

INF623

2024/1



Inteligência Artificial

A12: Representação do conhecimento II

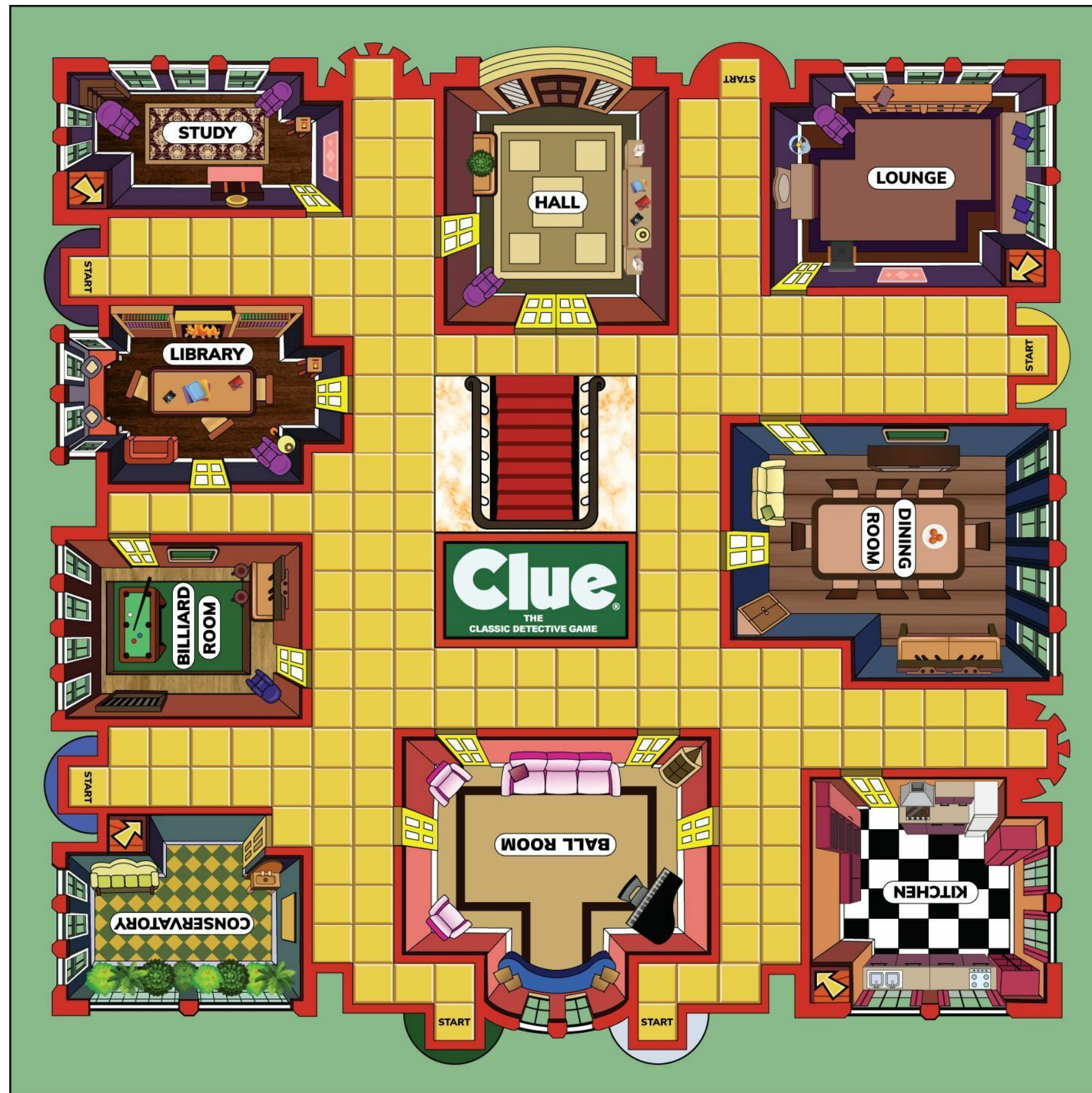
Plano de aula

- ▶ Engenharia do conhecimento
 - ▶ Jogo do detetive
 - ▶ Quebra-cabeças de lógica

Engenharia do conhecimento

O processo de modelar um problema real usando lógica

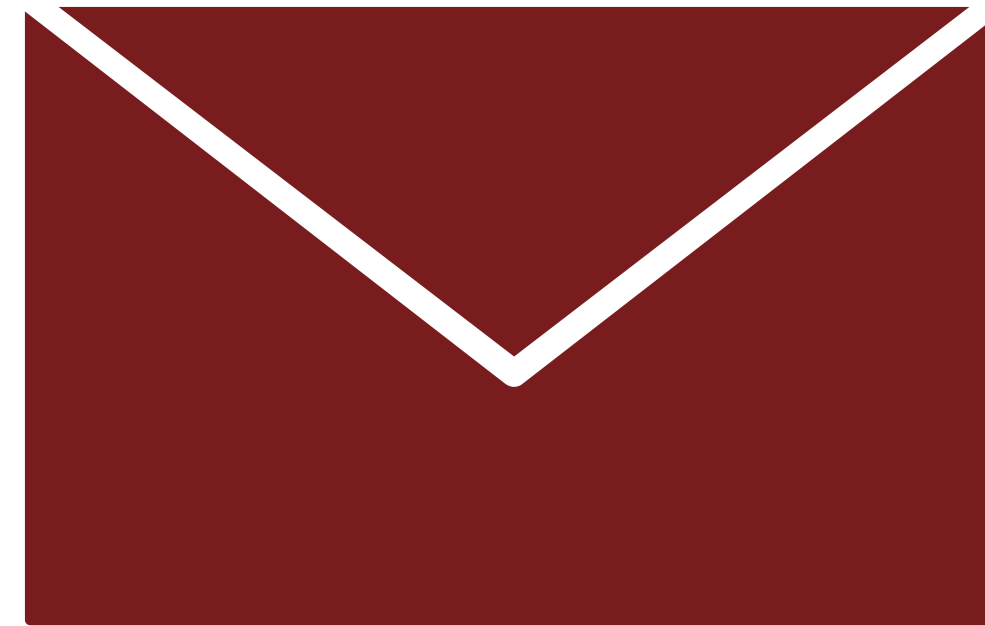
Exemplo 1: o jogo do detetive



Descobrir quem matou Mr. Boddy, em qual local da mansão e com qual arma.

- ▶ Jogo de tabuleiro para 3-6 jogadores
 - ▶ 1 dado
 - ▶ 21 cartas
 - ▶ 9 locais de crime
 - ▶ 6 suspeitos
 - ▶ 6 armas
 - ▶ Envelope secreto
 - ▶ Bloco de anotações

Exemplo 1: o jogo do detetive



Sala de estudos
Biblioteca
Salão de jogos
Estufa
Saguão de entrada
Salão de festas
Sala de estar
Sala de jantar
Cozinha

Locais

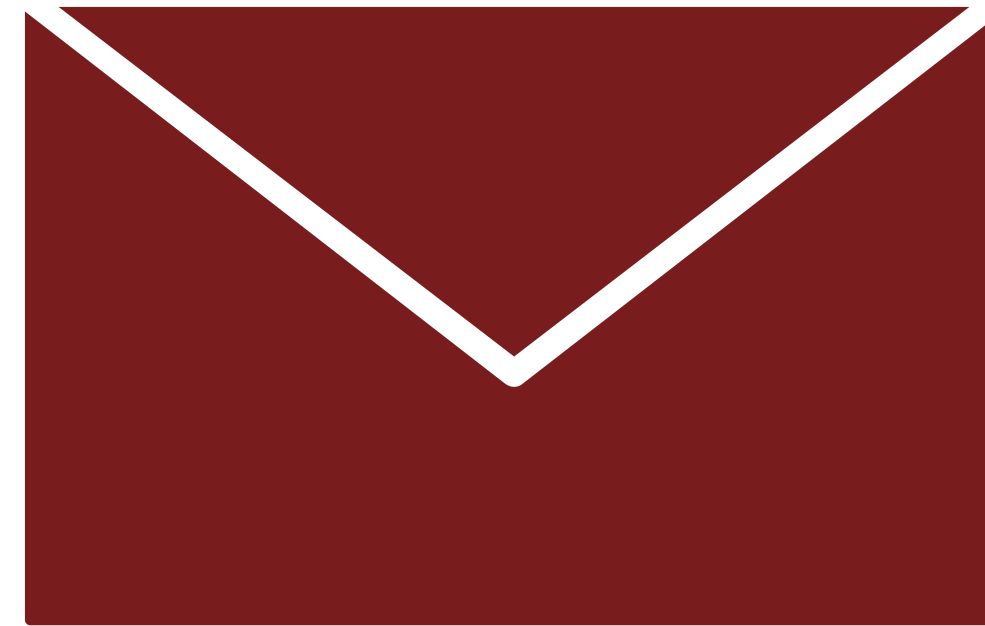
Col. Mustard
Miss Scarlet
Prof. Plum
Mr. Green
Mr. White
Mr. Peacock

Suspeitos

Castiçal
Faca
Cano
Revólver
Corda
Chave inglesa

Armas

Exemplo 1: o jogo do detetive



Sala de estudos
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Locais

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Faca
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Revólver
Corda
Chave inglesa

Armas

Ages 8 to Adult

3 - 6 players



INTRODUCTION

CLUE is unlike any other game. All of the characters are fictitious—even the “victim” is imagined. It is like a Stage Play. The scene opens in Mr. Boddy’s palatial mansion. Mr. Boddy is the victim of foul play and is found in one of the rooms.

THE OBJECT OF THE GAME is to discover the answer to these three questions:

1ST WHO?
Which one of several suspects did it?

2ND WHERE?

3RD HOW?

The answer lies in the little Envelope resting on the stairway marked X in the center of the board. The envelope contains 3 cards. One card tells who did it, another card reveals the room in which it all happened, and the third card discloses the weapon used.

The player who, by the process of deduction and good plain common sense, first identifies the 3 clue cards hidden in the little envelope, wins the game.

This is accomplished by players moving into the rooms and making “suggestions” of what they believe is the room, the person and the weapon for the purpose of gaining information. This information may reveal which CLUE cards are in the other player’s hands and which cards are

missing and must, therefore, be hidden in the little manilla envelope. “Accusing” a suspect and naming the weapon and the room under suspicion is one of the most exciting features of CLUE.

EQUIPMENT:

The Gameboard showing nine rooms of Mr. Boddy’s house.

Six colored pawns representing the suspects in the house. The colors of the pawns are closely associated with the names of the suspects:

Suspects	Pawns
Col. Mustard	Yellow
Miss Scarlett	Red
Prof. Plum	Purple
Mr. Green	Green
Mrs. White	White
Mrs. Peacock	Blue

Six miniature weapon tokens and ONE DIE.

The pack of 21 illustrated cards includes a card for each of the **6 suspects**, one for each of the **6 weapons**, and one for each of the **9 rooms**. There is also a case file envelope.

A pad of Detective Notes is included to aid the players in their investigations.

PREPARATION:

Place the pawns on the starting squares marked with their names. All 6 pawns are placed on the board regardless of the number of players. Place each of the Weapons in a different room, using any of the rooms.

Arranging the Cards:

Place the empty envelope on the spot marked “X” in the center of the board. Then sort the pack of cards into three groups—Room Cards, Weapon Cards and Suspect Cards.

Shuffle each of these three groups **separately**. Take the top card from each group and place it in the envelope. **This should be done carefully so that no player knows any of the three cards** (one room, one weapon, and one suspect) **placed in the envelope**.

Dealing the Cards:

The remaining cards in the three piles are now thoroughly mixed together and shuffled, and then are dealt, one at a time, clockwise around the table to each player.

IT IS IMPORTANT THAT NO PLAYER SHALL SEE ANY OF THE CARDS WHILE THEY ARE BEING SHUFFLED AND DEALT.

Some players may receive more cards than others.

Each player holds the cards dealt him, taking care that no other player sees the cards in his hand.

START:

Each player takes the colored pawn nearest to him on the board, and uses it throughout the game.

The player having the red pawn, Miss Scarlett, rolls the die and moves first.

After Miss Scarlett has moved, the next player on the left rolls the die and moves. Each of the other players follows in turn. In succeeding games players should take turns, dealing and starting.

MOVEMENT OF PAWNS:

To reach a room players may move their pawns on the white squares anywhere on the board according to the throw of the die. All the white squares on the board are for the movement of pawns. Pawns can move forward, backwards, or crosswise, but—**never diagonally**. A pawn may be moved forward and crosswise on the same turn, but it cannot move to a particular space twice in the same turn.

NO TWO PAWNS MAY OCCUPY ANY ONE SQUARE, NOR MAY A PLAYER MOVE HIS PAWN THROUGH A SQUARE OCCUPIED BY ANOTHER PAWN. A room, however, may be occupied by any number of pawns and weapons.

MOVING INTO A ROOM:

There are three ways of **entering** a room: (1) Throwing the die and moving your pawn along the squares *entering through a doorway*, (2) via the Secret Passages by leaping across the board, *corner to corner*, without using the die, and (3) a player’s pawn may be *placed in a room by another player* in the feature play known as “the Suggestion.”

If the space at the entrance to a room is occupied by the pawn of one player, no other player may move into that room, through *that* door.

SECRET PASSAGES:

The Secret Passages shown in the corner rooms enable players to move between opposite corner rooms in one move. This can be done on a player’s turn without throwing the die merely by moving his pawn to the opposite corner room and announcing he is using the Secret Passage. A Suggestion may be made after this move.

GETTING OUT OF A ROOM:

There are three ways of **leaving** a room: (1) by throwing the die and moving out through a doorway onto the squares, heading toward another room of your choice, (2) by using the Secret Passages and finally, (3) by being transferred to a new room by some other player.

On the throw of the die, players may enter Rooms by the **DOORS** only, but cannot leave a room on the same turn; **entering the Room ends the move**. It is not necessary to throw the exact number to enter a Room. That is, if a player needs 4 to bring him into a room and throws 6, he ignores the last two units after entering the Room.

Players already in a room may leave it **by any door**—using the die as usual and moving toward another room—or, they may use a secret passage, if in a corner room. The doors of each room are not counted as a square.

THE “SUGGESTION”

Whenever a player moves into a room he should make a “Suggestion.”

A “Suggestion” consists of naming a Suspect, a Weapon and the Room into which the player has moved. AS SOON AS A PLAYER MAKES A SUGGESTION THE PAWN OF THE SUSPECT NAMED AND THE WEAPON NAMED ARE BROUGHT INTO THE ROOM NAMED IN THE SUGGESTION. No player may forfeit a turn to remain in a particular room. Players must move by a throw of the die or by the secret passages on each turn.

An Example:

The player representing Miss Scarlett may, in two moves, reach the Lounge. Miss Scarlett may then call a Suspect into the Lounge (for example Mr. Green) and move the green pawn into the Lounge. She will also call into the Lounge some weapon (for example, the Wrench) and will say “I suggest that the crime was committed in the LOUNGE, by MR. GREEN with the WRENCH.”

Note: All pawns, spare ones as well as players’ own pawns, fall under equal suspicion and should be considered by players making “Suggestions.”

PROVING THE SUGGESTION TRUE OR FALSE:

When a Suggestion has been made the first player to the left of the one making the Suggestion examines his cards to see if he is able to prove the Suggestion false. To disprove the Suggestion he must hold one or more of the cards named. (In our example above, the cards named are Mr. Green, the Wrench and the Lounge). If he holds one or more of these cards, he must show one only to the player making the Suggestion. **This must be done without the other players seeing the card shown.**

(If Miss Scarlett holds **in her own hand** one or more of these cards, perhaps the **Lounge** and **Mr. Green**, she may soon discover whether some other player has the Wrench, or if it is hidden in the envelope. A smart player will often deliberately make a Suggestion naming one or two cards that he holds in his own hand just to gain information or to mislead the other players.)

If the first player to the left does not have any of the three cards, then the next player at his left examines his cards and must show one of the three if he has it. A player having more than one of the called cards may show whichever one he wishes, but only one.

Obviously if any player holds in his hand one or more of the 3 cards named in the suggestion, it is proof that those particular cards are not in the envelope. Therefore, when a card is shown to the player who made the Suggestion, his Suggestion has thus been proved to be false, and he may wish to make a note of this on his Detective Pad.

The opportunity to prove the Suggestion false passes to the left until some player has shown ONE card to the suggesting player, whose turn then ends, and play passes to the next player.

If no one disproves the Suggestion the player then may either pass the turn or else make an ACCUSATION.

ACCUSATION:

When a player is satisfied that he knows the three Clue Cards hidden in the envelope, he can on his turn, make an ACCUSATION. He states that he is making an Accusation and names the three Clue Cards he believes to be in the envelope. Then, carefully, so that the other players do not see, he looks at the three cards in the envelope. Contrary to the rules for making a suggestion a player may make an accusation whether or not his piece is in the room he mentions.

WINNING THE GAME:

IF THE ACCUSATION IS CORRECT, THAT IS, IF THE PLAYER FINDS IN THE ENVELOPE, THOSE 3 CARDS THAT HE JUST NAMED, HE LAYS THE CARDS FACE UP ON THE TABLE, AND HE IS THE WINNER.

If the Accusation is incorrect, the player returns the three Clue Cards to the envelope unseen by any other player and replaces it on the board. Having made a false Accusation he has no further moves in the game, and cannot win, but remains as a player to contradict Suggestions made by other players with the cards he holds in his hand.

A player can make only one Accusation during any one game.

OTHER INTERESTING NOTES AND HINTS FOR PLAY:

A PLAYER MUST BE EXTREMELY CAREFUL IN EXAMINING HIS CARDS BEFORE STATING HE CANNOT DISPROVE A “SUGGESTION.”

“Suggestions” may even include cards held in the player’s own hand.

The room named in a Suggestion must always be the one into which the suggesting player’s own pawn has been moved.

A player may make only one Suggestion after entering a room, and may not make another until entering another room or else, using at least TWO TURNS, leaving and then re-entering the same room.

Pawns and weapons transferred to a room as the result of a Suggestion are not returned to their original positions on the board. To leave a room in which his pawn has been placed by a Suggestion, a player on his next turn uses either the THROW OF THE DIE or, if in a corner room he can use the SECRET PASSAGE.

If a pawn is moved into a room by a Suggestion, the player who owns the pawn may, on his next turn, make a Suggestion of his own for that room. For this turn he does not throw the die or move his pawn.

By making Suggestions and having them proved True or False players will eventually be able to identify the three Clue Cards in the envelope.

Although there is no requirement or rule on how players should use the Detective Note Pads it is suggested that the best and easiest way to play the game is to check off items on the Note Pads as they become known and using the initials of the player showing the card sometimes is an additional aid in winning the game.

Some players prefer to check off the names of the cards dealt to them at the beginning of each game.

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Exemplo 1: o jogo do detetive

- ▶ Símbolos proposicionais
(3 suspeitos, locais e armas)

mustard
plum
scarlet

festa
cozinha
biblioteca

faca
revolver
chave

- ▶ Base de conhecimento

Pelas regras do jogo:

$(mustard \vee plum \vee scarlet)$
 $(festa \vee cozinha \vee biblioteca)$
 $(faca \vee revolver \vee chave)$

Após receber cartas, o agente sabe, por exemplo:

$\neg mustard \wedge \neg cozinha \wedge \neg revolver$

Quando alguém fizer uma “sugestão” falsa, o agente pode aumentar sua base de conhecimento, por exemplo:

$\neg scarlet \vee \neg biblioteca \vee \neg chave$

Exemplo 2: Quebra-cabeças de lógica



- ▶ Profs. Gilderoy, Minerva, Pomona e Horácio pertencem cada um a uma casa diferente: Grifinória, Lufa-Lufa, Corvinal ou Sonserina.
- ▶ Gilderoy pertence à Grifinória ou Corvinal
- ▶ Pomona não pertence à Sonserina
- ▶ Minerva pertence à Grifinória

Exemplo 2: Quebra-cabeças de lógica

► Símbolos proposicionais

GilderoyGrifinoria
GilderoyLufaLufa
GilderoyCorvinal
GilderoySonserina

PomonaGrifinoria
PomonaLufaLufa
PomonaCorvinal
PomonaSonserina

MinervaGrifinoria
MinervaLufaLufa
MinervaCorvinal
MinervaSonserina

HoracioGrifinoria
HoracioLufaLufa
HoracioCorvinal
HoracioSonserina

► Base de conhecimento

- Profs. Gilderoy, Minerva, Pomona e Horácio pertencem cada um a uma casa diferente: Grifinória, Lufa-Lufa, Corvinal ou Sonserina.

PomonaSonserina $\Rightarrow \neg$ *PomonaLufaLufa*

...

MinervaCorvinal $\Rightarrow \neg$ *GilderoyCorvinal*

...

- Gilderoy pertence à Grifinória ou Corvinal

GilderoyGrifinoria \vee *GilderoyCorvinal*

- Pomona não pertence à Sonserina

\neg *PomonaSonserina*

- Minerva pertence à Grifinória

MinervaGrifinoria