EECS510 Final Project

**Pokemon Battle Language**

Changwen Gong, Ella Nguyen, John Tran

horizontal line

# 

# Purpose

The goal of our final project was to take concepts from EECS510 - Theory of Computing, and create a formal language from a concept of our choice. As a group, we decided to base our language off of the hit game, Pokemon. Within Pokemon, there is a game mechanic called “Pokemon battles,” where Pokemon trainers face off against one another using various moves, items, and Pokemon. Our objective was to break these battles down into a pattern, of which we could build a formal language from, and display how theoretical computing can be applied to real-world mechanics, such as the functions of a beloved children’s game.

**Pokemon Battle Language Structure**

### Alphabet/Symbols

In a standard Pokemon game, there are a few factors to a Pokemon battle, such as Pokemon, Actions, and Determiners. These factors will be “symbols” in our formal language’s alphabet:

* **Pokemon (P):** Since there are so many different types of Pokemon that a user can have, our language allows the user to put in their own Pokemons’ name. Examples of Pokemon would include Pikachu, Ivysaur, Charizard, Squirtle, etc.
* **Actions (A):** Pokemon trainers are allowed to choose actions for their Pokemon. This includes attack moves, using items, or switching their Pokemon out. Essentially, actions can be simplified into three categories: Move, Item, and Switch.
  + **Move (M):** Moves are a branch of actions. If the trainer does an action, they can choose for their Pokemon to do a selection of different moves. This includes Thunderbolt, VineWhip, Flamethrower, and QuickAttack. Moves are followed by a Pokemon determiner. To use a move, the string would follow the format “Pokemon, Move, Pokemon.”
  + **Item (I):** Items are a branch of actions. In battle, trainers can choose to apply items to their Pokemon. This includes Potions and Pokeballs. Items are followed by item determiners. To use an item, the string would follow the format “Pokemon, Item, Pokemon.”
  + **Switch (S):** Switching Pokemon is a branch of actions. The trainer can swap their active Pokemon for a different Pokemon. Switches are followed by a Pokemon determiner. To switch, the string would follow the format “Pokemon Switch Pokemon.”
* **Determiners (D):** Determiners depend on the action. If the action is “Move” or “Switch”, then the determiner is another Pokemon. If the action is an item, then it is followed by an item determiner, such as a Potion or a Pokeball.

### Rules

Each string in this language is meant to represent a turn in a Pokemon battle. There are a few rules that the formal language must follow in order to emulate the pattern of a standard Pokemon battle:

* Substring must contain exactly one Pokemon, one Action, and one Determiner in that order.
  + In Pokemon battles, trainers must choose an action for each Pokemon to do; in other words, idle turns are not allowed. Therefore, in order for a sequence to be valid in this language, there must be an action for each Pokemon, and a determiner to go alongside the action.
* String must contain 1-3 substrings
  + As mentioned beforehand, Pokemon battles can be single battles, double battles, or triple battles. The amount of substrings is dependent on what kind of battle it is. For example, if the battle is a double battle, then there are two Pokemon on the field. Each of these Pokemon will have their own individual actions and determiners, making two substrings.
  + Strings do not necessarily have to match in substrings, because in double or triple battles, the trainers may or may not have enough Pokemon to fill up all slots, or their Pokemon may have fainted, which results in a different number of Pokemon selections.

### Examples

| **Valid Sentence** | **Invalid Sentence** |
| --- | --- |
| “PPikachuSwitchPCharizard”  The trainer chooses for the Pokemon, Pikachu, to switch out for Charizard. | “SquirtleBubblePikachu”  This sentence would cause issues due to there being no notation for the Pokemon, Action, or Determiner. |
| “PSquirtleMBubblePPikachu”  The Pokemon, Squirtle, uses the move Bubble on the target Pokemon Pikachu. | “PPikachuMThunderbolt”  The Pokemon, Pikachu, uses the move Thunderbolt. However, there is no target Pokemon. |