

# Drive the Rocket : Procedural Generation

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# Procedural Level Generation

- Level are divided into different zones
- Every 400m (TBD), a branching shows up presenting 2 new different zones to the player. He can choose the zone he wants to go. The level always keep branching and doesn't merge back (it reinforces the feeling of "choice").
- Each zone provides a specific type of challenge/obstacles. None is easier than the others, they are only different difficulty types.



# Procedural Level Generation - Creative Tools

- To present different equally interesting zones to the player, we can make a tab :

	Favorable to Boost	Not Favorable to Boost
Easy anticipation		
Hard Anticipation		

- Row : if it's easy or not to get the boost (in general, it's easier with straight lines than with erratic lines)
- Column : if the player can easily anticipate the next few meters (in general, having obstacles showing randomly is harder to anticipate than having no other obstacles than the walls)
- We will ban the upper left and bottom right cells, as they are not balanced with the other cells (Favorable to boost + Easy anticipation may be too easy, and Not favorable to boost + Hard anticipation may be too hard)
- New entries could be added, the ones here aren't confirmed.

# Procedural Level Generation - Lab Zone

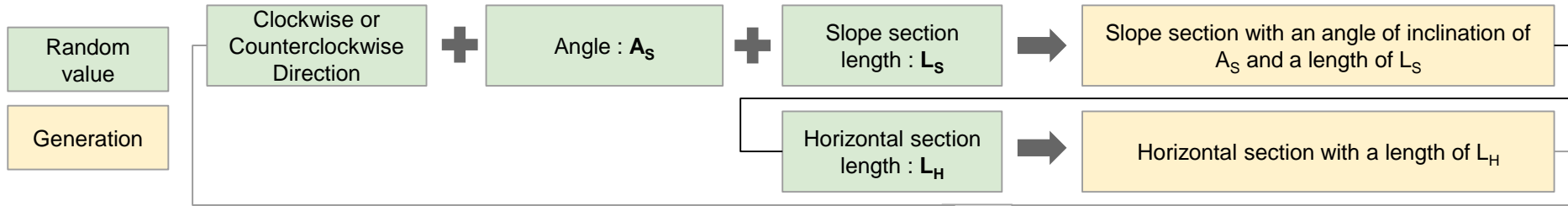
- This zone is relatively straight, obstacles will mainly show up in the walls (but can be in the center too).
- The player is encouraged to get the boost in this zone (the walls are simple to follow, the obstacles aren't very hard to avoid)
- Background : a deserted laboratory

	Favorable to Boost	Not Favorable to Boost
Easy anticipation	Gray	Light Gray
Hard Anticipation	Green	Dark Gray



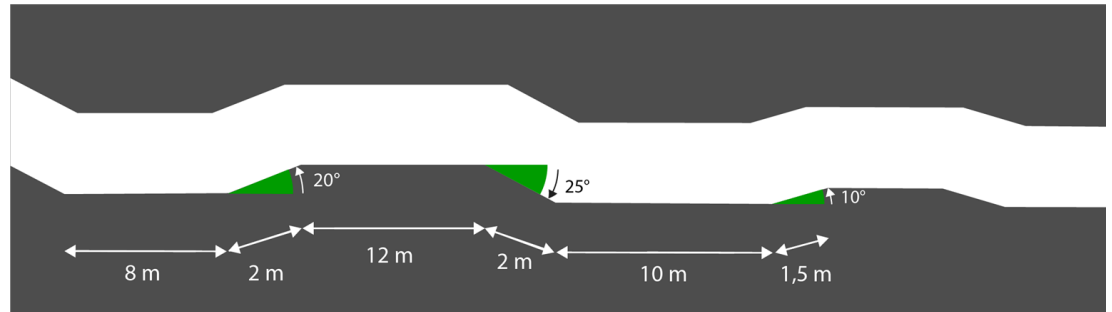
# Procedural Level Generation - Lab Zone

- The Lab zone is generated in 2 steps : the walls layout and the obstacles placement.
- **Step 1** : the walls are defined by 3 characteristics : Direction, Angle and Length



- This way, the tunnel alternates between short slope sections and longer horizontal sections.

Angle range	$A_S$	[10°, 35°]
Slope section length range	$L_S$	[1.5m, 3m]
Horizontal section length range	$L_H$	[8m, 14m]

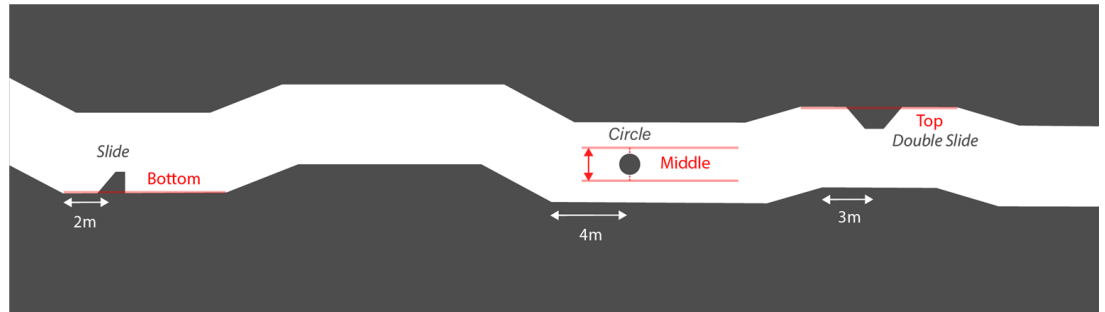


For information purposes only, exact values TBD

# Procedural Level Generation - Lab Zone

- **Step 2** : for each **horizontal section**, there is a chance an obstacle appears on the bottom, the middle or the top of this section (different probability for each line). This probability can change over time (more and more obstacles)
- If an obstacle appears, it has **less chance** to be on the same line (bottom/middle/top) as the preceding obstacle
- There can be different kind of obstacles for each line (in the image : a *Slide*, a *Circle* and a *Double Slide*). They each have a different probability to be the generated obstacle.
- Obstacles are placed at a random distance from the beginning of the section

Starting appearance probability	30% for each horizontal section
Bottom & Top	30% each
Middle	40%



For information purposes only, exact values TBD

# Procedural Level Generation - Tunnel Zone

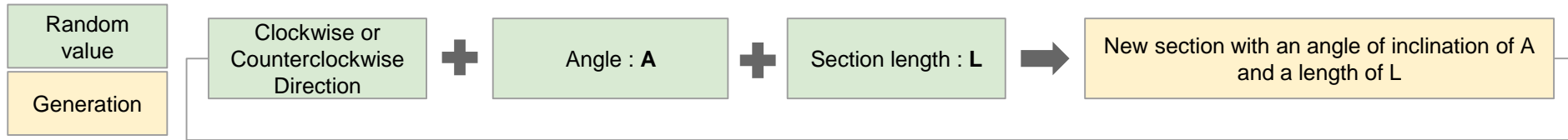
- This zone has a very erratic shape, but without special obstacles (the walls are hard enough to deal with)
- Getting the boost here is risky, as the walls have high angles. The player is encourage to stay more on the center, where it should be easier than in other zones (no obstacles)
- Background : a big tunnel, probably dug by someone ...

	Favorable to Boost	Not Favorable to Boost
Easy anticipation	Gray	Green
Hard Anticipation	Light Gray	Dark Gray



# Procedural Level Generation - Tunnel Zone

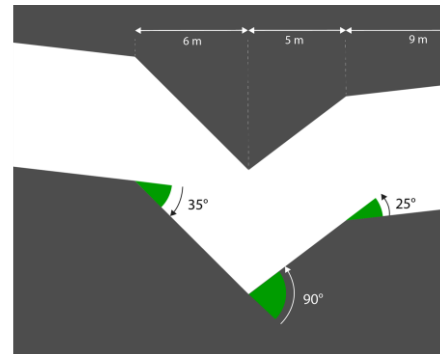
- This zone is generated in 1 step.
- Like the Lab zone, the walls are defined by 3 characteristics : Direction, Angle and Length



- There is a **minimum and a maximum angle** for the sections, as well as a **maximum angle difference** between a previous and a new section. Besides, there is different probabilities for the angle differences (at the start of the game, a  $50^\circ$  angle is less probable than a  $20^\circ$  one) which can change over time..

Angle range	[ $25^\circ$ , $50^\circ$ ]
Max angle difference with previous section (game start)	$60^\circ$
Section length range	[3m, 10m]

For information purposes only, exact values  
TBD

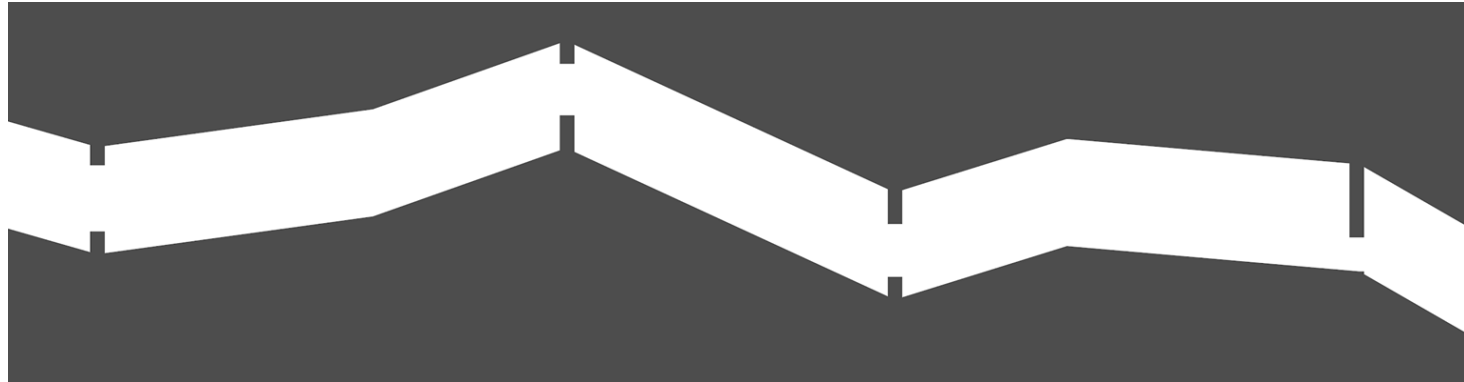




# Procedural Level Generation - Gates Zone

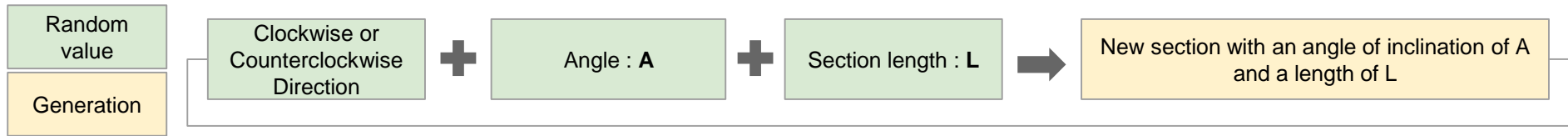
- This zone is relatively straight, but gate-shaped obstacle will show up regularly.
- The player can use the boost, but he has to be attentive to the gates, which will break his lines. The boost can only be used by little session.
- Background : something in relation with the gates, which maybe would protect something ... but what ?

	Favorable to Boost	Not Favorable to Boost
Easy anticipation	Grey	Light Grey
Hard Anticipation	Green	Dark Grey



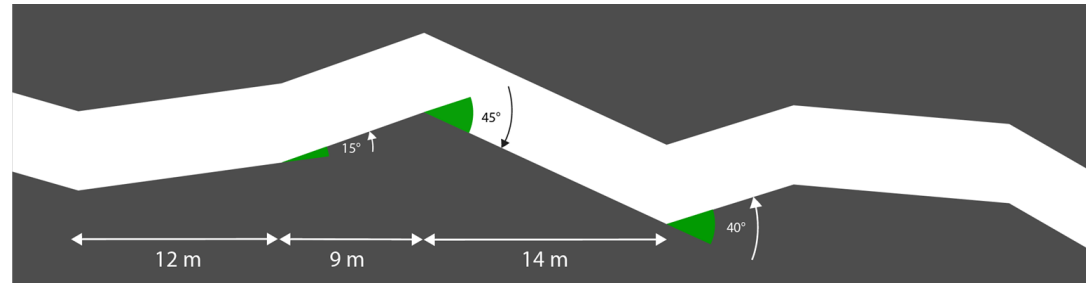
# Procedural Level Generation - Gates Zone

- This zone is generated in 2 step : the walls layout and the gates placement.
- Like the Lab zone, the walls are defined by 3 characteristics : Direction, Angle and Length



- There is a **minimum and a maximum angle** for the sections, as well as a **maximum angle difference** between a previous and a new section.

Angle range	[10°, 35]
Max angle difference with previous section (game start)	45°
Section length range	[8m, 14m]

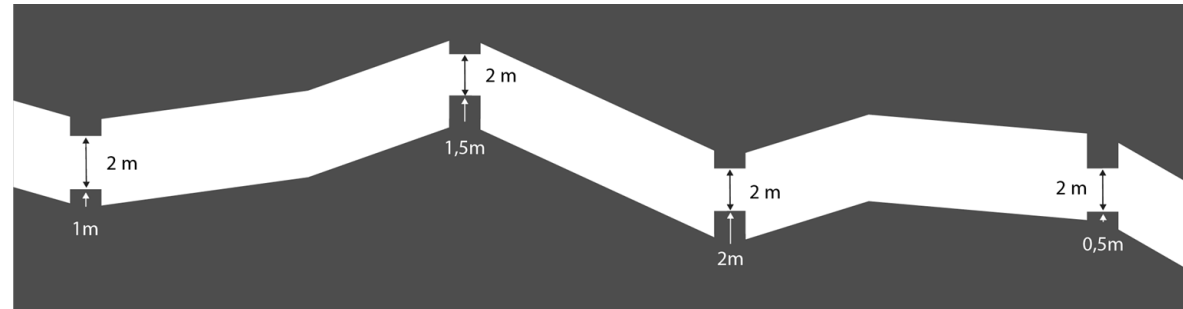


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TBD

# Procedural Level Generation - Gates Zone

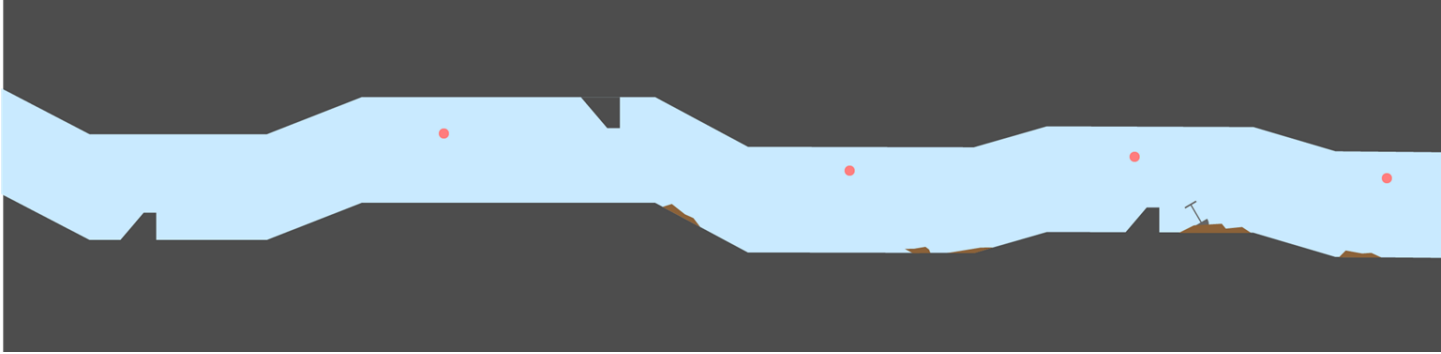
- **Step 2** : between each sections, there is a chance a gate-shaped obstacle appears. This probability **doesn't change** over the course of the game (as this would be impossible to use the boost after some time ; however, other things will change to higher the difficulty).
- Each gate has an “open space” which size is fixed (= not random) but **reduced over time**, until a theoretical minimum.
- The vertical position of this “open space” is randomly chosen in a range.

Appearance probability	50%
Starting open space size	2,5m
Vertical position range	[1m, ceiling - open space size]

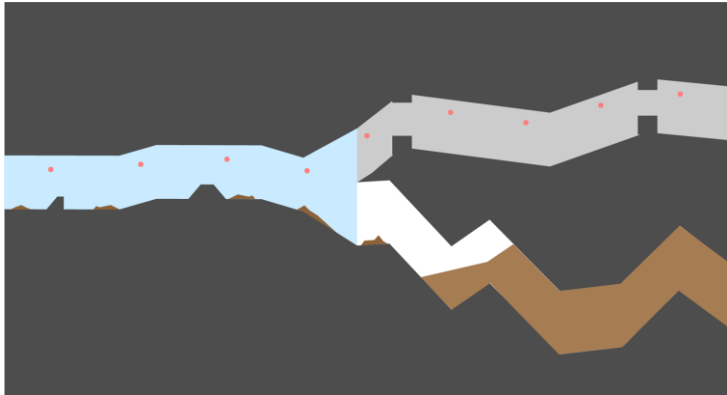


For information purposes only, exact values  
TBD

# Procedural Level Generation - Branchings



Some elements of the upcoming zones are shown on background



- When the branching appears, the elements are blending into their respective background

# Procedural Level Generation - Branching

- Each zone has 2 special starting sections (1 going up and 1 going down) and an ending section.
- When a branching appears, the current zone generates its ending section and the 2 new zones generates their respective starting sections. After these sections, the zones are generated as described above.

