LEGO YOSHI

Lego Super Mario Interactivity: The next step?

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First steps: Where does a new product fit in?

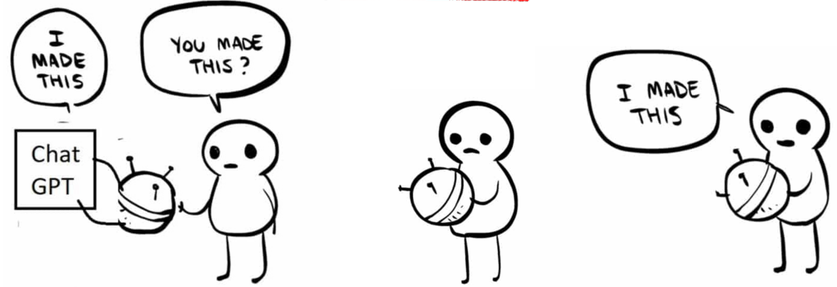
What does Super Mario offer?

- Characters with unique personalities and traits + Recognisability
- Years of worldbuilding and lore
- Variety of mechanics and contexts to work with/towards

eg: Super Mario Bros, Mario Sports, Mario Kart, Yoshi's Island

What do Large Language Models offer?

- Story narration/Dialogue generation for a range of prompts based on specific data. ← Which Lego Super Mario captures!
- Customisable agent personas.
- Lack of repetition/predictibility. ★



What does Lego Super Mario offer?

- 3 Interactive Figurines that have:
  - → Sound + LCD display + BT connection.
  - → Data capture points such as:
    - accelerometer/gyroscope
    - colour sensor, code scanner, etc.
  - → On board memory to save states.
  - → Strip connectors to 'mod' figurines.
- A system of interconnecting sets that work with each other in any order/setting - A toolbox for a child's imagination
- Free form play with quantification (through coins) if needed.

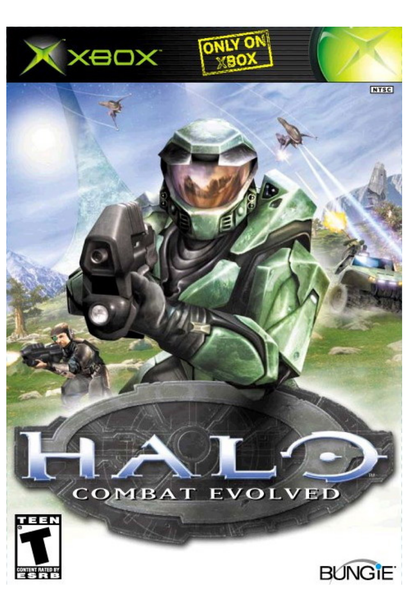
Where's the opportunity?

- Storytelling and worldbuilding on the fly to complement a child's imagination.
- Interactions with/between characters as the child plays.
- Creative challenge generation to increase longetivity of play.
- AI entity to play with!

Yes, but ...

- Make this AI entity not dystopian!
- LLMs are huge. Children's conversations must be safe!
- Any text generation must be within the scope of characterisations.
- The product should not nullify the current sets, only add to it!

One more thing:



Inspiration

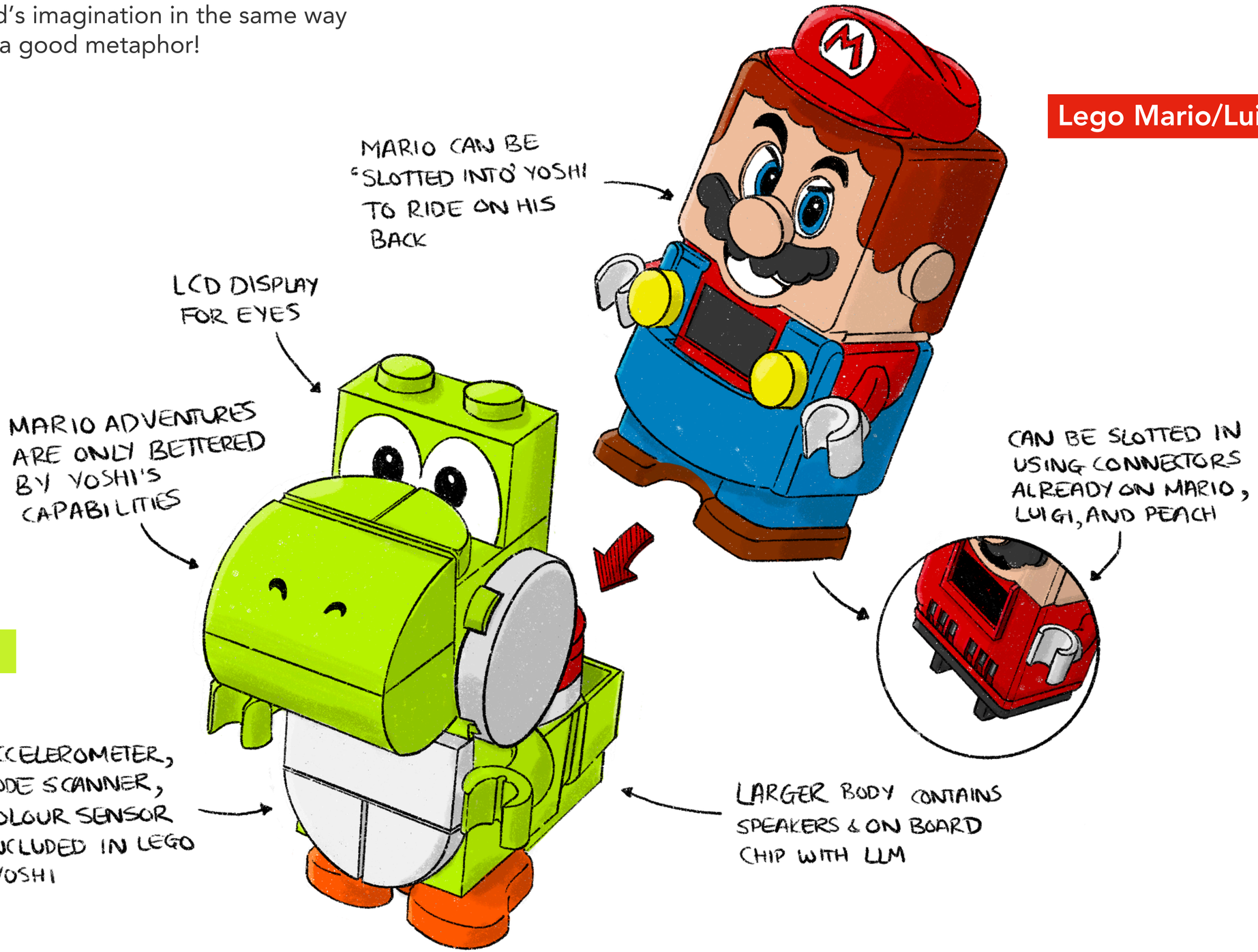
- I think the Super Mario interactivity is great as it is and doesn't warrant a 'relaunch'
- This is based on my childhood experiences of playing 'Duke Nukem' and 'Halo: Combat Evolved' in my bedroom.

- Imagination comes easy to kids.
- When we can provide a mould to imagine within, it becomes even easier.
- Having one more entity, a 'friend' or an 'enemy', would make the experience immeasurably better.

Lego Yoshi - The faithful (AI) sidekick

Lego Yoshi aids a child's imagination in the same way
Yoshi aids Mario - It's a good metaphor!

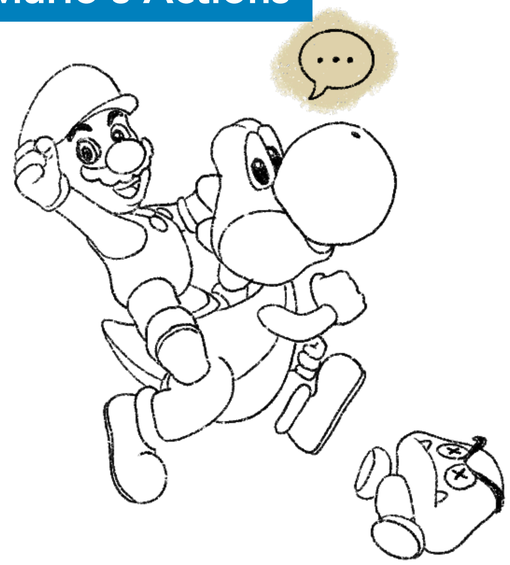
Lego Mario/Luigi/Peach



Lego Yoshi

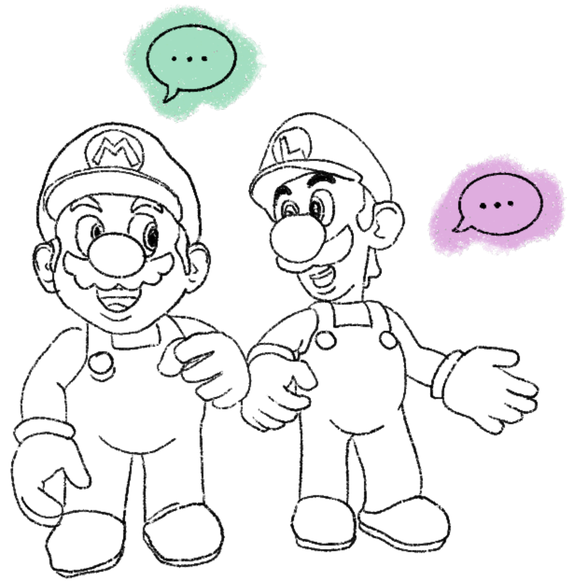
Lego Yoshi: What does he do?

1. React to Mario's Actions

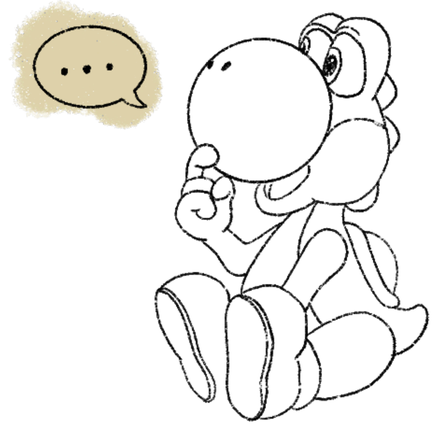


2. Receive Yoshi's signature power-ups

3. Give Mario hints

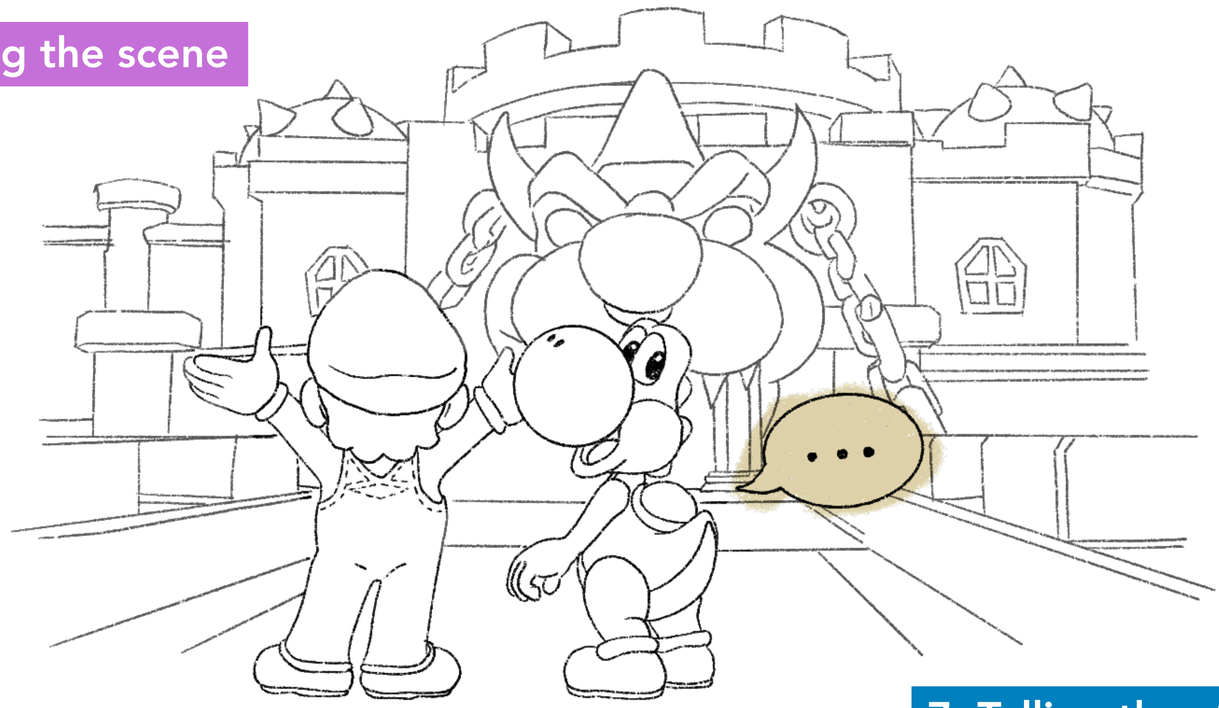


4. Generate dialogue between characters



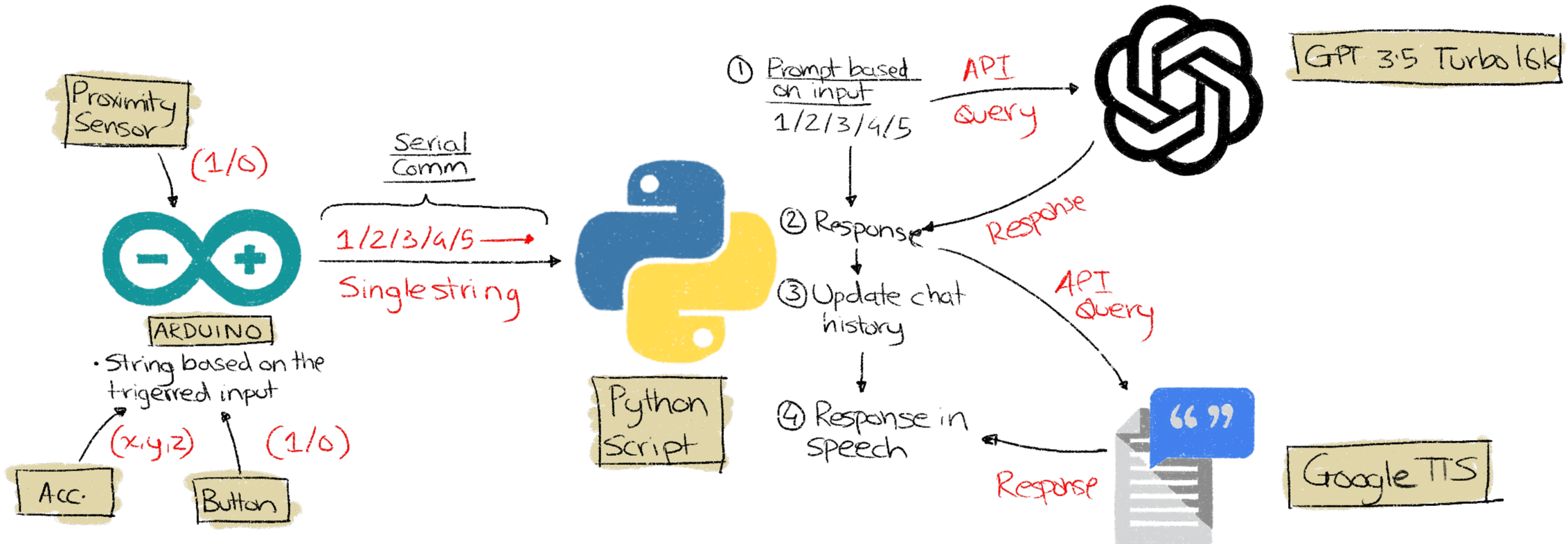
5. Open-Ended Storytelling

6. Setting the scene



7. Telling the story (so far)

Recap: How does it work



The prototype is comprised of 4 separate parts - The Python script (that does most of the heavy lifting), the Arduino sketch (to interface with hardware sensors), and the Google Text-to-Speech and GPT 3.5 APIs. The following are the steps that take place, in order:

1. The Arduino sketch receives input from the buttons/proximity sensor/ accelerometer. (Meant to mimic the actual Lego Mario hardware).
2. Based on set conditions, it send a string with a single digit to the Python script over the Serial Communication port.
3. The Python script runs functions based on the string received to create a prompt.
4. It appends the prompt to a list of all previous prompts and system instructions.
5. It send a query to the GPT API with the entire list and receives a response from the API's ChatCompletion Service
6. The response is appended to the same array and sent to the GTTS API.
7. The GTTS API sends back an MP3 with converted speech which is played.

What next?

Software

- **More experimentation with prompt engineering, an LLM retrained on Super Mario sample data like a VAE** - Solve conversational inconsistency.
- **Using on-board model instead of API** - Speed/Cost?
- **TTS trained on voice actor with better tonality** - Current TTS too mundane and not enjoyable for kids.

Hardware

- **Firmware capabilities of Lego Mario** - To work out best solution. Does Yoshi have to be electronic? Or is it more effective as a ‘suit’?
- **Built using a Raspberry Pi** - No slowdown/inconsistency with Serial Comm.
- **Integration of LSM sensors** - Can generate more ideas.
- **Physical prototype of Yoshi** - Often generates more ideas for interaction design too.

Design

- **More character design/intentional characterisation of Yoshi** - Personality can be too generic/‘vanilla’.
- **Possibilities of two-way dialogue?** - Safety, Security, Voice Detection capability, Designing model constrains, etc.
- **Yoshi abilities** - Tongue grab, Coloured shells, etc.
- **Yoshi to Yoshi communication?**