

Dark Design Decisions 1: On Time

When starting in on The Dark Unknown, very early on I had to make some decisions about the structure of the game, how to deal with time, and whether to have day/night cycles and NPC schedules. I felt I needed to decide about that last first, and use that decision to guide how I was going to do the rest.

So, should I do schedules? I decided at the time not to spend resources on them- while it adds to the world's depth, it vastly increases the dialog load and is often annoying- showing up in town at night, desperately looking for a healer, or needing to wait around 5 hours because the person you need to talk to will only speak to you at midnight. Not worth it, I felt- a decision that I have obviously now changed my mind on.

From there, though, to figure out time we must look at space. I've always been particularly fond of two-scale maps. It could in part be because it's what I largely grew up with- early Ultimas, of course, but also things like Bard's Tale, Might and Magic, and Pool of Radiance put towns on one map and the countryside on another. The other reason is that single scale maps tend to be so *small*. Britain sharing a border with Paws which stretches halfway to Trinsic. Modern 3d games manage to finally add a good sense of scale- Skyrim does load to get to the city maps, but the city takes up approximately as much room as it actually does when you see it on the map, and the world overall is pretty huge.

When working in two scales, you have to make certain decisions about how you want to handle time. The way I saw it, there were three main options I had to choose between.

- When in a smaller scale map, pause the world map.
- Keep time running 1:1 regardless of what map you're in.
- Scale the time flow to something other than 1:1 but not a full pause.

Early Ultimas (I-IV) went with the 'pause' option- go into a town, and when you come out everything will be where it was. Games like Might and Magic I think went with the 1:1 option- you can't see monsters on the world map from a distance, so you can't tell if they moved, but it's always the same number of your turns for the full duration of a day or night. I found neither really satisfying- pausing might be an easy way to handle it, but it seemed an unnecessary departure from the simulation, while 1:1 was outright unrealistic when there were other things on the map moving around.

So, I went with scaling. My initial choice for scaling was 250:1- you could take 250 turns in a city, and a single turn would pass on the world map. After not too long I shortened this to 100:1, which is still a pretty large disparity. This has a variety of consequences.

When time just flows continuously like this, there's one thing that bears closer examination, and that's duration. By which I mean, effects with a duration or that deal damage over time. If I want a Protection spell to last 25 turns in combat... well, that means it's going to last 1/10th of one of your turns on the world map. Buff and protective spells can't be cast in advance- they

would expire before the fight starts. Spells scaled to the world map, like Water Walking, last basically forever in a dungeon. This is inconvenient, but bearable. Less bearable is the effect it has on things like poison.

Because of the two scales, I needed to have two separate damage over time afflictions. One I called Poison, which acts on the short time scale- 2 damage per 1/250-tick (approximately one step in a dungeon). The other is Disease, which deals 2 damage per tick (contrariwise, one step outside). The problem with this is that while switching to a zoomed in map while Diseased just means you don't notice the disease effect for a while, switching to a world map while poisoned means taking 250 'turns' of damage in one step. (Actually less, since the poison wears off, but still enough to kill a first level character.)

I tried dealing with this in a couple of ways- I tried to minimize poisoning creatures near dungeon entrances (but that doesn't help someone who teleports out from the bottom), and I put warnings in the manuals that this would happen... but knowing it will happen makes it no less dissatisfying when it does. Finally, when I was testing my demo and died in a step to poison and had a moment of "wow, that was bullshit," *about my own game*, I decided something needed to change.

Here I decided to do some research. I installed a copy of Ultima V, the first of the series to have clocks that measure time, NPC schedules, and day/night cycles. I wanted to see if it used 1:1 scaling or something else. The answer is something else- roughly there is a 2:1 ratio of time passing between a single action in a town vs on the world map. This is important because it means (judging from the fact that Ultima V was successful) a player won't necessarily find it immersion breaking that you can cross an entire town's space in 2 minutes, but if you actually enter the town, 2 minutes gets you 1/16th of the way across town.

As such, the final (well, final so far!) version has been to shrink the gap down to 5:1. A little more than Ultima V used, wide enough that it can be noticed, but not so wide that it renders one scale unaffected by the other. Buffs and protective spells can now be cast in advance of combat, but don't last very long, and poison hits harder on the world map but doesn't kill you in one shot. (Disease, as I no longer require two distinct spells for vastly different scales, now has a different effect.)

Additionally, this allows me to take all those clocks I've been adding to towns and give them a function- I can keep actual time. This was the other reason for the change- a 100:1 ratio largely precludes a day/night cycle and any form of NPC schedules, because either time passes so *quickly* on the world map that the sun rises and then sets 12 steps later (which may be realistic for how far you could get at walking speed, but is utterly unplayable), or time moves so *slowly* on the town maps that NPCs might as well not have schedules because they're never going to reach their 4:00 appointments.

The other thing adding time and schedules requires is the ability to fast forward in some fashion. In Ultima V, my go-to example today, you could leave town and "(H)ole Up and Camp" for some number of hours. I haven't implemented making camp- instead of adding that

went with more of a Skyrim-style solution and just allow you to skip forward X hours, with a new (W)ait command.

It's possible that after I see how this plays I will shrink the gap further, but I feel like it is in a good place now. I can get to work on schedules. I'll write about schedules in another diary, however! For now, that's all the time we have for time.

Appendix:

Let me go into more detail about what I mean when I use the word "turn". Time in The Dark Unknown is not integer- it's stored such that it can have decimal values. An entity takes its turn at a specific time, and then the game figures out how much time will pass before its next turn. This is affected by a number of things- Dexterity, some spells, terrain. A starting PC, with unaltered stats, will take exactly 1 time unit to step onto a grass tile on the world map. I tend to call this "one tick", nomenclature from my MUDing days. So if you take your first turn while GameTime=0, your next turn will be at 1, then 2, but then perhaps 3.2 if you step onto a hill or something. Having a couple points in Dex might mean instead of going 1 tick after your previous turn, you might go after .9 ticks, and so occasionally get two moves in between any two of a given opponent. On a city map, each step, rather than taking 1 tick, would take 1/250th of a tick, or .004, in my original scaling.

As such, there is a continuous "timeline" that tracks when each entity will take its next turn, and progresses forward through that list, inserting people back into the timeline at whichever point they will be taking their next turn. So, if it is time 100 and you're in a city, and outside the city is a troll that will next take a turn at 101, you're going at 100.004, 100.008, etc. I don't need to anything special to make the monster skip its turns or anything- it just doesn't get one for a while, as the player takes their time running around town.