Phase 1 – Part 4: Duplicate Conversion System

Extends Phase 1 Part 2 with XP rewards for duplicate cards to enable progression through card upgrades.

Why Add Duplicate Conversion

Problem: Without a duplicate system, pulling a card you already own feels like wasted value and increases frustration unnecessarily.

Goals:

- Convert duplicates into tangible progression (XP)
- Make duplicate pulls feel rewarding through progression
- Enable long-term card upgrade mechanics
- Keep XP rewards balanced across rarities

Duplicate Detection & Conversion

Intuition

After cards are pulled and emotions are calculated, check if the player already owns each card. If yes, convert the duplicate to XP instead of adding it to the collection again.

New Tunable Parameters

XP per Rarity:

- **common_duplicate_xp** = 5
- **uncommon_duplicate_xp** = 10
- **rare_duplicate_xp** = 25
- **epic_duplicate_xp** = 50
- **legendary_duplicate_xp** = 100

Duplicate Conversion Formula

At Each Pull (After Step 6 - State Update & Clamping)

Step 7: Check for Duplicates (NEW)

For each card in the pull:

```
IF card already exists in player collection:
  duplicate_card = TRUE

  Convert card to XP based on rarity:

  IF card.rarity == "common":
```

```
    xp_gained = common_duplicate_xp (5 XP)

  ELIF card.rarity == "uncommon":
    xp_gained = uncommon_duplicate_xp (10 XP)

  ELIF card.rarity == "rare":
    xp_gained = rare_duplicate_xp (25 XP)

  ELIF card.rarity == "epic":
    xp_gained = epic_duplicate_xp (50 XP)

  ELIF card.rarity == "legendary":
    xp_gained = legendary_duplicate_xp (100 XP)

  Add xp_gained to player's total XP pool

ELSE:
  duplicate_card = FALSE

  Add card to player collection (new card)
```

Running Example: Pack with Duplicates

Context:

- Pack: Silver
- Player already owns: Common #12, Rare #5, Epic #3
- Pull result: Uncommon #7, Rare #5, Epic #3

Steps 1-6: Normal Emotion Calculation

```
Cards pulled: Uncommon(2), Rare(3), Epic(4)
Raw score: 2 + 3 + 4 = 9
quality01 = (9-6)/(12-6) = 0.50

(Follow Phase 1 Part 2 steps 1-6 exactly as documented)

Final emotions calculated:
S_t = 12.5
F_t = 8.3

NOTE: Emotions are calculated THE SAME WAY whether cards are duplicates or not.

The duplicate check happens AFTER emotions are finalized.
```

Step 7: Duplicate Check (After emotions are done)

Card 1: Uncommon #7

```
Check collection: Player does NOT own Uncommon #7
duplicate_card = FALSE
→ Add Uncommon #7 to collection (NEW CARD!)

xp_gained = 0
```

Card 2: Rare #5

Check collection: Player ALREADY owns Rare #5
duplicate_card = TRUE
→ Convert to XP
xp_gained = rare_duplicate_xp = 25 XP

→ Player total XP: +25

Card 3: Epic #3

Check collection: Player ALREADY owns Epic #3
duplicate_card = TRUE
→ Convert to XP
xp_gained = epic_duplicate_xp = 50 XP

→ Player total XP: +50

Pull Summary:

- Emotions: S = 12.5, F = 8.3 (calculated normally)
- 1 new card added to collection (Uncommon #7)
- 2 duplicates converted to XP
- **Total XP gained: 75 XP** (25 + 50)

Full Pull Example: All Duplicates

Context:

- Pack: Bronze
- Prior state: S = 10.0, F = 8.0
- Pull: Common #3 (duplicate), Common #5 (duplicate), Uncommon #2 (duplicate)
- Raw score: 1 + 1 + 2 = 4

Steps 1-6: Normal Emotion Calculation

quality01 = (4-3)/(7-3) = 0.25

(Follow Phase 1 Part 2 steps 1-6 exactly)

Final emotions calculated:
S_t = 9.2
F_t = 10.5

Emotions calculated THE SAME as if cards were new.

Step 7: Duplicate Conversion

Card 1 - Common #3: DUPLICATE
→ xp_gained = 5 XP

Card 2 - Common #5: DUPLICATE
→ xp_gained = 5 XP

Card 3 - Uncommon #2: DUPLICATE
→ xp_gained = 10 XP

Total XP gained: 20 XP

All 3 cards were duplicates, but emotions were calculated normally.

Final Result:

- Emotions: S = 9.2, F = 10.5
- No new cards added (all duplicates)
- Player XP pool: +20 XP

Summary of XP Values

Rarity	XP per Duplicate	Example: 3 Duplicates
Common	5 XP	15 XP
Uncommon	10 XP	30 XP
Rare	25 XP	75 XP
Epic	50 XP	150 XP
Legendary	100 XP	300 XP

Update Order (Complete with Duplicates)

At pull t, compute in this order:

1. Base deltas from Phase 1 part 1
2. Quality-driven reduction (dynamic reset)
3. Neutral-band recovery (if quality in middle band)
4. Oppositional dampening (cross-trim)
5. Streak multiplier (using rolling average of last N)
6. Apply to state and Clamp to ranges
7. **Check for duplicates and convert to XP (NEW)**

IMPORTANT: Steps 1-6 calculate emotions identically whether cards are duplicates or new. The duplicate check in Step 7 only affects XP gain and collection updates, NOT emotion values.