DES214 – Level Design Methods

PCG Tiles

DigiPen Institute of Technology

PCG Tiles

How to use tiles to procedurally generate content?

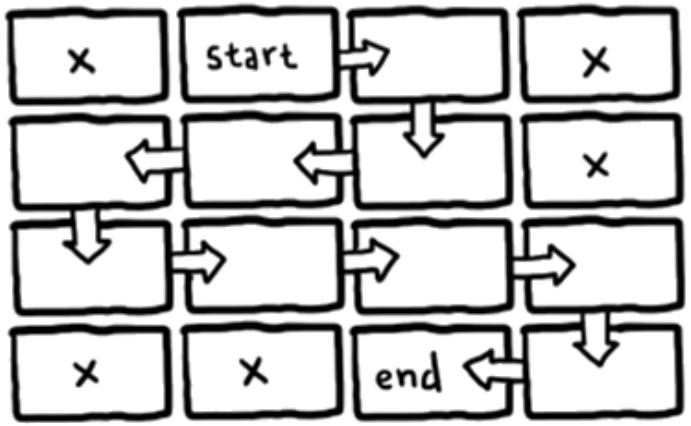
PCG Tiles

Tile

A discrete chunk of handcrafted game content.

PCG System

- Scope
- Variety
- Context
- Granularity
- Randomness
- Additive vs Subtractive



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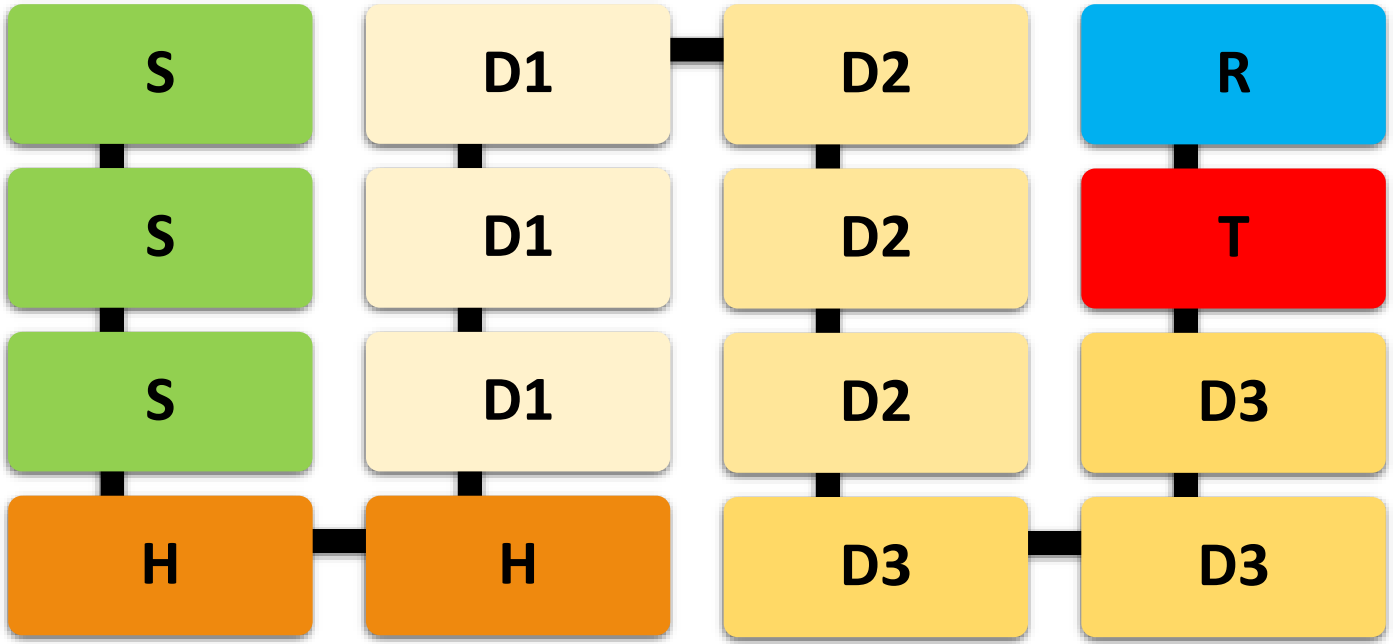
Embedding Structure



Dungeon Topology

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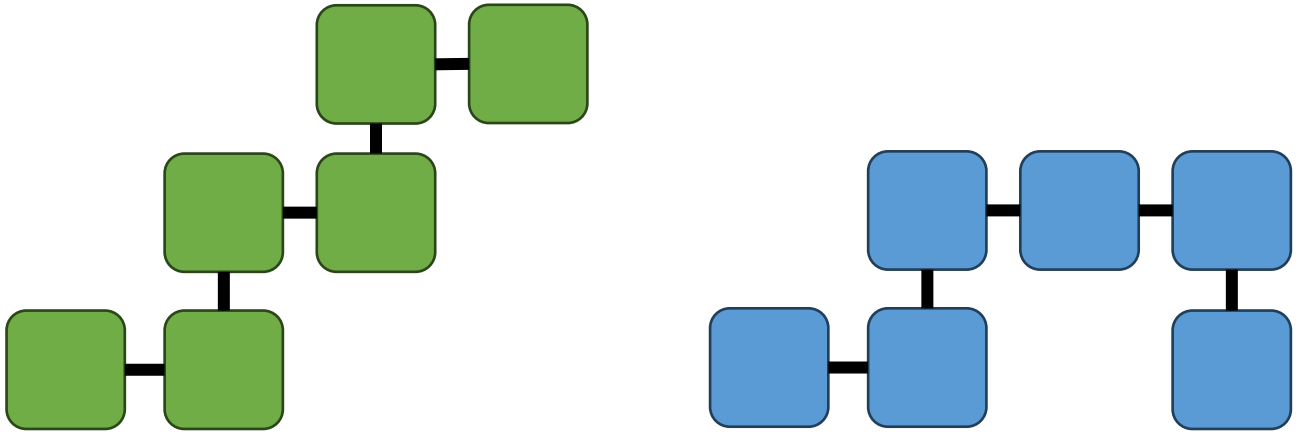
Path

A linear set of rooms. They can be either critical for the completion of the level or optional.



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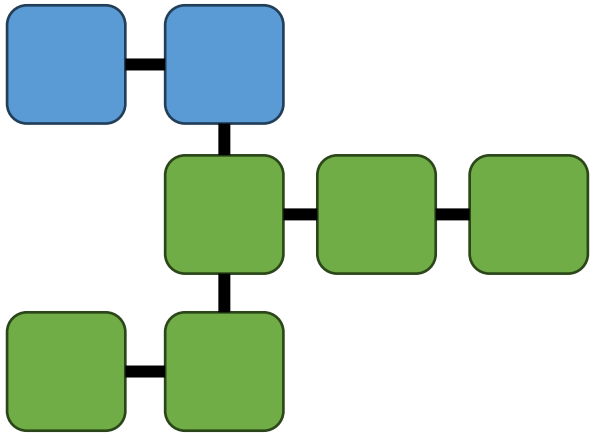
Branch

A room that leads to two or more paths. Either path may be critical or not.



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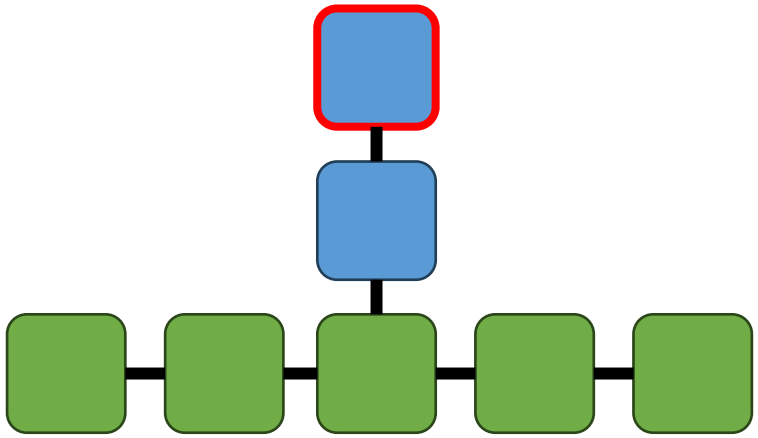
Dead End

The ending of a non-critical path. Typically features a reward and some backtracking



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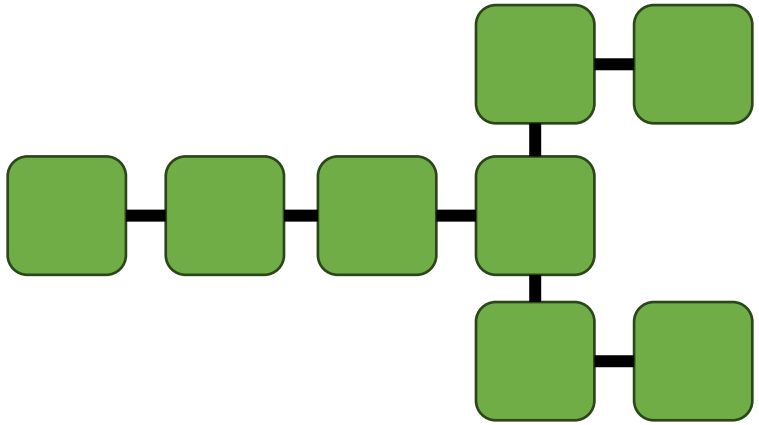
Fork

A branch that leads to two or more paths, each equally valid or necessary for the level's completion.



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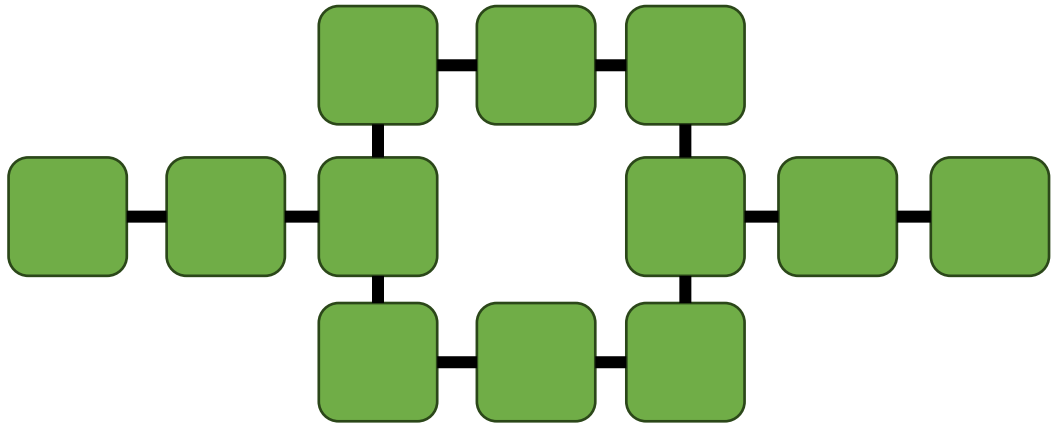
Loop

A two or more paths that rejoin, creating a cycle.



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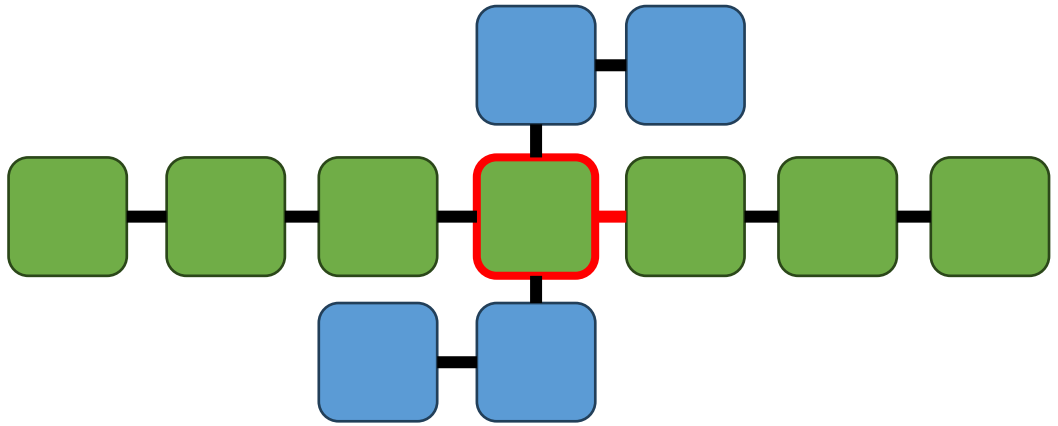
Hub

A room just before a branch where the player is expected to re-traverse, usually due to a roadblock.



Dungeon Generation

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Grid

It’s useful to start with an underlying grid layout for your dungeon.
This way you easily query for adjacent rooms / cells.

00	01	02	03	04	05
10	11	12	13	14	15
20	21	22	23	24	25
30	31	32	33	34	35
40	41	42	43	44	45
50	51	52	53	54	55

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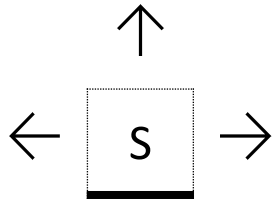
Additive Example

Step 1 – Start with a cell that can spawn adjacent cells



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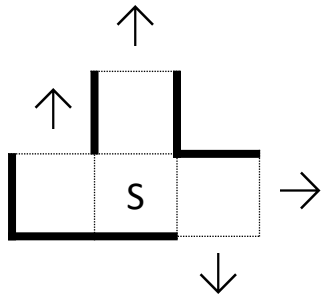
Additive Example

Step 2 – Repeat the process, spawning more cells. If a cell is already occupied, ignore it.



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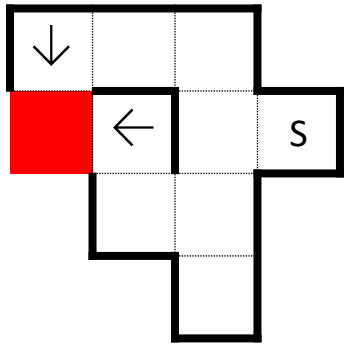
Additive Example

NOTE – A scenario can occur where two cells may want to spawn an adjacent one in the same spot. You must detect and handle this case.



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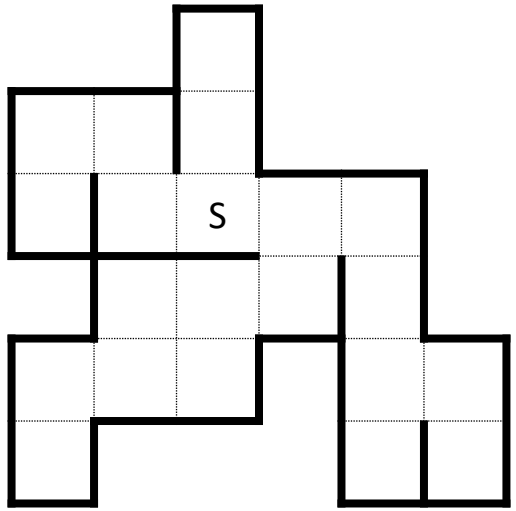
Additive Example

Step 3 – Keep repeating until you have the desired amount of cells.



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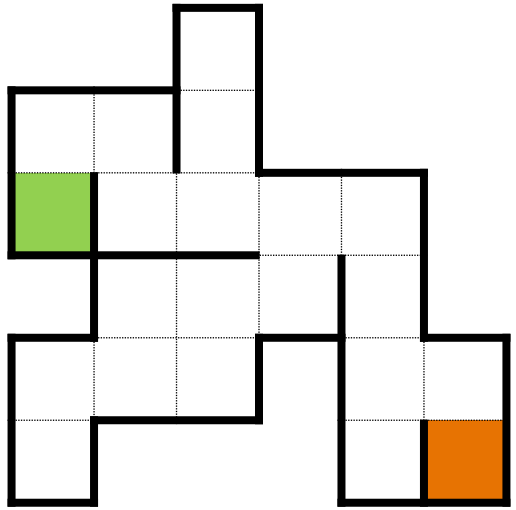
Additive Example

Step 4 – Pick start and end points.



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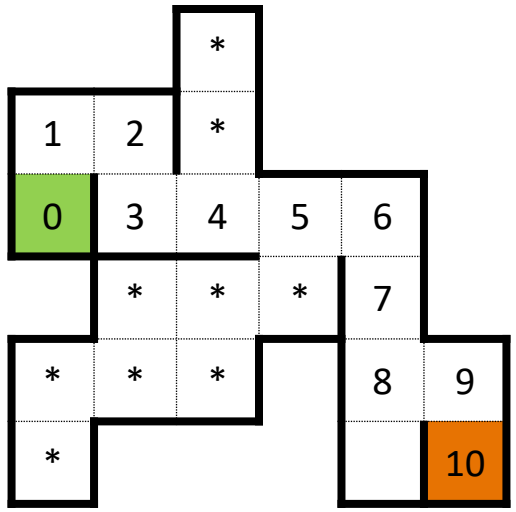
Additive Example

Step 5 – Define a main path. Number cells along the way.



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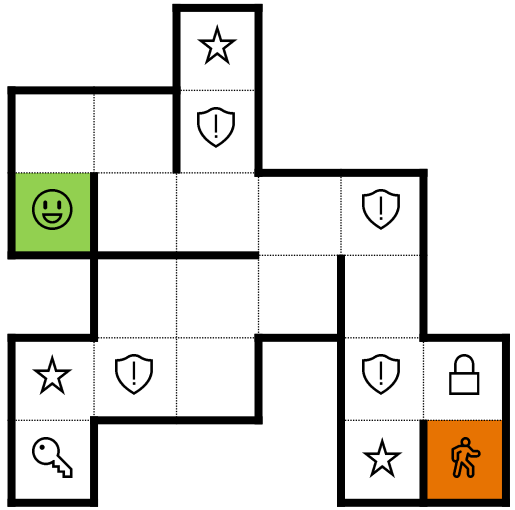
Additive Example

Step 6 – Populate cells according to their numbers. Increase difficulty as you go and place keys before doors.



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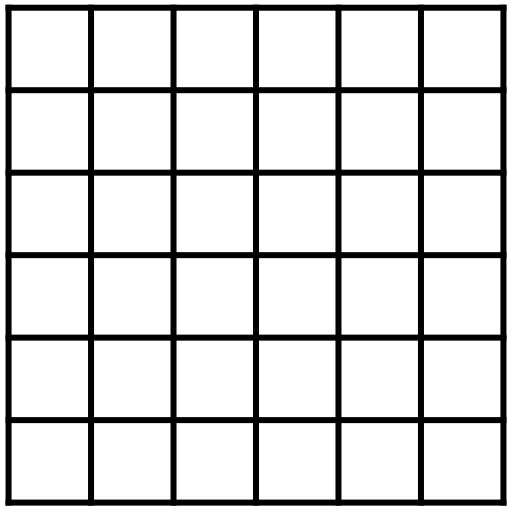
Subtractive Example

Step 1 – Identify maximum dungeon size and divide it into cells.



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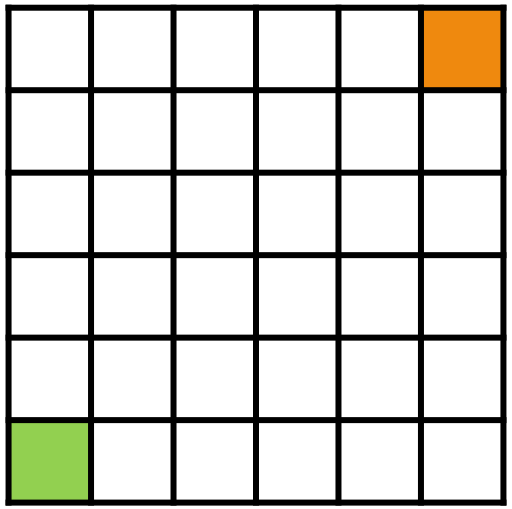
Subtractive Example

Step 2 – Pick start and end points.



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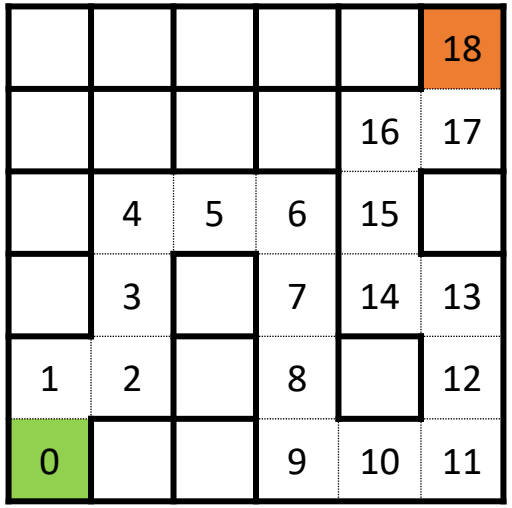
Subtractive Example

Step 3 – Do a random walk between cells to create a critical path adjoining entrance to the end. Number rooms along the way.



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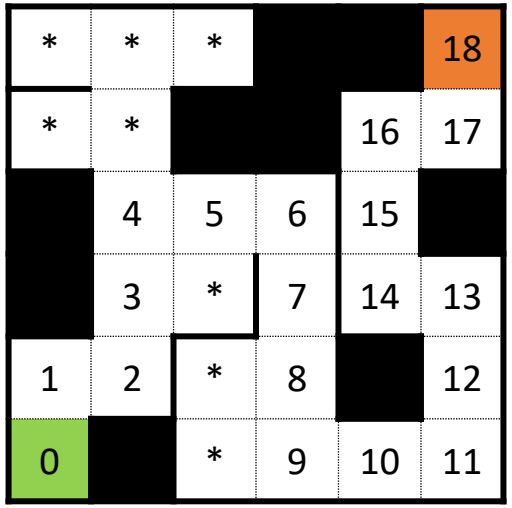
Subtractive Example

Step 4 – Randomly select some unused adjacent cells to be added to the dungeon. Block off unselected ones.



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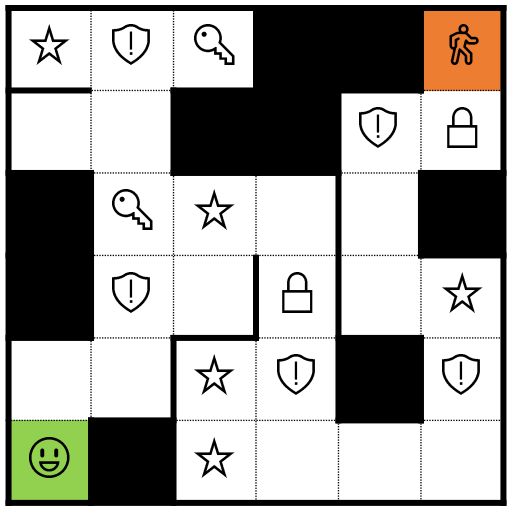
Subtractive Example

Step 5 – Populate cells according to their numbers. Increase difficulty as you go and place keys before doors.



Random Generation

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Randomization Options

- Die Roll
- Weighted Table
- Deck Random

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Die Roll

Simplest form of randomness wherein you simply roll for potential tiles, with each outcome being equally likely.

A	B	C	D	E
20%	20%	20%	20%	20%

C	B	D	D	A	C	E	A	B	C

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Weighted Table

Similar to die roll, but you control the likelihood of each outcome.

A	B	C	D	E
25%	40%	20%	5%	10%

B	B	A	C	B	A	B	B	B	A

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Deck Random

Instead of a fixed likelihood, tiles are put into a shuffled list and drawn one at a time until all are selected.

D	C	E	B	A	B	C	A	E	D

This is equivalent to a dynamically weighted table wherein selecting a tile, reduces its likelihood of being selected again.

PCG Tiles

Find balance between boredom and chaos.

Thank You!

Questions?

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