Games and Systems Thinking: Compulsory 1

2SPIS212-1 26H

The Quarrel Quest

Group 4

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Introduction

For this group assignment, we will be analyzing the children named Mark and Ellen and their relationship with their parents and between themselves. This report describes their relationship and the three different scenarios of their conflict's escalation presented in the task. Additionally, we also analyze a scenario where the parents are not present.

We will present some possible solutions to the problem itself, from parents' involvement to the kids being presented with "doomscrolls" to read when they are bored.

Our group consists of 4 members, and we all played a part in designing the diagrams and graphs.

Research Question

How do Mark's response strategies and parental intervention affect the escalation of the conflict between Mark and Ellen?

How does the conflict develop when Mark retaliates, retaliates and complains, or complains without retaliating?

How does a delay in retaliation affect the development of the quarrel?

Does parental intervention (Doomscrolls) reduce the underlying drivers of conflict, or mainly suppress aggressive behaviour?

Requirements

The model must represent the main mechanisms that initiate and sustain the quarrel between Mark and Ellen. These include Ellen's boredom and need for stimulation, the children's anger, and their responses to each other's aggression.

We made a basic model involving only the children first. Afterwards we added parental intervention to the scheme.
The models had to allow comparison of the three scenarios described in the assignment:

- Mark retaliates when Ellen hits him.
- Mark retaliates and complains to his parents.
- Mark complains without retaliating.

The causal loop diagrams has to show the relationships between the variables, with positive or negative polarity on each causal link and clearly identified reinforcing and balancing loops.
These diagrams will guide the development of a simple Stella simulation. For the simulation task we used a delay.

We used consistent initial conditions and shared parameters and only changed the mechanisms associated with each strategy in order to have a fair comparison of the scenarios.
Variables, units, equations, and assumed parameter values are documented in the report. An RBP is included as well.

The simulation produces graphs showcasing how aggression develops over time.
These results are compared with the RBP, and are used to discuss whether the different strategies pause or uphold the conflict.

Limits and Restrictions

The project is limited to just the kids' actions and the parents' response.
We focus on this single incident, rather than the wider idea of the family, or the children's behaviour outside of this scenario.

Such aspects as school, other friendships, past relationship history between the siblings have been exempt from this task.

In general the few variables we have made for the task do not represent the full scope of human emotions and motives. This is a thought experiment and not an accurate prediction for real life usage.

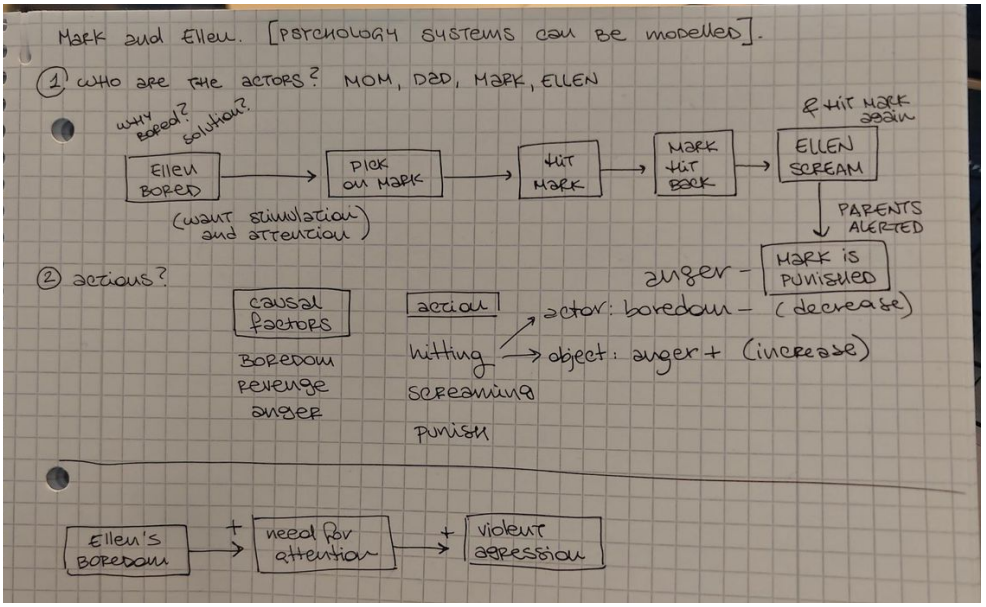
We have no measured data and we make a lot of assumptions, that is the nature of this assignment.

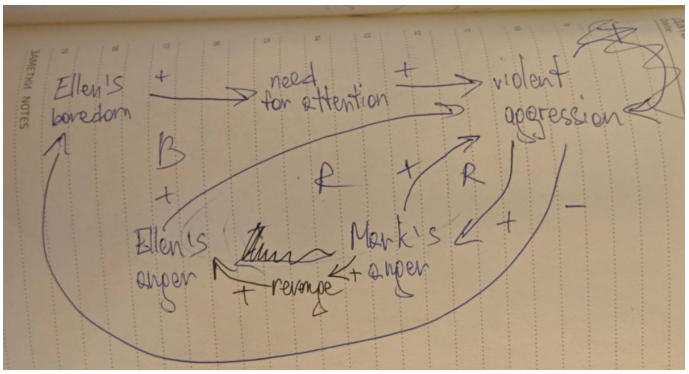
We made sure to focus on the distinction between stopping aggression and resolving its underlying causes, which in this scenario was boredom.

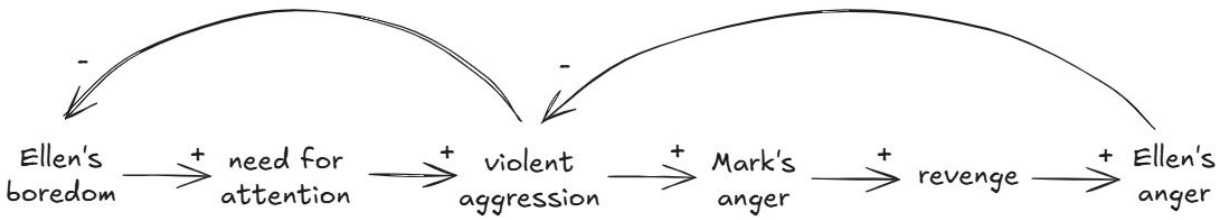
We also intended to figure out what would happen if we focused on stopping the initial boredom, rather than just focusing on what happens after the boredom has already occurred.

Flow chart

These were our first iterations for the case. Following the guidelines given in the task, we started by defining the actors and the actions that they develop. Separated causal factors (boredom, desire for revenge and anger) with the accordingly performed actions (hitting, screaming, punishing). We sketched a loop where Ellen's boredom is the trigger and after she hits her brother her boredom decreases. We created a polished version using Excalidraw.

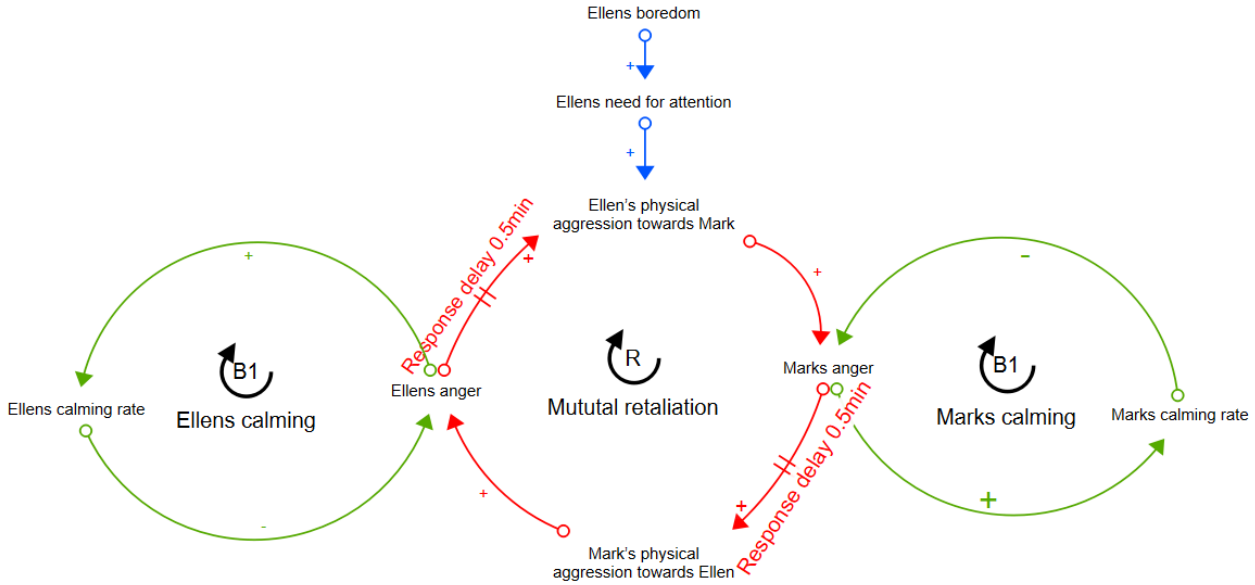




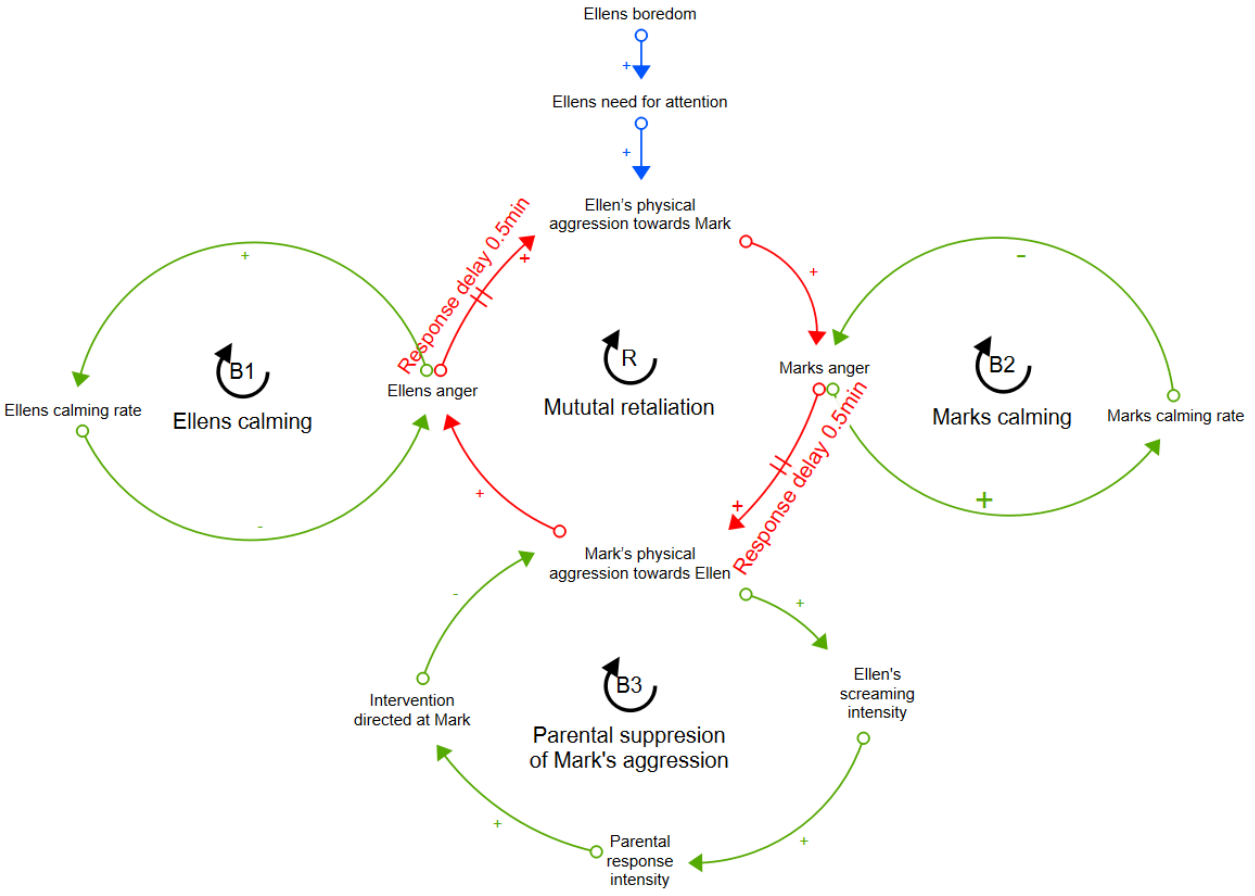


Causal Loop Diagrams

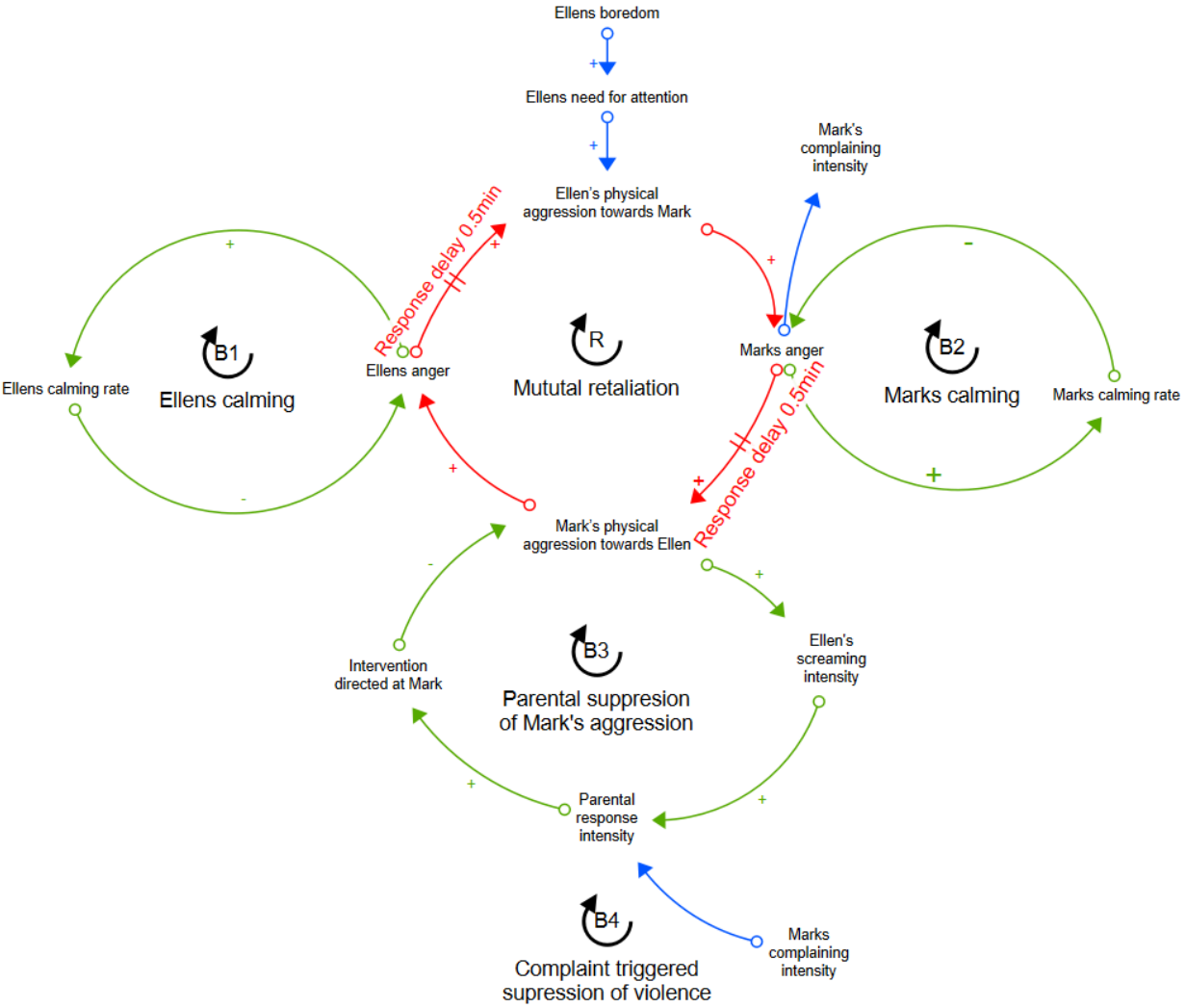
Version 0: No parents/intervention



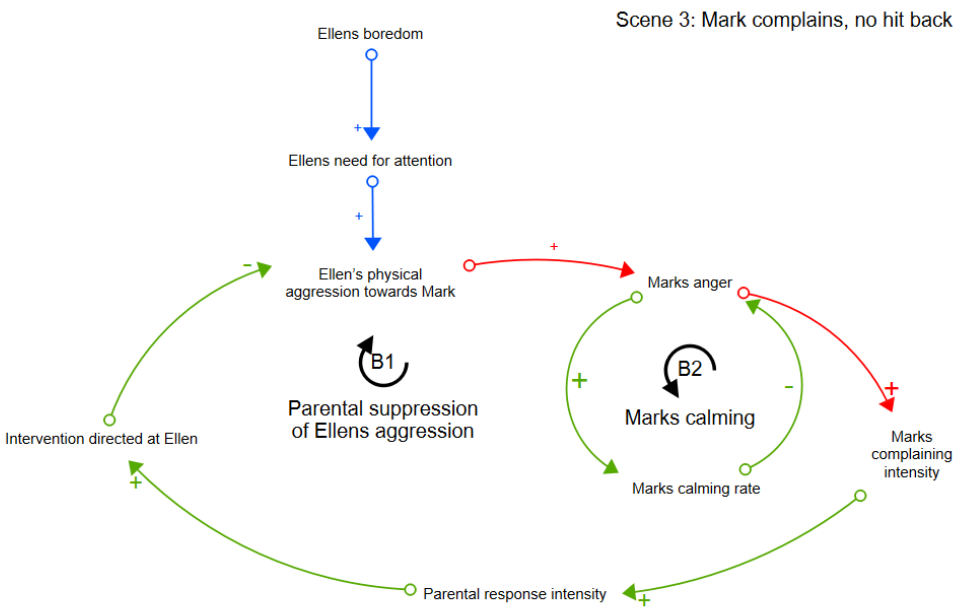
Version 1: Mark hits back, does not complain



Version 2: Mark hits back and complains



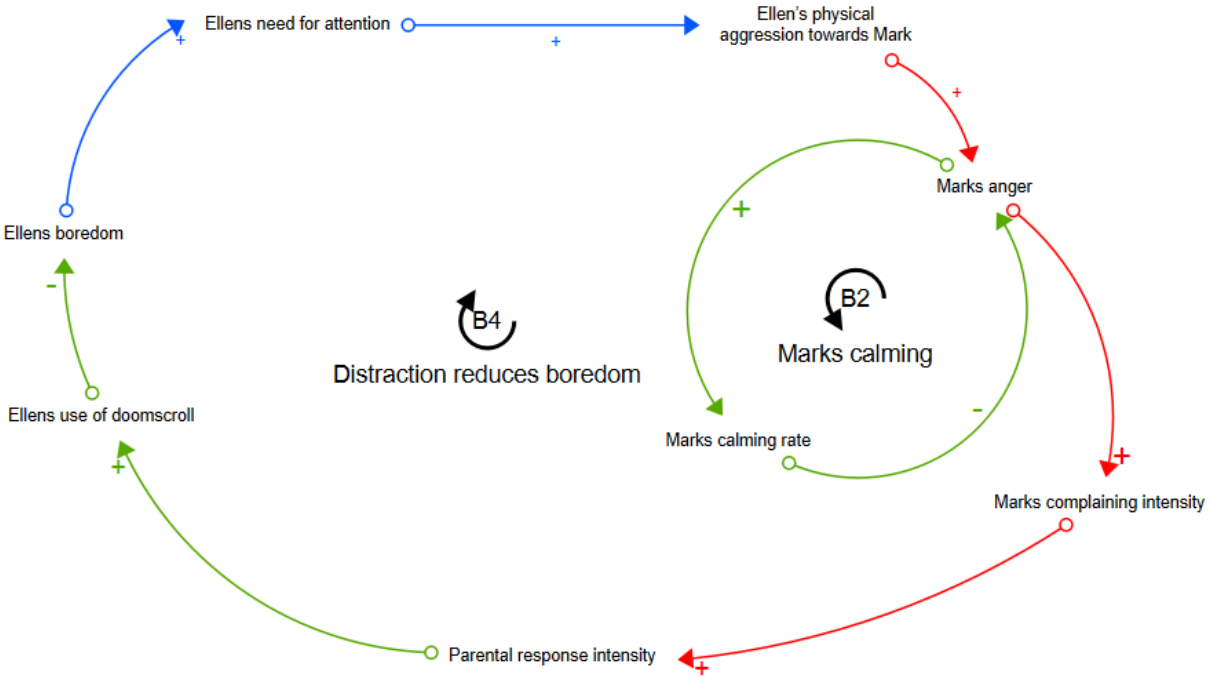
Version 3: Mark doesn't hit back, but complains



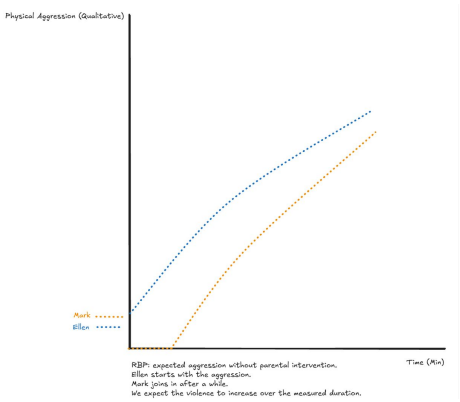
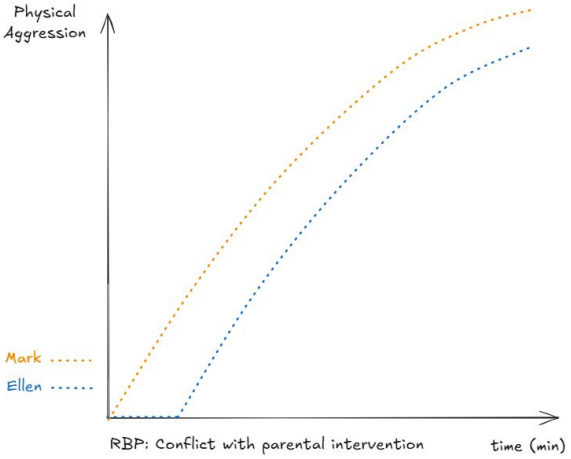
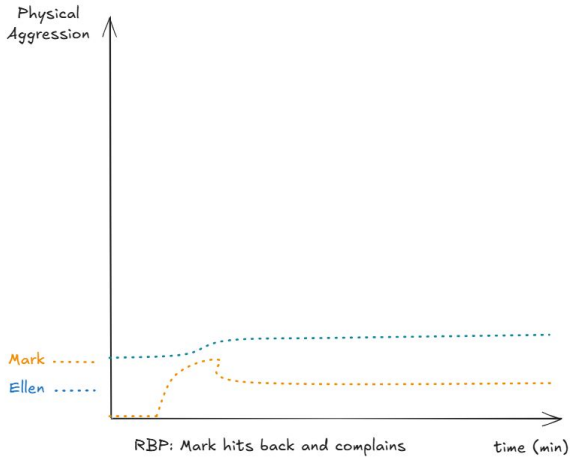
Expected result?

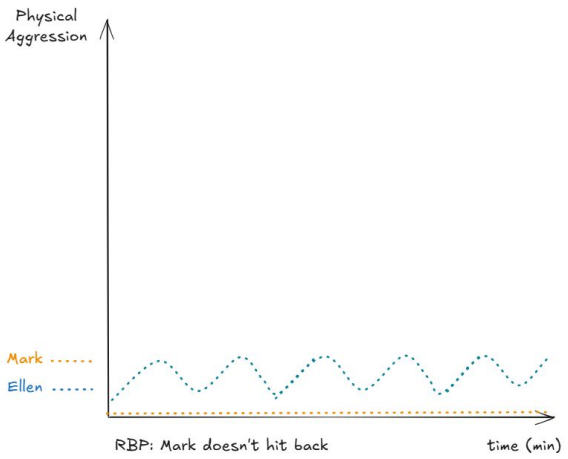
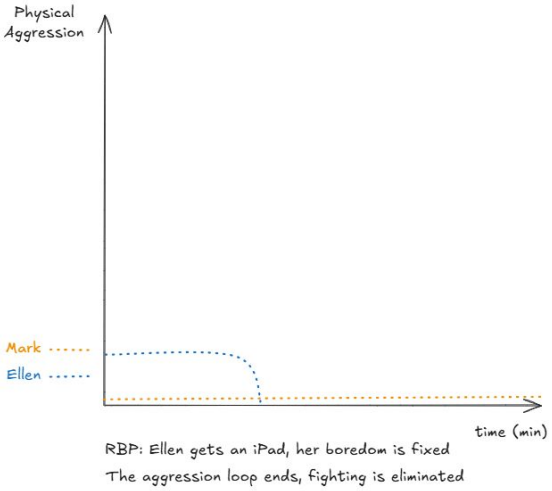
Infinite torment by sister

Version 4: Parents' Intervention via Scrollpads



RBP

Version 0: No parents/intervention	
Version 1: Mark hits back, does not complain	
Version 2: Mark hits back and complains	

Version 3: Mark doesn't hit back, but complains	
Version 4: Parents' Intervention via Scrollpads	

Scenarios

The task asked us to go over these three main scenarios and a baseline without parents. We added one extra scenario to showcase what would happen if we attacked boredom directly.

Each scenario begins with Ellen becoming bored and hitting Mark to obtain stimulation or attention. The main differences are Mark's response and the information available to the parents.

Before introducing the parents, we examined a simplified baseline involving only Mark and Ellen. This helped us understand how aggression and retaliation can sustain the quarrel.

- Pre scenario: Kids are left unsupervised

  In this version there are no parents, and the loop just goes on forever.

- Scenario 1: Mark retaliates

  In the original situation, Mark hits Ellen back after she hits him. Ellen screams and continues the conflict, attracting the parents' attention. The parents punish Mark for hitting Ellen.

  This scenario examines the reinforcing effect of mutual retaliation and the effect of parental intervention directed at Mark. We expect retaliation to increase the conflict, while intervention may suppress Mark's hitting. Whether this also reduces anger or prevents further aggression will be investigated through the simulation.

- Scenario 2: Mark retaliates and complains

  Mark continues to hit Ellen back, but also complains loudly to make the parents aware that Ellen hit him first. He hopes this will redirect their intervention towards Ellen.

  This scenario introduces Mark's verbal complaint as an attempt to get out of the punishment. This model focuses on the parental reaction and who gets blamed. We will check whether this helps the problem, despite Mark continuing to hit back. Its effectiveness is expected to depend on how the parents respond.

- Scenario 3: Mark complains without retaliating

  Mark complains after Ellen hits him but does not hit her back. His intention is to draw the parents' attention to Ellen's aggression without contributing further physical aggression himself.

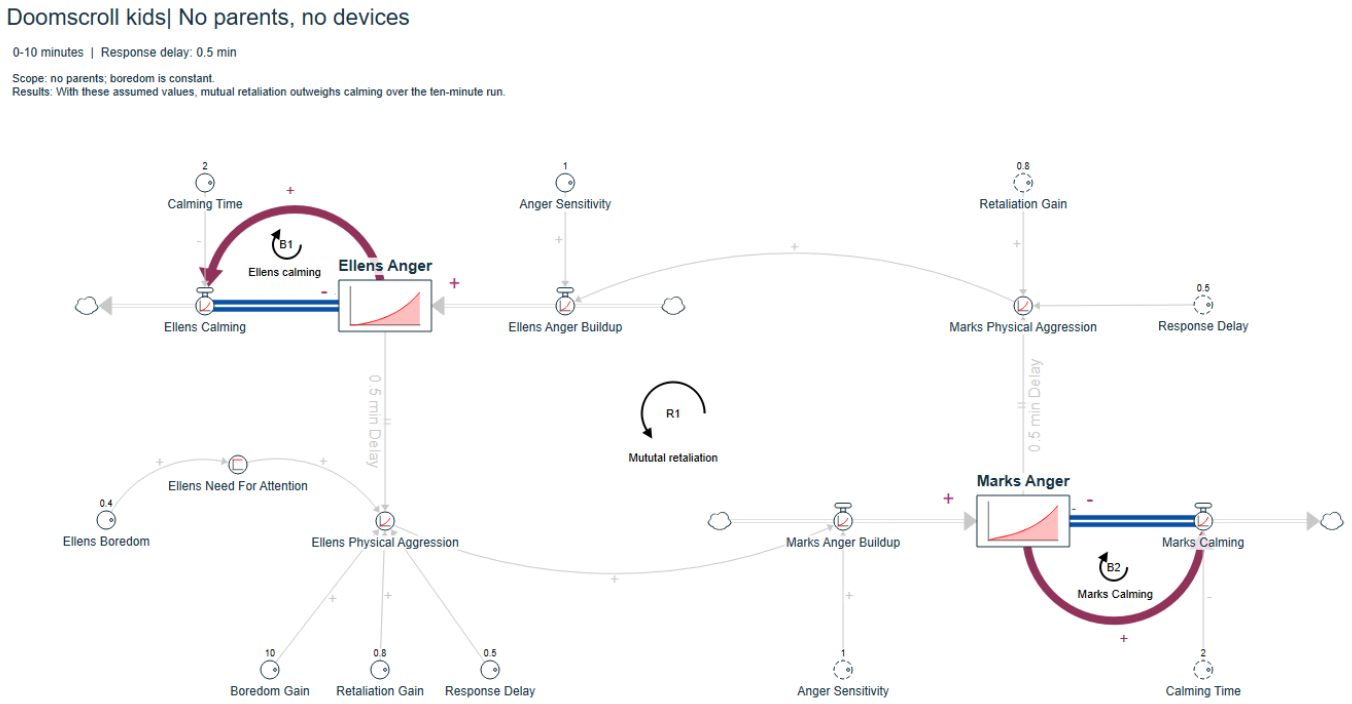
  This time, Mark's hitting response is disabled. But he still complains to the parents. This does not stop Ellen from being bored and hitting him anyways. The simulation here will show if just alerting the parents is enough to stop him from being hit.

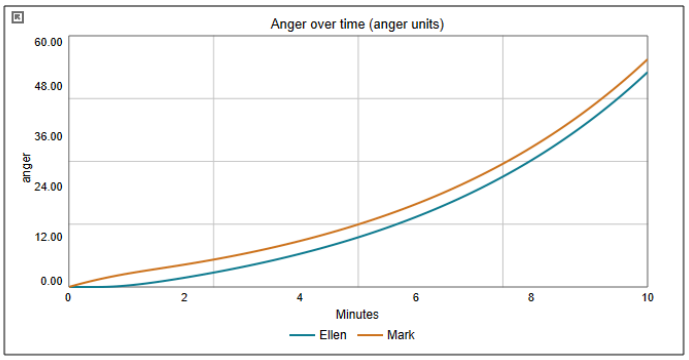
- Scenario 4: Kids get an ipad each

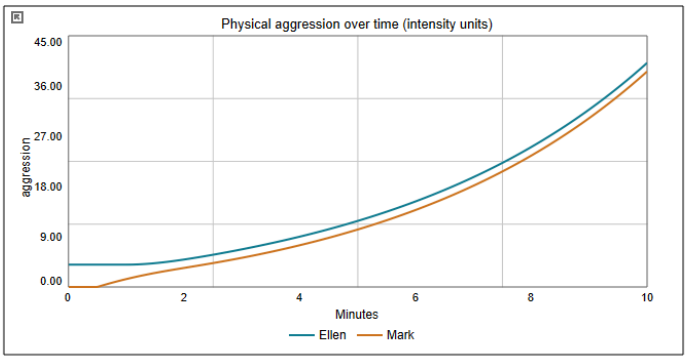
  We expect that if we reduce the initial outside trigger (Ellen's boredom) the problem won't exist in the first place and the causal loop is not needed.

Stella Models

Core Scenario Stella Model



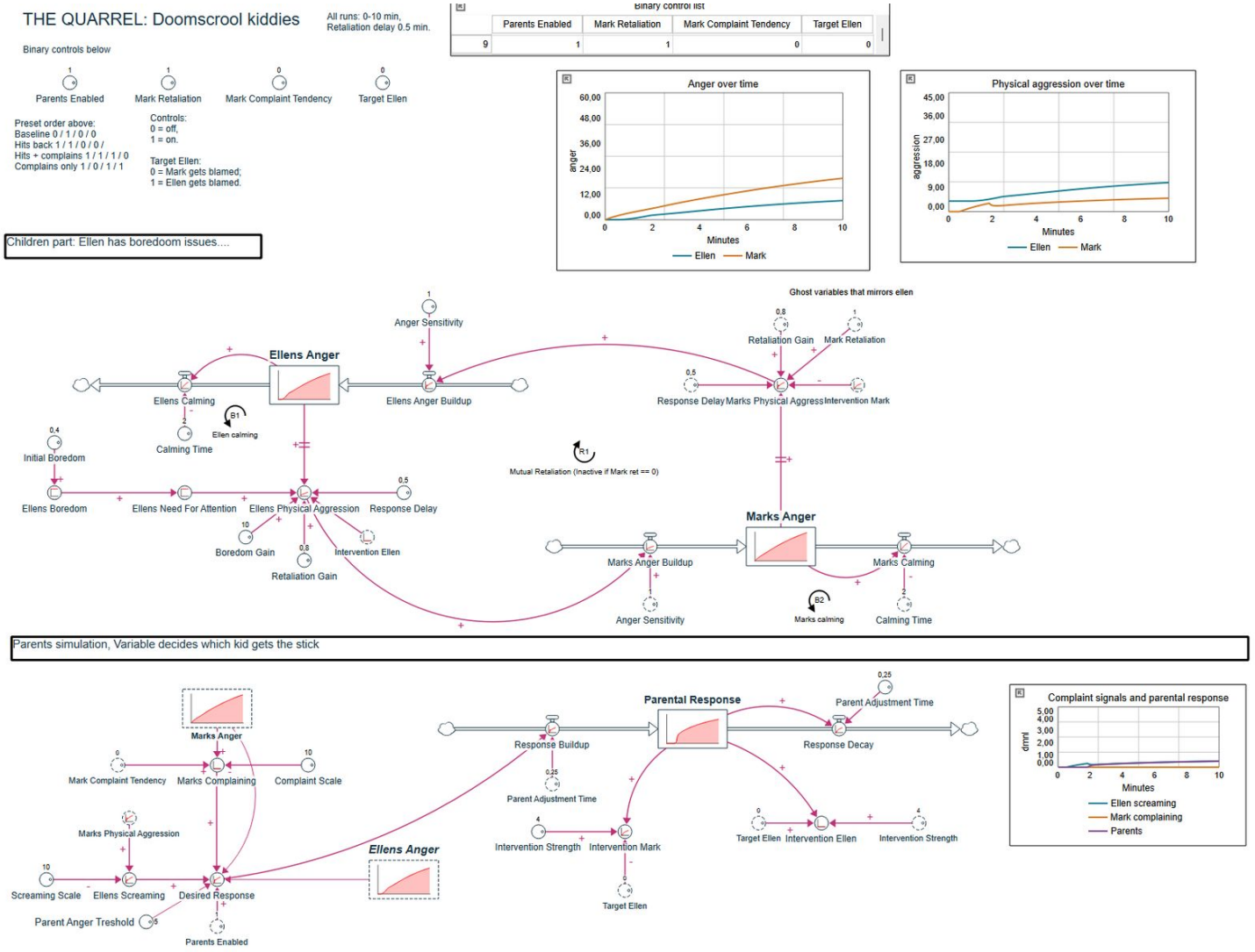




Explanation of model:

Using Stella we modeled up a quick version of the first CLD, with no parental intervention. We added graphs to it so we could visualize and compare the RBP to the data immediately. During our presentation we got a suggestion/feedback about changing Ellen's boredom into a stock, and have it decrease as she “alleviates” boredom when she hits mark.

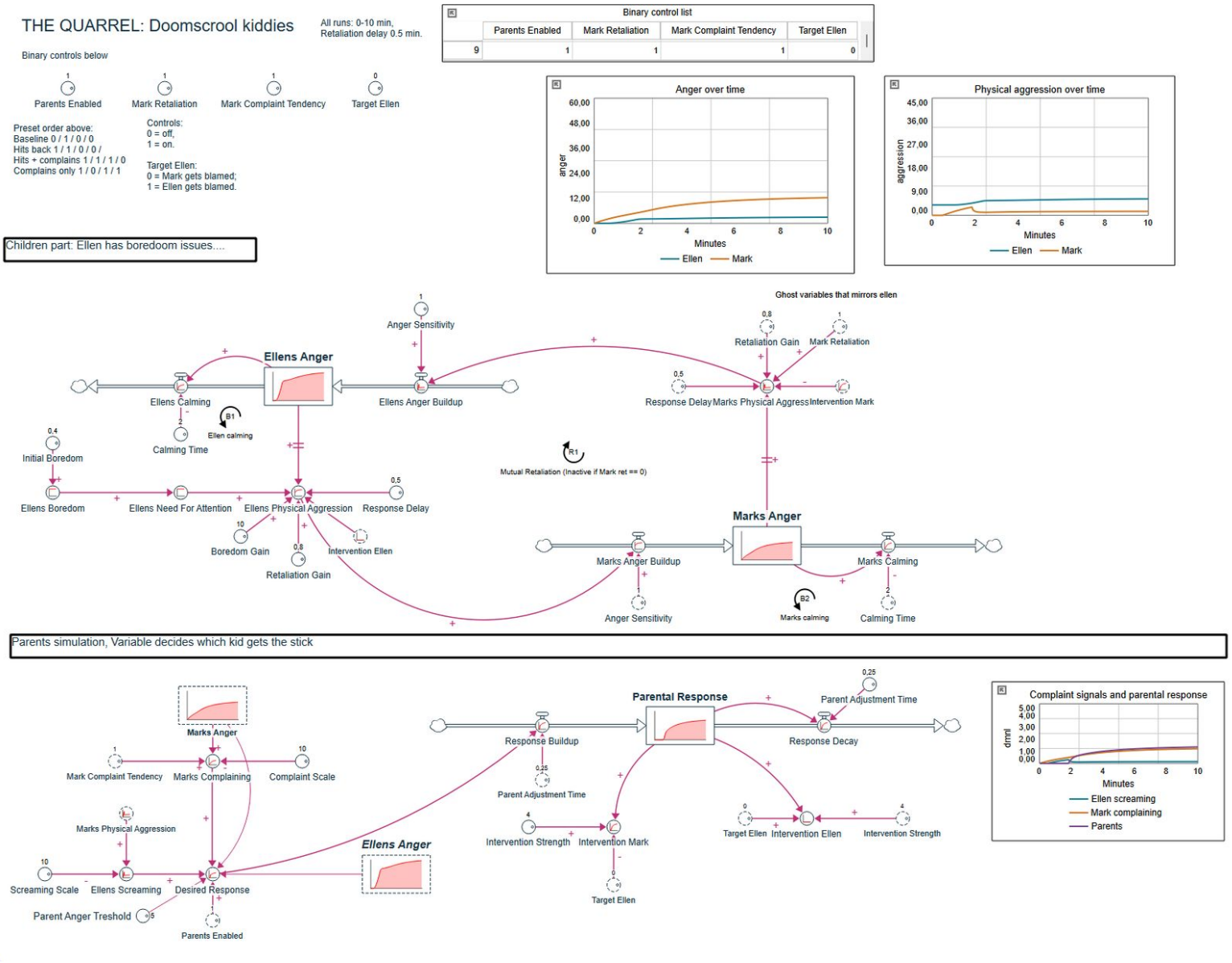
First Scenario Stella Model (Mark hits back)



Explanation of model:

For this model we made the parents separate and connected the two parts using ghost variables. The binary variables at the top left are multipliers that start and stop the different parameters to create the different scenarios. At this point we had decided we wanted one model that could be altered to test all the different scenes.

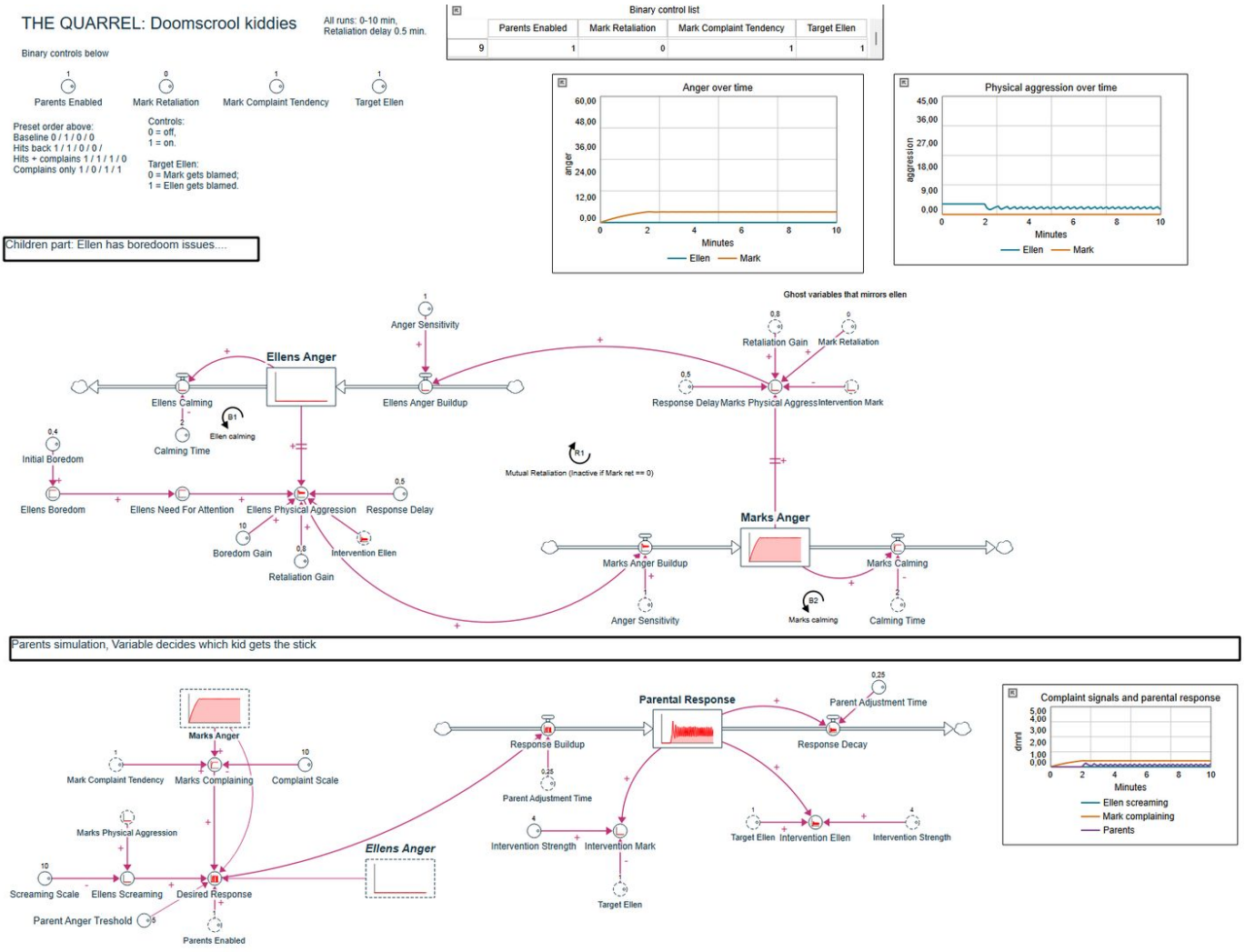
Second Scenario Stella Model (Mark hits back and complains)



Explanation of model:

Here we have altered the variable marks complaint tendency, but as it only connects into the parents response which is decided by a “parents target” variable. He only ends up with a slight increase in how fast the parents reprimand him. The graphs are changed in the newest model to better represent this small change. Here is where the boredom being alleviated by physical violence would be interesting to see.

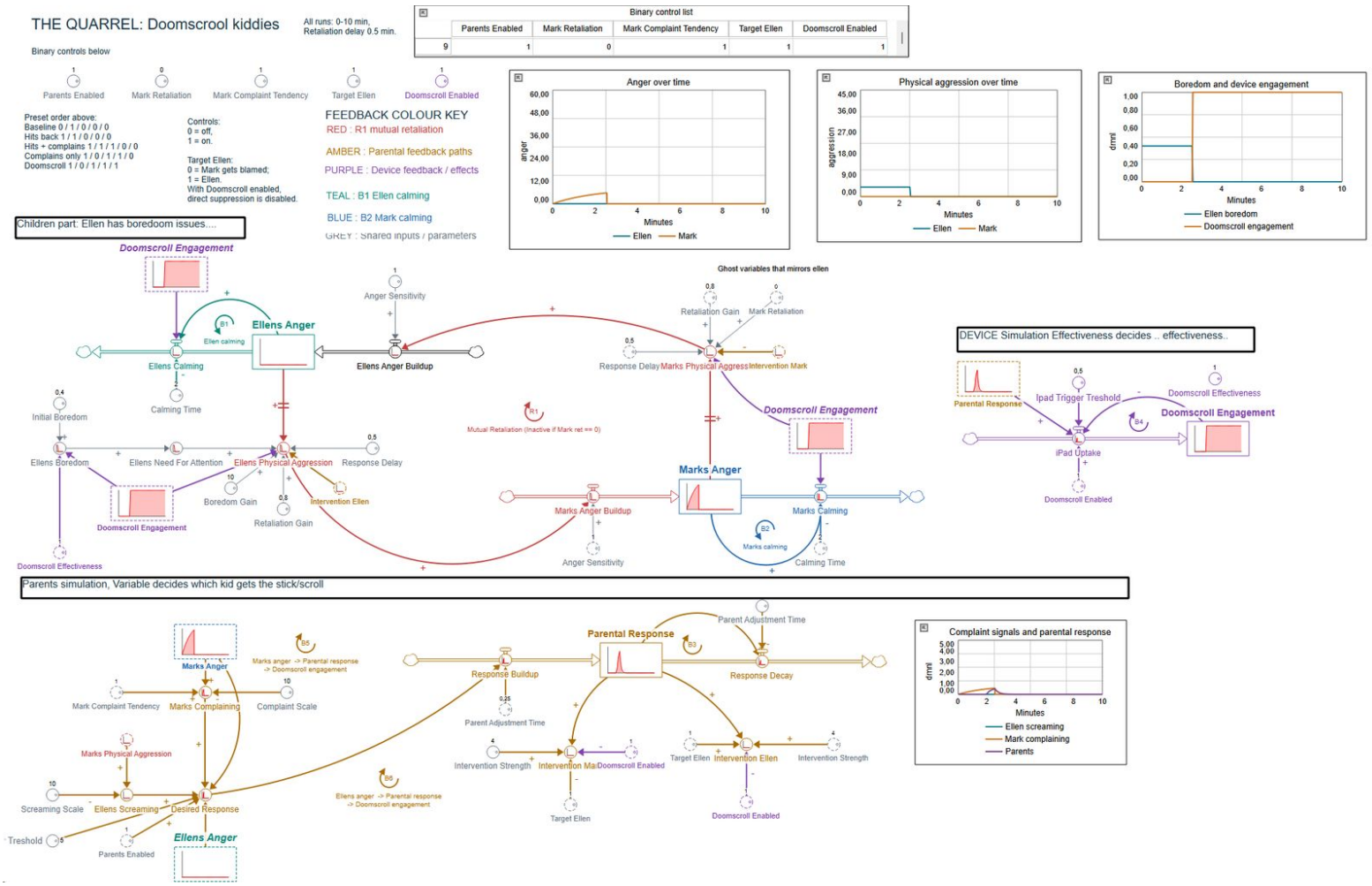
Third Scenario Stella Model (Marks doesn't hit, but complains)



Explanation of model:

Here we changed the settings so that he stops hitting, which creates a very visible change. Now Ellen's aggression simply triggers from the boredom, and the parents step in whenever things get too heated. Leading to a yoyo graph. The parents are still needing to be bothered, Ellen is still bored, and Mark still has a baseline of anger rolling.

Fourth Scenario Stella Model (doomscroll added)



Explanation of model:

Here we have the final model version, full with colors, and the doomscroll is added on the right side, with another graph to showcase engagement. We also added more loop labels to make things more viable, and a Legend and guide. There is also a table, showing the last used variables in the set. When the Doomscroll is put into play, you can see the boredom plummet, and it also removes all anger from the child with the most anger.

Discussion

As we are modeling two children's psychological behaviour using a system dynamics approach, we are bound to get a lot of things wrong, and forced to make assumptions based on how we perceive the actors' behaviour to play out based on little information. The largest issue with this is that we are attempting to quantify a complex problem using a simpler solution. In class, the day of the presentation, a statement was raised about how morally questionable an approach like this would be in a real world situation. As this is a fictional scenario which would realistically have minor impact on the actors in the long term, an approach like this is something one has to tread carefully when considering.

The question then is what systems thinking can truly apply to, as system dynamics can be used to describe people when we come in larger numbers. In essence, it is usually only applicable when there is something quantifiable to measure, like birth rates, or user-bases on a website or network. When it comes to individual people however, a model like the one described here would fail to see the intricacies of a single human being, and as we are modeling the behaviour of two people, it is hard to say this is truly a useful application of a systems thinking approach, although it is an interesting exercise in how we could apply it anyways.

Conclusion

In the RBP, for the base scenario without parental intervention the greatest inaccuracy was that the observed pattern was exponential rather than logarithmic. Without intervention the kids would seemingly spiral in an infinite quarrel with increasing violence. Another inaccuracy was the RBP for the first scenario. In the OBP, Mark's aggression suffers a modest dip in the early ticks of the simulation, something which was added in the RBP for the 2nd simulation, which also continued to be observed in the OBP. The remaining RBPs only had minor inaccuracies to what was observed through the model.

The model that we made was specifically made to be played around with, allowing anyone who understands the model to activate different components and observe how the model changes. It's possible to test a total of 32 combinations by editing the values of the controllers at the top of the model view.

There were also ideas of extending the simulation time, but we observed that there was little value in any data that came from simulating the model for any longer than 10 minutes. We also considered expanding on the model with after effects of tablet use, but it was eventually disregarded, as it could quickly bloat the model.

There are several previous versions of the model within the submission, all of which are expansions of the previous one, these are included as a way to document our progress. The final version should be the one put to test.

References

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