

Bachelor Thesis

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Design, Implementation and evaluation of different strategies for playing Pokémon battles

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Abstract

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Zusammenfassung

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1. Introduction

1.1. What is Pokémon

To Be Done (TBD)

2. Related Work

[?]

3. Approach

3.1. Basic rules

(Game is turn based)

ToDo

(Each player has 6 Pokémon)

ToDo

(If a Pokémon has no HP left, it faints)

ToDo

(If all Pokémon of a player fainted, the player loses)

ToDo

3.2. Battling

One of the key aspects of the Pokémon game is to battle other Pokémon. In the mainline games, you can have up to six Pokémon in your team, also known as party. There is the option to swap a Pokémon with another Pokémon, but you can't have more than six Pokémon at any point in your team. When playing the original Games, you can explore the world to find more Pokémon and use your team to defeat wild Pokémon and other Pokémon trainer. This thesis however focus on random battles taking place on Pokémon Showdown. In a random battle, both you and your opponent get a team of six random Pokémon. At the start of the battle, you know each of your six Pokémon but only the currently active enemy Pokémon.

Every turn, both players can choose to either use a Move of their currently active Pokémon or switch their active Pokémon to another Pokémon. Moves can either deal direct damage to the enemy Pokémon or yield other advantages like increasing the damage dealt by the next move. Moves will be covered in more detail in section 3.2.2. Each Pokémon has an amount of Hit Points (HP). The HP of a Pokémon can be dropped by attacking it with a Move. If the HP of a Pokémon drops to zero, it faints and can't be used in this battle anymore. A player wins, if all Pokémon of the enemy are fainted.

Note: In the mainline games there is the possibility to heal or even revive a fainted Pokémon during battle using *Healing Items* like *Revive* or *Hyper Potion*. In competitive Play, only *Held items* like *Leftovers* are allowed. Items will explained in depth in section 3.2.5.

3.2.1. Types

Pokémon implements a *Rock-Paper-Scissors*-like system. Each Pokémon has either one or two of 18 types. For example, a *Fire*-type Pokémon is weak against *Water*-type Pokémon

DEFENSE → ATTACK ↓	NOR	FIR	WAT	ELE	GRA	ICE	FIG	POI	GRO	FLY	PSY	BUG	ROC	GHO	DRA	DAR	STE	FAI
NORMAL													½	0			½	
FIRE		½	½		2	2						2	½		½		2	
WATER		2	½		½				2				2		½			
ELECTRIC			2	½	½				0	2					½			
GRASS		½	2		½			½	2	½		½	2		½		½	
ICE		½	½		2	½			2	2					2		½	
FIGHTING	2					2		½		½	½	½	2	0		2	2	½
POISON					2			½	½				½	½			0	2
GROUND		2		2	½			2		0		½	2					2
FLYING				½	2		2					2	½					½
PSYCHIC							2	2			½					0	½	
BUG		½			2		½	½		½	2			½		2	½	½
ROCK		2				2	½		½	2		2						½
GHOST	0										2			2		½		
DRAGON															2		½	0
DARK							½				2			2		½		½
STEEL		½	½	½		2							2				½	2
FAIRY		½					2	½							2	2	½	

Figure 3.1.: Pokémon type chart [1]

whereas a *Water*-type Pokémon is weak against *Grass*-type Pokémon. Lastly, a *Grass*-type Pokémon is weak against *Fire*-type Pokémon. The figure 3.1 shows how different Pokémon types interact with each other. It is important to note, that the type modifiers will be multiplied if a Pokémon has two types. For example, a *Fire*-type attack will deal 4 times the damage against *Parasect* as *Parasect* has the types *Grass* and *Bug* [2].

3.2.2. Moves

Moves can either deal direct damage to the enemy Pokémon or yield other advantages, possibly multiple turns in the future.

3.2.2.1. Move Categories

ToDo (Physical and Special moves)

3.2.3. Switching

3.2.4. Types

3.2.5. Items

3.2.6. Field Conditions

ToDo (Weather conditions)

3.2.7. Damage calculation

The damage dealt by a move mainly depends on the *level* of the Pokémon that uses the move, its effective Attack or Special Attack stat, the opponent's effective Defense or Special Defense stat and the move's effective power.

Precisely, the damage is calculated as follows[3]:

$$\text{Damage} = \left(\frac{\left(\frac{2 \times \text{Level}}{5} \right) \times \text{Power} \times A / D}{50} + 2 \right) \times \text{Targets} \times \text{Weather} \quad (3.1)$$

$$\times \text{Badge} \times \text{Critical} \times \text{random} \times \text{STAB} \times \text{Type} \times \text{Burn} \times \text{other}$$

The only exception for this are moves that deal direct damage. A list of these moves can be found at [4].

3.2.7.1. Level

Level refers to the level of the attacking Pokémon[3]. In Pokémon Showdown, the level is displayed next to the name of the Pokémon. **(Mainline games leveling)**

ToDo

3.2.7.2. A / D

A is the effective Attack stat of the attacking Pokémon if the used move is a physical move, **(Reference to physical moves)**

ToDo

or the effective Special Attack stat of the attacking Pokémon if the used move is a special move. **(Reference to special moves)**

ToDo

D is likewise the effective Defense stat of the target if the used move is a physical move, or the effective Special Defense of the target if the used move is a special move[3].

There are four moves that use stats from different categories, more Information can be found at [5].

3.2.7.3. Power

Power is the effective power of the used move. **(When is the power not equal to the base power)** The *Base Power* of a move in Showdown can be seen when hovering over a move in the move list.

ToDo

Note: The same move will always have the same base power. For example, *Fire Punch* will always have a base power of 75[6].

3.2.7.4. Weather

The *Weather* modifier is 1.5 if a *Water-type* move is used during *rain* or a *Fire-type* move during *Harsh Sunlight*. The modifier is 0.5 if a *Water-type* move is used during *Harsh Sunlight* or a *Fire-type* move during *rain* [3]. **(Reference to weather section)**

ToDo

3.2.7.5. Critical

In the latest Generation, a Critical Hit (crit) deals 1.5 times the damage compared to a normal hit. If the crit rate is not increased, the chance of landing a crit is 1/24 [7]. Increasing crit rate, as well as other stats, will be explained in chapter 3.2.8.1.

Note: In earlier games, crits worked different, see [7] for more details.

3.2.7.6. Random

Random is a random integer percentage between 85% and 100%. Because of this, the same move may deal different damage in the same scenario [3].

3.2.7.7. STAB

STAB stands for *Same Type Attack Bonus*. It is a multiplier of 1.5 if the used move is of the same type as the attacking Pokémon. Otherwise, it is 1.0 [3].

3.2.7.8. Type

This is the in section 3.2.4 described type modifier [3].

3.2.7.9. Burn

Burn is 0.5 if the attacking Pokémon is burned, and the used move is a physical move¹. Otherwise, it is 1.0 [3].

3.2.7.10. Other

The *other* modifier is usually 1. A list of exceptions can be found at [3].

3.2.8. Effective Stats

3.2.8.1. Boosting

ToDo (Boosting critical rate)

3.3. Hazards

An *entry hazard* is a condition that affects a side of the field that causes any Pokémon that is sent into battle on that side of the field to be afflicted by a negative effect. Entry hazards are created by moves, usually status moves [8].

ToDo (This paragraph is copied word by word from Bulbapedia)

3.3.1. List of entry hazards

Currently, there are five moves that create an entry hazard

3.3.1.1. Spikes

Spikes is a *Ground*-type entry hazard that causes the opponent to lose 1/8% of their maximum HP when they enter the field. This effect can be stacked up to three times. Two layers of spikes will deal 1/6% and three layers will deal 1/4% of the enemies maximum HP.

ToDo (Removal and Immunity of Spikes) Spikes are created by the move *Spikes*[9].

3.3.1.2. Stealth Rock

The move *Stealth Rock* sets an entry hazard around the target Pokémon causing Pokémon on the target's field to receive damage upon being switched in. The amount of damage inflicted is affected by the effectiveness of the type *Rock* against the target. Unlike Spikes, this entry hazard does not stack. The damage taken from the victim's maximum is denoted in table 3.3.1.2[10]. *Note:* Stealth Rocks can also be created by the move *G-Max Stonesurge*. This damage-dealing Water-type G-Max move is exclusive to Gigantamax Drednaw [11].

ToDo (Does this move exist in Showdown)

¹This does not apply if the attacking Pokémon has the Ability *Guts* or the used move is *Facade*

Type effectiveness	Damage (Max. HP)
0.25x	3.125%
0.5x	6.25%
1x	12.5%
2x	25%
4x	50%

Table 3.1.: Damage dealt to Pokémon by Stealth Rocks[10]

3.3.1.3. Sticky Web

The entry hazard set by the *Bug*-type move *Sticky Web* lowers the opponents speed stat by one stage upon switching in [12].

(Pokémon that are not affected by this)

ToDo

3.3.1.4. Poison spikes

Poison Spikes set by the *Poison*-type move *Toxic Spikes* cause the opponent to become poisoned. If two layers of spikes are set, the Pokémon instead becomes badly poisoned [13].

(Pokémon not affected)

ToDo

(Explain (badly) poisoning)

ToDo

3.3.1.5. Sharp steel

This entry hazard works very similar to Stealth Rock described in 3.3.1.2. However, Sharp steel can only be set by the *Steel*-type move *G-Max Steelsurge* which is the exclusive G-Max Move of Gigantamax Copperhead. The damage dealt by Sharp steel does not stack, the amount of damage dealt is based on the Type effectiveness of the *Steel*-type against the target. Exact damage modifiers can be found in table 3.3.1.5 [14]. (Unaffected Pokémon)

Type effectiveness	Damage (Max. HP)
0.25x	3.125%
0.5x	6.25%
1x	12.5%
2x	25%
4x	50%

Table 3.2.: Damage dealt to Pokémon by Sharp Steel[14]

ToDo

3.3.2. Hazard counterplay

There are some moves that can remove entry hazards. *Rapid Spin* [15] removes entry hazards from the user's side of the field and *Defog*[16] removes entry hazards on both sides of the field². In addition, *Court Change*[17] will exchange the entry hazards on each side of the field, along with other one-sided field conditions. (What other one-sided field conditions are there?) If a grounded³ *Poison*-type Pokémon enters the battle, it will remove Toxic Spikes, described in 3.3.1.4, from its side of the field. Lastly, Pokémon holding the item *Heavy-Duty Boots*[19] are unaffected by entry hazards, but grounded *Poison*-type Pokémon can still remove Toxic Spikes even if they hold the boots[8]. There are various exceptions and special cases to hazards. (Special cases of hazards)

ToDo

ToDo

²In older games *Defog* would only remove Hazards on the target's side of the field. But as we only investigate the latest version, this won't be covered in detail.

³The term *grounded* is used to describe a Pokémon that can't be affected by damaging *Ground*-type moves and several other associated effects[18].

4. Evaluation

5. Conclusion

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Listings

Acronyms

TBD To Be Done

HP Hit Points

crit Critical Hit

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Appendix

A. First Appendix Section

ein Bild

Figure A.1.: A figure

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