
DEDUCTIVE AND INDUCTIVE REASONING USING POPULAR TABLETOP GAMES

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CATALYZE WONDER, JOY, BEAUTY?

Games provide ...

- Wonder - exploration to understand rules and discover strategies
 - Joy - winning through competition/cooperation
 - Beauty - clear goals with rule system (or game aesthetics)
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MATHEMATICAL REASONING

"Reasoning can be thought of as the process of drawing conclusions on the basis of evidence" (p. 4)

- Deductive reasoning - draw conclusions based on available information
- Inductive reasoning - start with specific examples, then generalize to rule

NCTM's *Focus in High School Mathematics: Reasoning and Sense Making* (2009)

GAMES

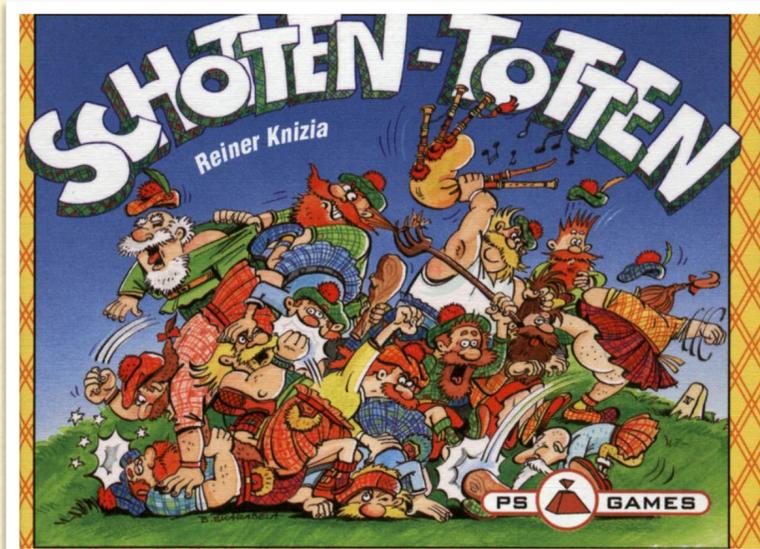
- Schotten-Totten/Battle Line (deductive reasoning)
 - Love Letter (social deduction)
 - Similo (interpretive deduction)
 - Mastermind (inductive reasoning)
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DEDUCTIVE REASONING

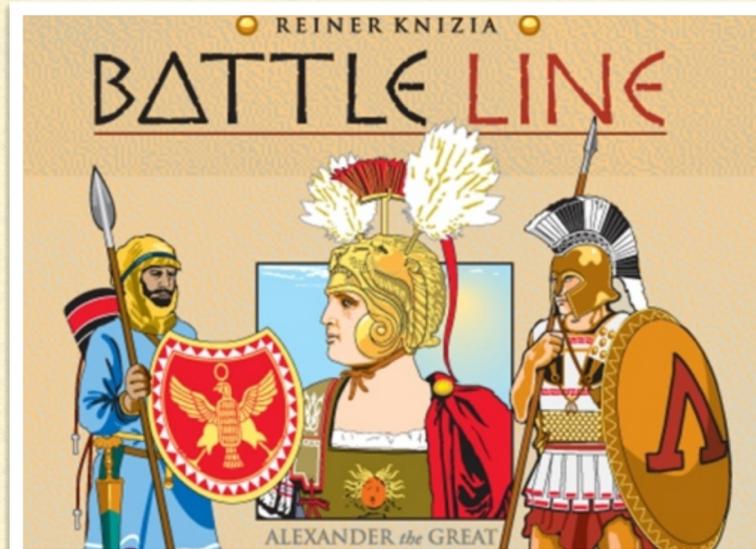
Draw conclusions from available information.

- **Schotten-Totten** aka. Battle Line (2-player)
 - Shipwreck Arcana (2-5 players)
 - Mr Jack (2 player)
 - Cryptid (3-5 players)
 - Clue/Cluedo (3-6 players)
 - Scotland Yard (3-6 players)
 - Search for Planet X (app driven, 1-4 players)
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SCHOTTEN-TOTTEN (VERSIONS)



Schotten-Totten (1999)



Battle Line (2000)



Schotten-Totten (2016)



Battle Line: Medieval (2019)

SCHOTTEN-TOTTEN (RULES VERSIONS)

SCHOTTEN-TOTTEN(1999)

six suits

ranks 1-9

hand size 6

claim before playing card

BATTLE LINE (2000)

six suits

ranks 1-10

hand size 7

claim after playing card
(variant: claim flag before)

+ tactics cards

SCHOTTEN-TOTTEN (2016)

six suits

ranks 1-9

hand size 6
(if using tactics, then 7)

claim after playing card (variant:
claim stone before)

+ tactics cards

SCHOTTEN-TOTTEN (RULES)

- Setup: 9 stones organized in a row, each player draws 6 cards
- Goal: First to gain 5 stones or 3 adjacent stones
- Turn: Play card beside one of 9 stones. At most 3 cards per stone. Draw card from deck.
- Stones are won by having better 3-card "poker" rank than opponent
 1. Straight flush (consecutive cards all in same suit)
 2. Three of kind (all same number)
 3. Flush (all same suit)
 4. Straight (consecutive)
 5. Other

SCHOTTEN-TOTTEN (EXAMPLE)



SCHOTTEN-TOTTEN (EXAMPLE)



SCHOTTEN-TOTTEN

Deductive reasoning:

- May make mini "proof" to claim stone
 - Depending on version, argument is made before or after card play
 - May also reveal card in hand to make argument
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SCHOTTEN-TOTTEN (PROBABILITY)

SCHOTTEN-TOTTEN	BATTLE LINE	POKER (3 CARDS)	POKER (5 CARDS)
Straight flush (42)	Straight flush (48)	Straight flush (48)	Straight flush (40)
Three of a kind (180)	Three of a kind (200)	Three of a kind (52)	Four of a kind (624)
Flush (462)	Flush (672)	Straight (720)	Flush (5108)
Straight (1470)	Straight (1686)	Flush (1096)	Straight (10200)
Other (22650)	Other (31614)	High card (16440)	High card (1.3mil)

SOCIAL DEDUCTION

Uncover players' hidden roles or allegiance.

- **Love Letter** (2-4 players)
 - Sheepshead (5 players)
 - Dead of Winter (2-4 players)
 - The Resistance (5-10 players)
 - Coup (2-6 players)
 - Citadels (2-7 players)
 - Werewolf (8+ players)
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LOVE LETTER (OVERVIEW)

- Setup: Shuffle cards. Each player draws 1 card
- Goal: Win round by being last player or having highest card when deck runs out.
- Turn: Draw a card. Play a card and apply its action.

(See <https://print-and-play.asmodee.fun/love-letter/>)

LOVE LETTER (EXAMPLE)

9-**Princess** (x1): Out of the round if you play/discard.

8-**Countess** (x1): Must play if you have King or Prince.

7-**King** (x1): Trade hands.

6-**Chancellor** (Included in full game.)

5-**Prince** (x2): Discard a hand & redraw.

4-**Handmaid** (x2): Immune to other cards until your next turn.

3-**Baron** (x2): Compare hands.

2-**Priest** (x2): Look at a hand.

1-**Guard** (x5): Guess a hand.

0-**Spy** (Included in full game.)

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Guard



Choose another player and name a non-Guard card. If that player has that card, they are out of the round.

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LOVE LETTER

Deduction and social deduction

- Guard - eliminates another player if their card is guessed correctly
 - Baron - compare hands with another player, lower player eliminated
 - Prince - make player discard
 - Princess - eliminated if card is discarded
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INTERPRETIVE DEDUCTION

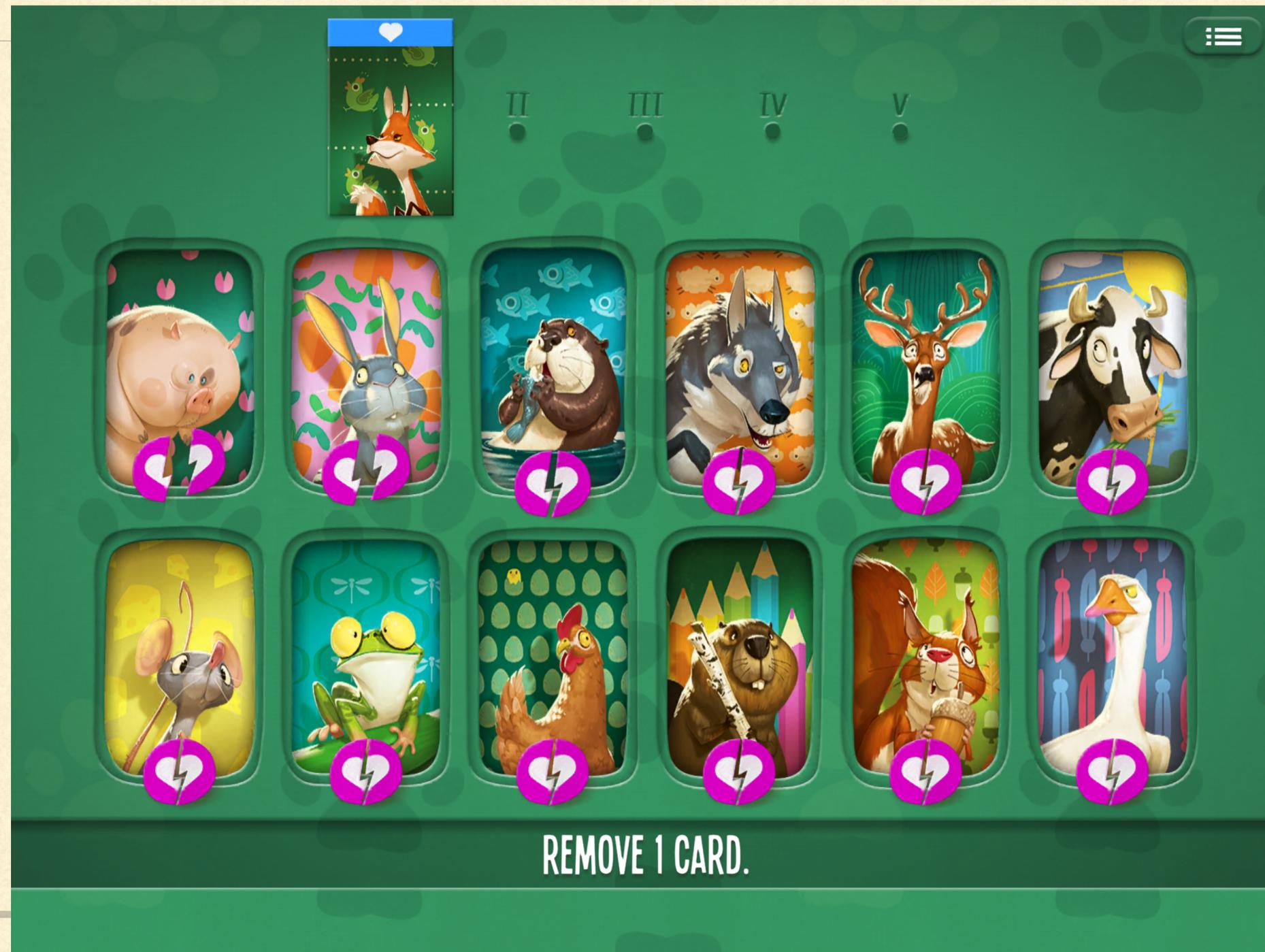
Draw conclusions from vague examples.

- **Similo:** Fables, History, Myths, Animals, Wild Animals (2-8 players)
 - Mysterium (2-7 players)
 - Mysterium Park (2-6 players)
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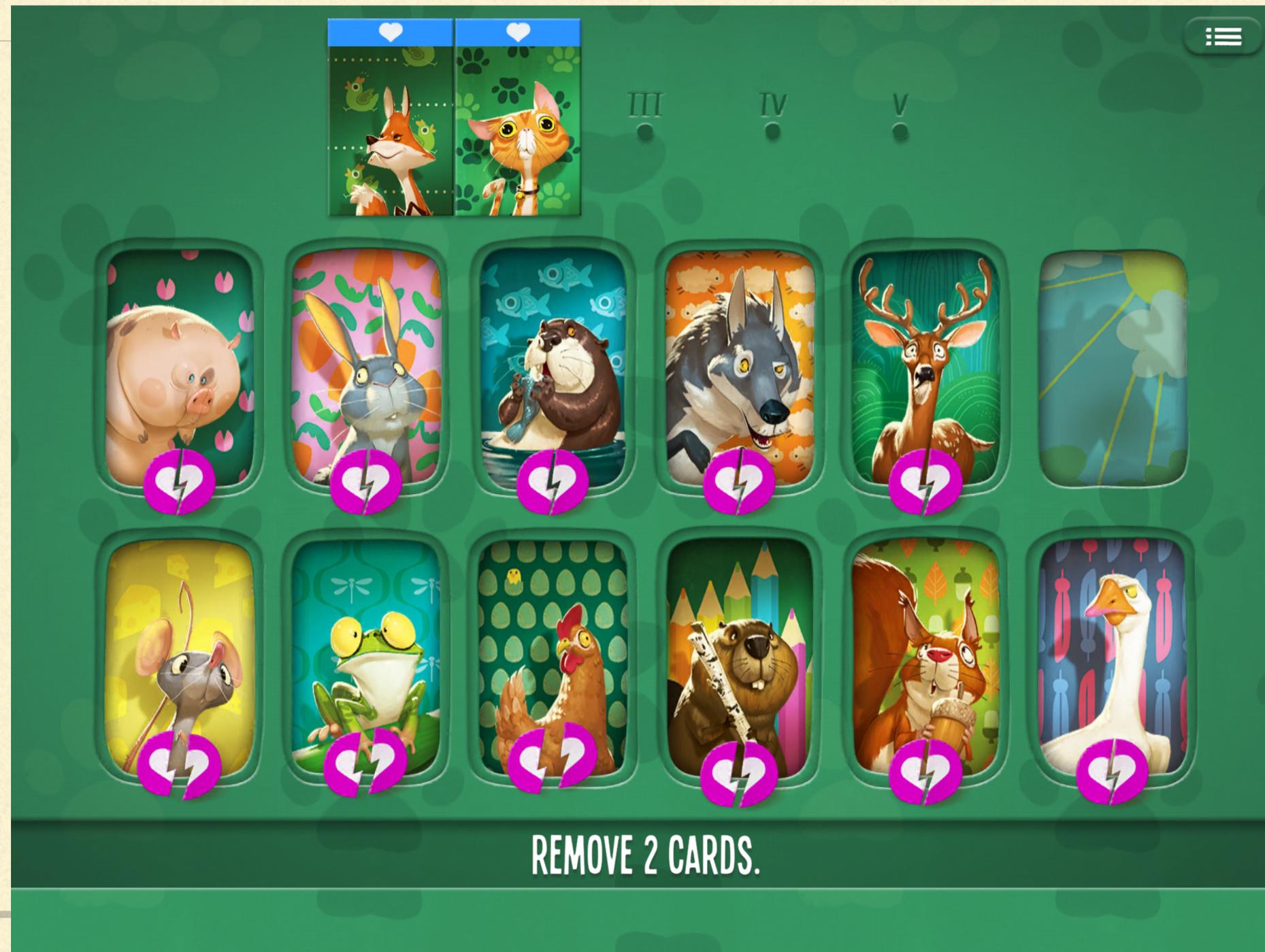
SIMILO (OVERVIEW)

- Setup: Clue-giver secretly looks at one card then deals 12 cards face up in array. Clue-giver draws hand of 5 cards.
 - Goal: Clue-giver is trying to have other players correctly identify of secret card
 - Turns:
 1. Clue-giver cannot talk, but selects a card from hand and places face-up:
 - vertical: clue is *similar* to secret card
 - horizontal: clue is *different* than secret card
 2. Guessers remove cards based on round number (1 for round 1, 2 for round 2, and so on)
 3. If secret card is removed, game over and everyone loses. If secret card is last card, everyone wins!
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SIMILO (EXAMPLE)



SIMILO (EXAMPLE)



SIMILO (EXAMPLE)



SIMILO

Interpretive deduction

- Limited possibilities (secret card is one of twelve)
 - Uses information from clue to deduce answer, but unclear how clue is important
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INDUCTIVE REASONING

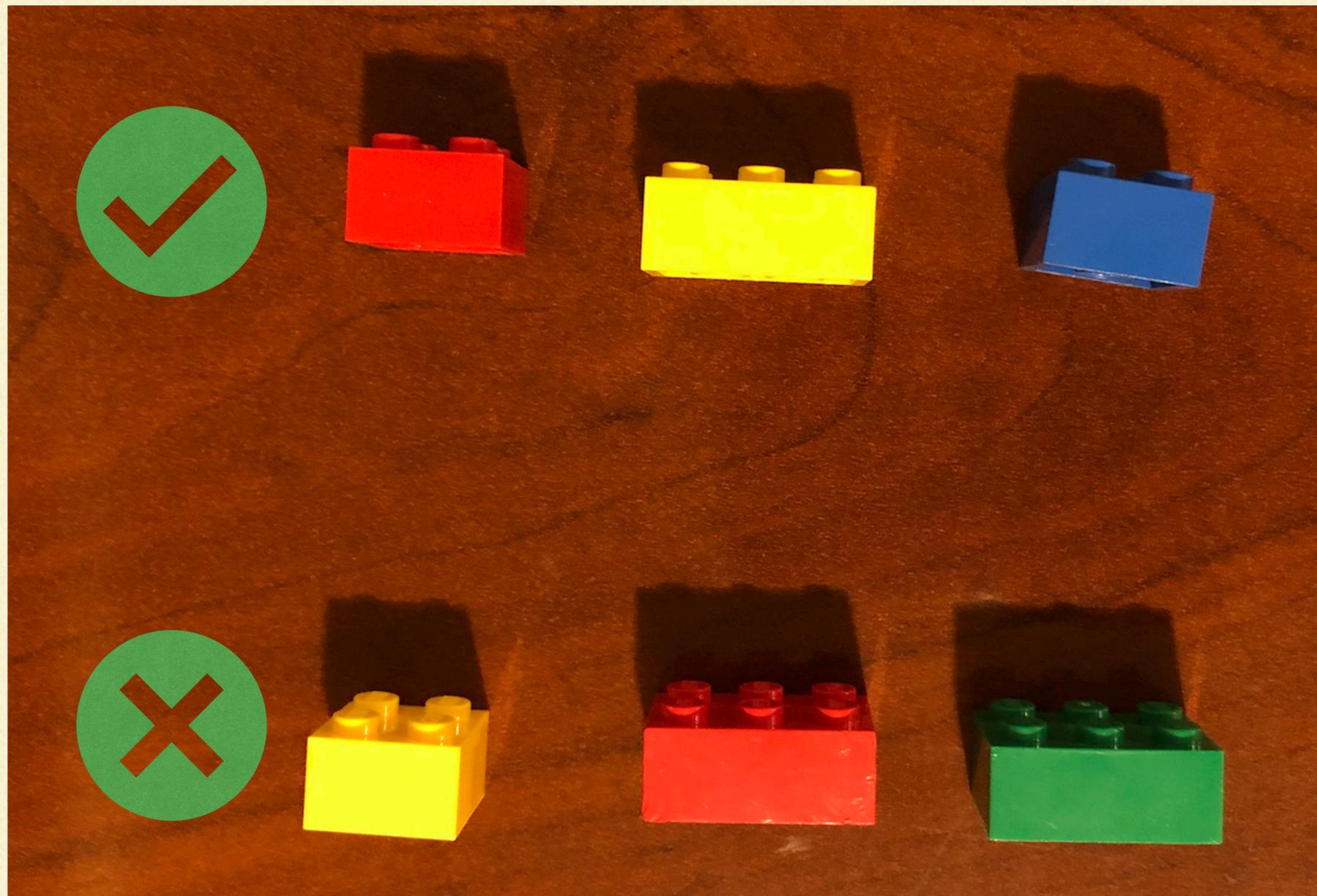
Identify rule based on given examples:

- **Zendo** (3-5+ players)
 - Mastermind (2 players)
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ZENDO (OVERVIEW)

- Setup: The Master creates a rule that is hidden from other players ("Students"). The Master gives an example of the rule and a non-example of the rule.
 - Goal: Students correctly identify the rule
 - Turn:
 1. A student creates an example and says "Master" or "Mondo"
 - 2a. Master - the Master indicates if the example follows rule or not
 - 2b. Mondo - All students guess if example follows rule or not. If correct, students get guessing stone.
 3. (optional) Student may spend guessing stone to guess rule. If wrong, the Master will provide a counter-example. If correct, the student wins!
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ZENDO (EXAMPLE)



ZENDO

Inductive reasoning

- Identify rule from examples
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GAMES

- Schotten-Totten/Battle Line (deductive reasoning)
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 - Zendo (inductive reasoning)
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SOURCES

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