed with the proper terrain."

"Well and good, Embert. Now, what about other terrain features? Do we want lakes and islands?"

"I should think not, Florin. I think that we should remove all maritime factors and make this a strictly land-based environment. We have spent months debating the role of maritime factors in the social evolution on Earth, and we never did reach any agreements. It was simply too complex. The transition from a land-centered regime to a maritime regime coinciding with the fall of Byzantium ."

"No, Embert, the transition came earlier than that. Fully 54% of all trade tonnage in 1.300. "

"You see, we still cannot agree on anything. I must say, at first I liked your ideas about water-borne traffic, and all those rivers and seas everywhere to make certain that the humans would be able to transport things at a very early stage of their social evolution. But we were never able to agree on what it all meant! We debated endlessly and fruitlessly. Let's leave maritime stuff out this time, just for simplicity's sake. Please?"



Florin laughed. “Very well, Embert, I will forgo my preference for seaborne activity. Just for you. So, we won’t have any lakes or islands or maritime geography. Anything else?”

“How about a few volcanoes spewing lava, and perhaps the occasional earthquake with yawning crevices swallowing people and horses, and.. .”

“That’s another game, Embert.”

“Yes, I know. Sorry.”

“Very well. I think that we have the physical geography down pat. Now, how about the political geography? Shall we just go ahead with our standard provinces-cum-countries system’!”

“I don’t know, Florin; it seems so staid. Every planet we’ve done had provinces making countries. Can’t we come up with something better this time?”

“Be my guest, Embert.”

A long pause followed. Embert paced about, hands clasped behind his back. Several times he jerked to a stop with a sentence pregnant upon his lips, only to hesitate and swallow the thought. At length, his shoulders slumped.

“Very well, Florin. Provinces and countries.”

“If it ain’t broke, don’t fix it. Now, what about roads connecting provinces?’

“Oh yes, I assumed that we would have some roads. But how many? Should every pair of adjacent provinces be connected by roads?”

“Surely we can do better than that. Let’s say that, oh, only half of the adjacent provinces are connected by roads. The others will have no connections other than the simple adjacency.”

“Ooh, ooh, we can put the forests, mountains, and deserts into those places where there aren’t roads!”

“Capital idea, my man! Yes, let’s! And that suggests another simple idea: attacks down roads are easier than attacks across borders without roads.”

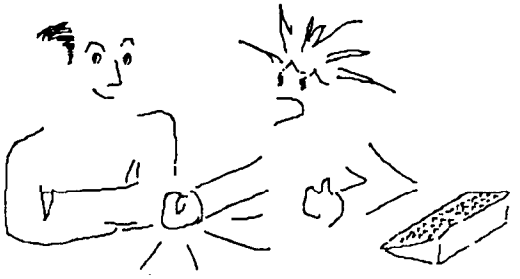
"Why, Florin, you’ve never been one to take interest in the finer points of military technique. I’m pleased to see you taking some interest in the subject.”

“Some of your voluminous knowledge on the subject had to rub off on me. Now then, let’s see how it all adds up.”

Florin had been tapping away at the keyboard as they spoke, translating their ideas into code. Her fingers flew across the keyboard in a grey blur, the lines of code rocketing across the screen. Like a concert pianist reaching the crescendo of her piece, she completed her work with a dramatic flourish and melodramatically pressed the carriage return, then looked up at Embert with a self-satisfied smile. Embert glanced down at the screen, paused, and then looked up at the ceiling. Alarmed, Florin looked back down at the screen. “What!?!?! It refused to compile?!?! What’s wrong with this thing?”

“Urn, perhaps, dear Florin, just perhaps you made some minor programming error?

Florins fists clenched and she sat more erect. “You forget, friend Embert, just who I am. Rememhcr. 1 am omnipotent. omniscient, and infallible.” She paused, and then said slowly. evenly, and with great emphasis on each word:



“I...DON’T...MAKE...PROGRAMMING...ERRORS!”

Florin set to work examining the precise nature of the problem. After a few moment’s effort, she uttered a triumphant cry and pointed at the offending item. “There, there it is! The language specification calls for this class of records to be infinitely dimensionable, but the compiler writer decided to restrict it to three dimensions and never declared the restriction. Damn that compiler writer!”

“Florin! Do you mean that literally‘! Do you wish to consign him to my care?”

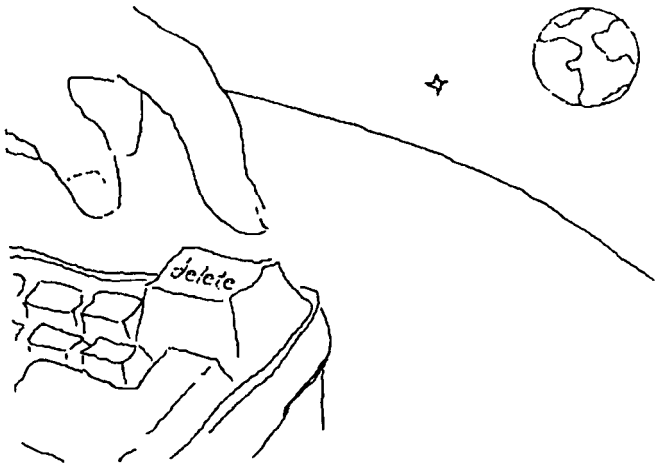
Florin glanced up, realizing that she had lost her temper. She started to correct herself, then hesitated, thought for a moment. A wicked smile slowly crept across her face. Very softly she said, “Yes.. . yes.. . why don’t you take him? Truly he deserves it. Yes.” She smiled with great satisfaction for a moment. Then she sat up and muttered, “Back to work? It took a few moments to program around the flaw in the compiler. “There. All done now. Let’s try it out.” Once again she pressed the carriage return to engage the compiler, albeit a little less melodramatically this time. They watched with satisfaction as the program compiled properly and launched. It created the planet and built something valuely like continents. “Oh my!” Embert exclaimed. “That’s not right at all. Oh, dear me!”

“Of course, how silly of me! In my rush to correct that stupid compiler problem, I overlooked that possibility of word overflow on one of the variables. It’s all that compiler writer’s fault. Will you see to it that he occupies one of the less temperate climes?”

“But of course, my friend. I suppose that we shall have to dispense with this abomination of a planet?”

“Yes, yes, let it go.” Florin pressed a key. Somewhere in space, a malformed planet exploded into atoms. On the next try, it came out right. They looked over their new planet with satisfaction.

“Perfect! Perfect! This will serve our purposes admirably! Florin, you’ve done it again!”



Population Design

“Very well, what shall we do now?”

“I suggest that we consider the population structure of each country.”

“There isn’t much to consider, is there? Each province has a population and a certain amount of farmland. The farmland is just enough to feed the existing population using the primitive methods available at the beginning of the game.”

“Let’s give them a small surplus to permit some opportunity for economic growth.”

“Very well, a small surplus it is. Now, we shall lump together all the populations in all the provinces to create the labor force for the entire country?

“Embert, is that wise? Shouldn’t there be some sort of transportation limitation on the economy of each country? I am uncomfortable with the idea of just lumping everything together without any consideration for transportation factors?’

“But Florin, do we really want our subjects to devote their energies to getting the train schedules running smoothly? You know how complex a task that can be Why tax their little minds with large problems that do not ultimately bear on the matters we wish to explore?"

“I suppose so. It's just that I have always been so fond of trains and boats:’

“Well, we can do a Transportation Planet next time."

“Very well. On with the design!”

“We were considering the population of each country. Now, how should that population grow? I suggest that population grow in proportion to food surplus.”

“That makes sense. For simplicity, let us declare that one ton of food per person per year will sustain life with no population gain or loss. Less than one ton will lead to population decline, more will lead to growth.”

“What should the function look like‘!”

“Well, we don’t want it to be too harsh. Let’s allow food supplies to fall to, say, about half a ton per person before wc start lo get severe population decline.”

“Fair enough. On the other hand, though, WC shouldn’t be too generous with population growth. I certainly don't want anything like a linear function:‘

“Most certainly not. We can't have them doubling their population merely by doubling their food surplus. Let's put in a nice diminishing returns function- how about a square root?"

Food Functions

"Yes, that should work just fine. Yes, indeed. Now, how about food production? How should we have that work?"

"Well, as I see it, there are three factors that will control food production: acreage, labor supply, and machinery."

"The acreage will be fixed by the stock of provinces in the country. What about the labor supply? I suppose we'll need some sort of function that will permit diminishing returns for increasing numbers of workers per acre."

"You know, Embert, we could greatly simplify matters by freezing that variable."

"What? Freeze the number of workers per acre? That's crazy! Why would you want to do that?"

"Well, in the first place, our experience with Earth indicated some stability in that number across a wide range of circumstances. The only strong exception was the rice-growing culture of East Asia, which had very high labor densities. But the wheat and cereal growing regions exhibited a remarkable stability in the number of workers per acre."

"Towards the end there was a precipitous decline."

"Yes, that's sure, but I think we can safely skip that. And think how much it would simplify the system!"

"That's certainly true. Freezing agricultural labor at one worker per acre would eliminate one degree of freedom from the situation. Yes, I'll go for that."

"Good. Now we have just one variable left to tackle: machinery."

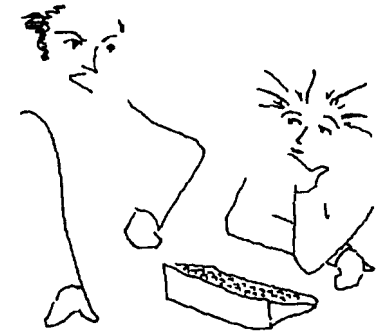
"Which is, of course, the dominanf one for the purposes of our study. What we need is a sequence of agricultural tools that are increasingly powerful:'

"I would greatly prefer to see the progression be one of regular increases in the utility of the succeeding tools."

"Dear Florin, you are certainly being structured this time around. Where are all those creative flourishes you used on Earth, or the baroque creativity you expressed with Lamina? Are you losing your flair?"

"Not at all, Embert. I want a nice, simple planet this time around. We spend so much time arguing the intricacies of the matter that this time, I want something with no intricacies."

"I am hurt, Florin. Have you lost the enjoyment of our discussions?"



Florin leaned back from her keyboard and laughed. "No, no, Embert, that's not it at all. I just want to crucify you this time around, without any intricacies to obstruct my intellectual assault."

"Well and good I shall be on my guard. To return to the subject at hand: you wanted a simple progression in the increases in utility of agricultural devices. Would a factor of two be simple enough for you?"

"Each succeeding agricultural tool is twice as productive as the previous one? Yes, that sounds straightforward enough. It appeals to my sense of order."

"What shall we call them'!"

"We'll make up four or five. It doesn't matter what we call them. The locals won't know the difference."

"I would impose this constraint on the sequence: not only should the productivity of each tool increase in a regular geometric fashion, but the production cost should also increase geometrically, but at a lower rate. Thus, as the mortals move along the technological curve, they enjoy greater efficiencies?'

"Very well. I suppose that we shall want to start off with simple farm tools and move all the way up to tractors?

"OK. I'd like to see iron plows and irrigation systems, but that makes only four. Can you suggest at least one more?"

"Well, we are lacking a tool from the middle Industrial Revolution period. The farm tools and iron plow are pre-Industrial Revolution, and the irrigation and tractor are post-Industrial Revolution. That does leave a historical gap that we must fill."

"Hmm, what about a cotton gin?"

"No good-- too narrow in application."

"Very well, how about a steam-driven combine? It will require use of the steam engine. We do have a problem with the steam engine. Its primary application on Earth was for transportation, railroads and steamships, but you have eliminated transportation considerations, so our planet's occupants will simply skip the steam engine. That seems such a shame. This would correct the problem."

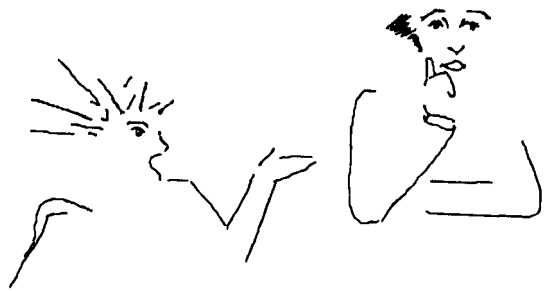
"I like that. We have five agricultural technologies."

"Now it's my turn. We must discuss the weapons technologies that we will make available to our mortals:'

"Ah, yes, I knew this would come. Look, I am prepared, with some reluctance, to concede the necessity of conflict, weaponry, and war. But can we make it a little less bloodthirsty this time?'

"But conflict is the acid test of our theories. War is the great judge of societies, the wolf that purges the herd of its weaklings, the cleansing agent that sweeps away all that is false and weak. Look what happened when we held back the barbarians from the Roman Empire. The damn thing slowly rotted, smothering the European peoples with its putrescence. Attila was the best thing that could have happened to Europe, and you stopped him!"

"Now, I've told you before, I only intervened at the Po Valley in 452. I felt that there was still some life left in Rome, and I could not stomach those Huns tearing everything down. But I had nothing to do with the battle of Campus Mauriacus or Nedao. Those were fair fights, good examples of what you call 'the cleansing agent: It was your Huns who were swept away, fair and square."



"Humph! I suppose so. Still, the Huns had a lot of bad breaks. Attila's death had to be one of the worst."

"Sympathy for the Huns, eh? Sorry, Embert, I don't feel it. Now let me counterattack. If war is such a purifying agent, what about the Great Plains American Indians? Their culture institutionalized perpetual warfare. At puberty, a boy became a warrior, not a man. And the result was an utterly stagnant culture. Those people wasted 10,000 years while almost every other culture on the planet made great strides forward. And don't give me that line about 'lack of resources: The Indians of the Great Plains were surrounded by gigantic herds of bison, a food surplus that should have touched off a population explosion, but they never could get their population to increase because they were always killing each other. Even sparing the women and killing only males, they still couldn't get a population increase. The direct result of their warlike attitudes was that they were still in the Stone Age when the Europeans arrived."

"That's true, Florin, but recall what the Europeans did to them: they wiped them out! War corrected the problem!"

"I'm sorry, Embert, but you haven't convinced me. I will concede, though, that some amount of warfare is necessary. I think that we can work together within that compromise, don't you?'

"Yes, of course, my good friend. Tell you what-as a gesture of goodwill, I propose that our sequence of weapons stop short of atomic weaponry. No nuclear weapons, ICBMs, ABMs or any of that good stuff. Let's stop with tanks. 1 can have enough fun with them. Fair enough?"

"A noble compromise! Done!"

"So we shall have tanks at the top of our sequence and, what, umm, swords at the bottom?"

"If you don't mind, Embert , 1 would prefer not to participate in this part of the design. Feel free to devise any reasonable sequence you fancy?

Embert laughed. "Very well. 1 shall do so. Let's see, I suppose that we should follow up swords with firearms. What firearms do I want'? Arquebuses, muskets, culverins, bombards, field cannons, howitzers-there are so many from which to choose."

"Please don't drag this process out."

"Very well. I shall keep it simple. I shall follow swords with muskets, rifles, cannons, and lastly, tanks. That's five. Good enough?"

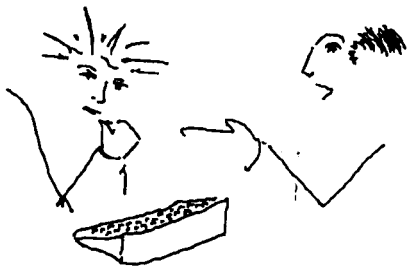
"Fine. Now we must move on to what is perhaps the most difficult task we face: the definition of all the commodities used in the economy and the relationships between them."

"I was afraid of this one, Florin. 1 presume that you want to keep things simple."

"Yes, I think we should strive for the simplest possible structure. Rich enough to demonstrate the principles, but not so messy as to dominate the economic interactions?

"We have agreed on the end products, agricultural tools and weapons. Now, should we work up from raw materials or down from the end products?"

Transcriber's note: There followed a tedious and extended discussion of the merits of nearly 100 different raw materials and intermediate products and their natural interrelationships. The two interloculors went to great lengths to examine every one of the many millions of mathematically possible combinations. After much trial and error, a coherent set was finally obtained, but not before the patience of the transcriber was exhausted. The transcription resumes at the agreement.



"So let's go over it one more time, shall we?"

"Please, Florin, let's!"

"For raw materials, we have lumber, coal, sulfur, iron ore, light metals, heavy metals, petroleum, and nitrates. Agreed?"

"Agreed. My list of intermediate materials now includes charcoal, pig iron, iron, low-grade steel, high-grade steel, gunpowder, explosives, and high explosives. That's still eight, yes?"

"Unless the complexity of this discussion has addled my arithmetic powers as badly as it has yours. What does our list show for machinery?'

"I have steam engine, wire, pipe, electrical devices, ball bearings, diesel engines, and instruments. How many is that?"

"It's only seven, but we can live with it. I just can't accept iron parts as a prerequisite for anything else."

"OK, OK. I think we have it. You have the input/output diagram for it?"

"Right here."

"I must tell you, Florin, I am not at all comfortable with this structure. I'm not suggesting that we should go back over it one more time; I think that we have driven this one into the ground. My fear is that the thing may still have holes in its structure. holes that We will not be able to divine."

"Embert, if I had intended to make flawless economic systems, I would have made them that way. Part of the fun of all this is seeing how it works out, yes?"

"I suppose so. So now let us turn to another bedeviling issue: the mechanics of production. Land, labor, and capital. How shall we balance these factors this time around? I have a truly novel suggestion: let us dispense entirely with capital in all its forms."

"WHAT!?! Embert, is this another one of your jokes, like that planet with non-commutative sexual relationships? I felt so sorry for those poor people.. ."

"Hey, what's the point of creating all those worlds if you can't engage in a bit of levity?"

"Indeed! What about all those particles you kept foisting on the earth physicists?" Florin chortled. "You got them started with the simple proton-electron-neutron triangle, but then came the mesons, baryons, and leptons, and then the neutrinos, and then when they started getting close, you really went wild. Quarks! Those were great! How did you ever think up anything so funny?'

"I don't know what go into me. I considered the whole thing an intellectual challenge, but the little buggers kept going to higher and higher energies, and I had to keep making up new and better schemes to keep them at bay. Once the joke got started, I couldn't stop it-you can imagine what their reaction would have been had they discovered the truth. I'm just glad that they were so good at translating laboratory results into weaponry so quickly. It sure got me off the hook."

"Yes it did. Imagine-a blue quark bomb. Oh, well."

"Well, this time, I am not joking. After all, what is capital but the accumulation of the product of labor? And do not all capital assets depreciate?"

"Yes, but many of the largest capital assets depreciate very slowly indeed."

"HOW slowly, Florin'! How long does it take the typical capital asset to depreciate?"

"Well, that depends on the capital asset in question. Some assets depreciate in years, while ot hers take decades."

"There IS a pattern, though. In general, capital assets do not last longer than the average lifetime of the builders. After all, who wants to expend precious resources creating an asset whose returns will not be fully realized in one's own lifetime'!"

"There are many cases of societies building capital assets whose lifetime greatly exceeded the life of an individual. The Pyramids, the gothic cathedrals, the great bridges and dams- there are thousands of counterexamples to shatter your claim."

"But every one of those counterexamples was a public work, undertaken not for private profit but rather for the public good. Moreover, every one represented an investment too large to be undertaken by private concerns. If we restrict our considerations to business activities undertaken for profit, I think that you will find that my generalization holds water:'

"I suppose so. But what is its significance?"

"Just this: if We use a long enough time scale in monitoring economic activity. **everything** depreciates! If we use as basic unit of time the life span of an individual, then all capital assets will depreciate away in a single unit of time. And that means that they can be ignored!"

"I am not willing IO completely dispense with capital; its role in economic development is absolutely undeniable. And how do you explain the accumulation of wealth that is always associated with economic progress?"

"I do not propose the total elimination of capital from the economy, only its elimination from our direct involvcmcnt. In effect, each generation creates its own capital. In any real system, the creation and depreciation of

capital is an ongoing process. At any given moment, slightly more capital is being created then depreciated, and so the net stock of capital grows. What 1 am proposing is the artifice of gathering all the creation for a single generation into a single instant at the beginning of that generation, and also gathering all the depreciation for a single generation into a single instant at the end of the generation. This vastly simplifies the behavior of the system from our point of view, does it not?"

"1 must admit, it is a brilliant way of simplifying an otherwise knotty problem. 1 will readily concede that the handling of capital assets is a truly infernal problem. Your scheme does banish that problem. But 1 must insist that you recognize this as a gross simplification."

"Oh, yes, 1 will gladly concede that point. A simplification, yes; but one whose clarifying effects make it worth the sacrifice."

Very well, I accept your proposal. we shall have no capital assets in this planet. The workers build the factory in their youth, use it to make product in their maturity, and decommission it as they retire:'

"Very well, we have eliminated capital from our considerations. Now, what about land and labor?"

"We have already established the basic land factors: farmland, forest for lumber, mountains and deserts for other raw materials. 1 think we are in good shape there. All that remains is labor."

"You know, Embert, 1 begin to appreciate the novelty of your system. An economic structure dominated by labor. Do you think we should fetch Karl Marx to look in on this once it is complete? He would surely think that he had died and gone to heaven!"

"Please, don't reward my creativity with exposure to that long-winded bore! Don't you recall how we fought over who would be stuck with him?"

"OK, OK, we'll leave Karl out of this. Now, back to labor. How shall we handle it?"

Productivity Functions

"I deem it absolutely essential that we provide a solid basis for economies of scale. Productivity **must** increase as an exponential function of labor?

"Agreed. But there are two issues we must tackle. First, should the proportionality constant in the productivity function be the same for all industries, and second, should the exponent be the same for all industries?"

"Well, let's figure it out. If we use the same proportionality constant for all industries, that implies that workers in different industries would be equally productive. If it takes five workers to produce 100 tons of coal, then it would take five workers to produce 1000 tons of, say, electrical instruments. That doesn't make much sense, does it?"

"Obviously not."

"So our proportionality constants must differ across industries. 1 further believe that we must have different exponents. old technologies simpler and more labor-intensive, would enjoy smaller economies of scale, expressed mathematically in a lower exponent in the productivity function. Newer and more complex technologies would. I presume, require more in the way of capital and less labor, permitting them to enjoy larger economies of scale, and hence we would want lo use larger exponents."

"But aren't you going too far? After all, who will be able to appreciate such subtleties? Do you really think that the mortals will be able to figure out the differences between the industries with differing proportionality constants and exponents?"

"Probably not. But even if they don't understand it, the system must still work. The more advanced industries must have smaller proportionality constants and larger exponents so that they are less efficient at smaller scales and more efficient at larger scales. This is an essential component of technological progress. Without it, we would have 15th century peasants building digital watches. In effect, my economies of scale theories link with your population theories to insure that technological progress parallels population increase:'

"Embert, you do seem to have quite an infatuation with economies of scale. Is this your latest interest?"

"Yes, I have been quite taken by the notion of late. Isuppose that what got me started on this was the realization that economies of scale are nothing more than an operational expression of the essence of toolness. Bigger and better tools cost more but are more efficient. That's just a rephrasing of the notion of economies of scale. It's really quite fascinating."

Technology Transitions

"Florin, I would now like to turn to the difficult problem of technology transitions. It is vital that the mortals move through the technological sequence that we have created in a regular and orderly fashion. I am concerned that this might not happen."

"Come now, Embert, it should be easy. Each technology in the sequence is twice as efficient as its predecessor. That should be motivation enough to guarantee an advance up the ladder."

"Actually, we may have to worry that the motivation might be too much. What if an iron plow is twice as productive as farm tools, and costs only 50% more? Surely your subjects would move immediately to the iron plow."

"But Embert, that is precisely our intenation!"

"Yes, but we don't want it to happen too soon. If we fail to adjust the equations properly, we might well see 16th century peasants riding tractors."

"I see your point. How can we balance the equations?"

"I believe that we need to use exponentail functions to express the economies of scale. To make advanced technologies more productive at the high end of the production scale, we need to give them larger exponents. And to hold their value down at the low end of the production scale, we need to give them small multiplicative coefficients. The trick then will be to balance the system of equations to guarantee that the entire set of equations (one for each technology) fits together properly. I think that it all turns on selecting a good set of crossover points."

"Well, what is it if we initialize the situation such that the mortals start halfway up the scale with the lowest agricultural technology. that way, they will only need to double output to saturate that technology, and when they make the transition to the next technology, it will automatically be halfway toward saturation (because it is exactly twice as productive)."

"This implies that crossover points will be spaced at neat intervals of factors of two in output. I like that. The only remaining issue is to set the boundary conditions. Just how many workers should it take to handle all this?"

"The boundary condition is established by our initial population and our desired growth rate. If they put all their labor into building agricultural tools at the lowest level, then the labor supply should be just large enough to create enough food to achieve, say, 30% growth."

"Fair enough. This still requires me to balance the system of equations. Ugh! I'd better get cracking."

Military Factors

"You know, Florin, we have been avoiding the all-important issue of military operations. I realize that you find the matter distasteful, but it is incumbent upon us to address it now?

Florin sighed. "Yes. 1 know, Embert. Let's get it over with now. How do you want to handle this?"

"Well, we have already figured out the source of military power in production. The only tasks are the actual application of military power. First off is the problem of getting the weapons from the factories to the field:'

"1 would very much like to minimize this element of the system. Can't we just make it happen automatically?

"Florin, you can do anything you want. Sure, we can make it automatic. How, though, can we insure that the automatic process makes sense?"

"What if weapons are distributed each turn in proportion to the previous turn's concentration? If you had concentrated forces in one province on turn X, then on turn X + 1, weapons will be sent to that province:'

"I like it! Yes, that is very clean. OK, so now we turn to the problem of combat results computation. Province A attacks Province B: how do we calculate the winner?"

"You do this. I Embert"

"Very well. here goes we don't want to encourage too much attacking, so let's put in some attack penalties. First off, I suggest that the attacker automatically loses 10 firepower points, and the defender fights with an extra bonus of 10 firepower points. This will discourage attacks with small forces. I hate it when sombody wins a victory with trivial forces. I want to see Combat! Battle! Not some petty skirmish leading to conquest. OK so far?"

"I would prefer not to have such automatic bonuses. they won't make sense to the locals. Your proposal presumes a standard calculation of the ratio of attack strength to defense strength. What if instead we use the difference between the two rather than the ratio'! That would automatically solve the problem of minimum attack strength requirements:

"Hmm, you make a good point. I suggest that we defer to a Higher Authority on this matter."

"Very well, Embert; you do the honors. I take my normal position."

Embert reached into the folds of his gown and brought out an ancient coin. He flicked it high up into the air with his thumb. Both parties watched it spin higher and higher, just missing the vaulted ceiling, and arc down. Embert's eyes glanced down to catch Florin's attention; he grinned impishly before looking up again to follow the coin as it fell into his extended palm. He slapped it down hard onto the back of his hand.

Then he slowly raised the hand, with coin still covered by the other hand, up to his face. Casting a facetiously suspicious glance at Florin, he raised one finger of the covering hand ever so slightly and peered underneath it for a few seconds. Then he looked up at Florin, took a deep breath, and announced: "Heads-I win!"

"Very well, Embert: strength ratios with additive penalties and bonuses."

"Next, I think we should have a strong terrain penalty. Let's say that the attacker is quartered attacking across terrain."

"What do you count as terrain?"

"Anything that isn't a road. Attacking down a road, you fight with normal strength, but anywhere else, your strength is quartered. That should force some sense of strategic maneuver onto our subjects."

"Anything else?"

"Hmm . . . oh, yes, we need a provision for the effects of the battle on the civilians. After all, they are the ones who pay the highest price. I suggest that we reduce the population of the attacked province by the amount of military power that the attacker brought to bear on the province. That way, a big conquest will wipe out the population and dramatically reduce the value of the province. Scorched earth, so to speak."

"Leave it to you, Embert, to remember these fine points?'

"Ah, but 1 am done now!"

Economic Unions

"Good! Now we have one last problem to address, and we are done. How are we going to prevent runaway growth in the eight-nation continents?

"I don't see the problem."

"Consider the question: at what point does one nation obtain an unshakeable lead over all the others?"

"That wouldn't happen until that nation has 51% of the total resources on the continent "

"No, it would happen much earlier. Remember, we have large economies of scale on this planet "

"I still don't follow you. What do economies of scale have to do with this?"

"Economies of scale in production imply that a 2:1 superiority in population translates into a greater-than-2:1 superiority in production. Hence a nation with 51% of the total population will have much more production than all of the other nations combined. In fact, given the strong economics of scale we have set up for this planet, a nation with only 25% of the total population could still produce more than all the other nations combined!"

"How could that possibly happen?"

"Here, I'll walk you through the numbers. Suppose that one nation has 25% of the total population and the other seven have 11% each. Suppose further that all other factors are equal and that the economies of scale work out to a cubic power in this case. Thus, the leading nation, with a population superiority of 2: 1, ends up with a production superiority of 8: 1. If all of the smaller nations throw all their production against the largest nation, the combined production ratio is 8:7 in favor of the larger nation. He's got a lock on victory with only 25% of the population base!"

"Mon dieu!" Embert stood stunned and speechless for a moment. "What are we going to do?'

"It's obvious that we must somehow permit smaller nations to engage in some form of economic cooperation that enables them to enjoy the benefits of economies of scale?

"Hold it right there, Florin! Are you about to drag me into some sort of trade scheme again?"

"Well, that was not my intention, but I will point out that trade would solve our problems handily."

"No good, Florin. We've been through this once before, with Planet Hubert. Don't you remember what a disaster that was?"

"But you must admit that trade worked well on Earth."

"That was different. On Earth, we decentralized trade. It was handled by millions of earthlings in millions of tiny transactions. It became a statistical function out of the direct control of the policymakers. It worked well that way. In fact, it worked so well that any attempt on the part of the policymakers to influence the trade process only garbled the process. It was funny, I admit. watching the poor fools struggling with a phenomenon that was out of their intellectual grasp. They'd twist the trade policy one way, and the currency valuations would jerk around to correct the problem, and then they'd try to stabilize the currency, and round and round they went, never getting on top of il. Yes, it was funny. But there was a clear message: trade cannot be handled by direct control. It's too intricate to match up two economies by hand. The matching must be done statistically?

"But wouldn't it be possible to create some sort of statistical arrangement for trade?"

"That's exactly what we tried to do with Hubert. Remember how that came out? We used that central store concept of yours to even out fluctuations in prices and supplies, and so the Hubertans spent all their energies interacting with the damned store! They bought and sold wildly and never noticed each other. And when we started twisting the numbers away from the store, they were unable to form a decent economy. Remember, a stable economy requires a perfect marketplace, and the half-dozen actors we placed on Hubert were insufficient to create a perfect marketplace. We needed a hundred different countries to make that work."

"But, Embert, we NEED trade. Without it, the biggest player will have a lock on victory."

"We need something, I agree, but trade won't work unless there are many countries to assure stable supplies of and demand for every commodity. Without the smoothing effects arising from large numbers of countries, trade breaks down. Admit it, Florin, trade is a statistical concept that works only in large decentralized systems. And such systems are outside the range of the tightly controlled experimental system we are setting up here."

"But do you have any alternative?'

Embert paused. He had been on a roll in his condemnation of trade. Now he had to change gears and was momentarily off balance. He hummed and hawed for a moment. "What if we allow them to directly merge their economics'!"

"What?!?! Simply merge their economies, just like that?"

"Well. yes, and why not? We're working at such a large scale here that it seems appropriate to me. After all, are not close trade relationships extended over a long time a form of economic integration?"

"Integration falls well short of union."

"True, but as a simplifying model, union expresses the concept, doesn't it?"

"Let me hear a proposal."

"OK, here goes. We allow nations to merge their economies for single turns. While merged, all their assets are pooled. They enjoy the benefits of economies of scale. They distribute the fruits of their labors, both military and agricultural in proper tion to the labor supply they brought to the pool. At the end of the turn, the union is dissolved."

"Who makes the economic decisions for the union?"

"Its sponsor, the person who declared the union. Anybody who joins a union surrenders economic sovereignty to the leader."

"Why should anybody do that?"

"First, what's the joy in figuring all those economic balances? Second, joining a union makes you stronger than you would be alone. It's worth it."

"It's a radical idea. We've never tried anything like this before."

"Is that any reason not to try now'? After all, it's just an experiment, a game. Besides, consider the interesting advantages that accrue from this. Think of all the interesting diplomatic interactions that arise from this system. Consider how quickly a player could rise or fall with the fortunes of his unions. Without unions, the planetary situation focuses on economics and military factors. The unions make it a triangular interaction between economic, military, and diplomatic factors. Now that's interesting, don't you agree?'

"You've convinced me. Let's do it!"

"Done!"

And they did it.

-Chris Crawford (text)
-Amanda Goodenough (artwork)