

# SOCIAL PRESENCE IN LONG-TERM HUMAN-COMPUTER RELATIONSHIPS

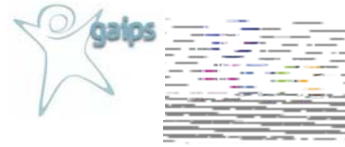
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GAIPS (Intelligent Agents and Synthetic Characters Group)

INESC-ID



# Outline



- Motivation
- LIREC Project
- Related Work
- Problem Statement
- Scenario: iCat, the Affective Chess Player
- Long-term Evaluation
- Conclusions
- Future Work

# Motivation (LIREC Project)

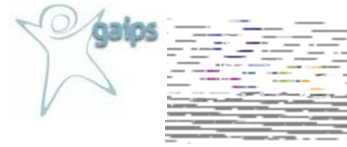


- Existing work on artificial agents has only considered short-term interactions
- After the “novelty effect” wears off...



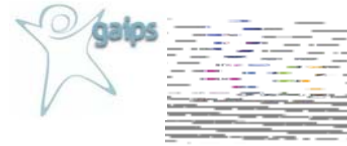
... people lose interest and change their attitudes towards the agents

# The LIREC Project



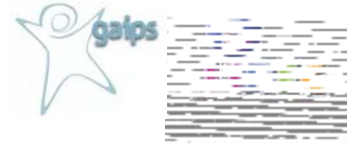
- EU FP7 LIREC (Living with Robots and InteRactive Companions)
- Long-term affect sensitive and socially interactive companions
  - ▣ Robots, graphical synthetic characters, interactive toys...
- Existing prototypes have limited functionalities
- Need to establish natural interaction with users
- Social and affective capabilities

# Related Work

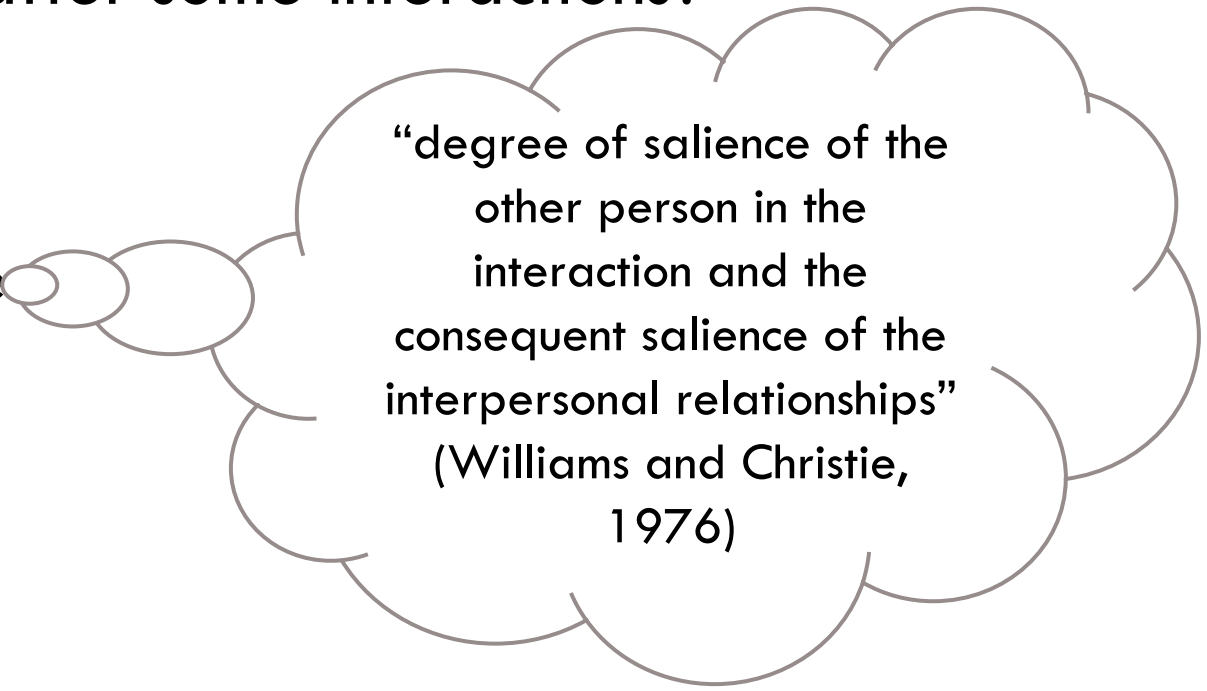


- Robovie (Kanda et al., 2004)
  - ▣ Robot failed to keep most of the children's interest after the first week
- Valerie, the Roboceptionist (Gocklet et al., 2005)
  - ▣ Many visitors continued to interact daily with the robot, but only few interacted for more than 30 seconds
- Laura, the exercise advisor agent (Bickmore and Picard, 2005)
  - ▣ Relational behaviours increased participant's perceptions of the quality of the working alliance (on measures such as liking, trust and respect)

# Problem Statement



- How to create and maintain **long-term** relationships, or companionship between agents and humans?
- What changes after some interactions?
  - ▣ Awareness
  - ▣ Intimacy
  - ▣ Social presence



“degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships”  
(Williams and Christie, 1976)

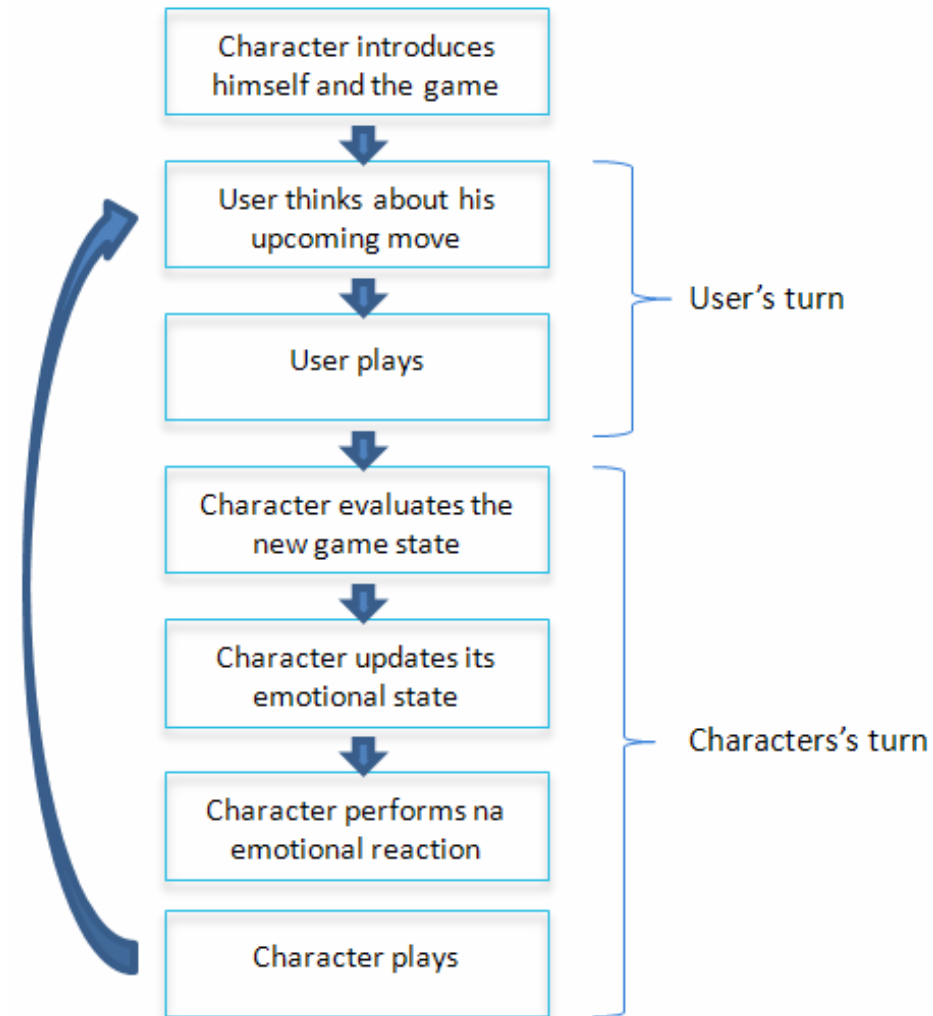
A large, light gray thought bubble graphic is positioned to the right of the 'Social presence' list item. The bubble has a main large cloud-like shape with several smaller circles leading to it from the left. The text inside the bubble is centered and in a black, sans-serif font.

# Hypothesis

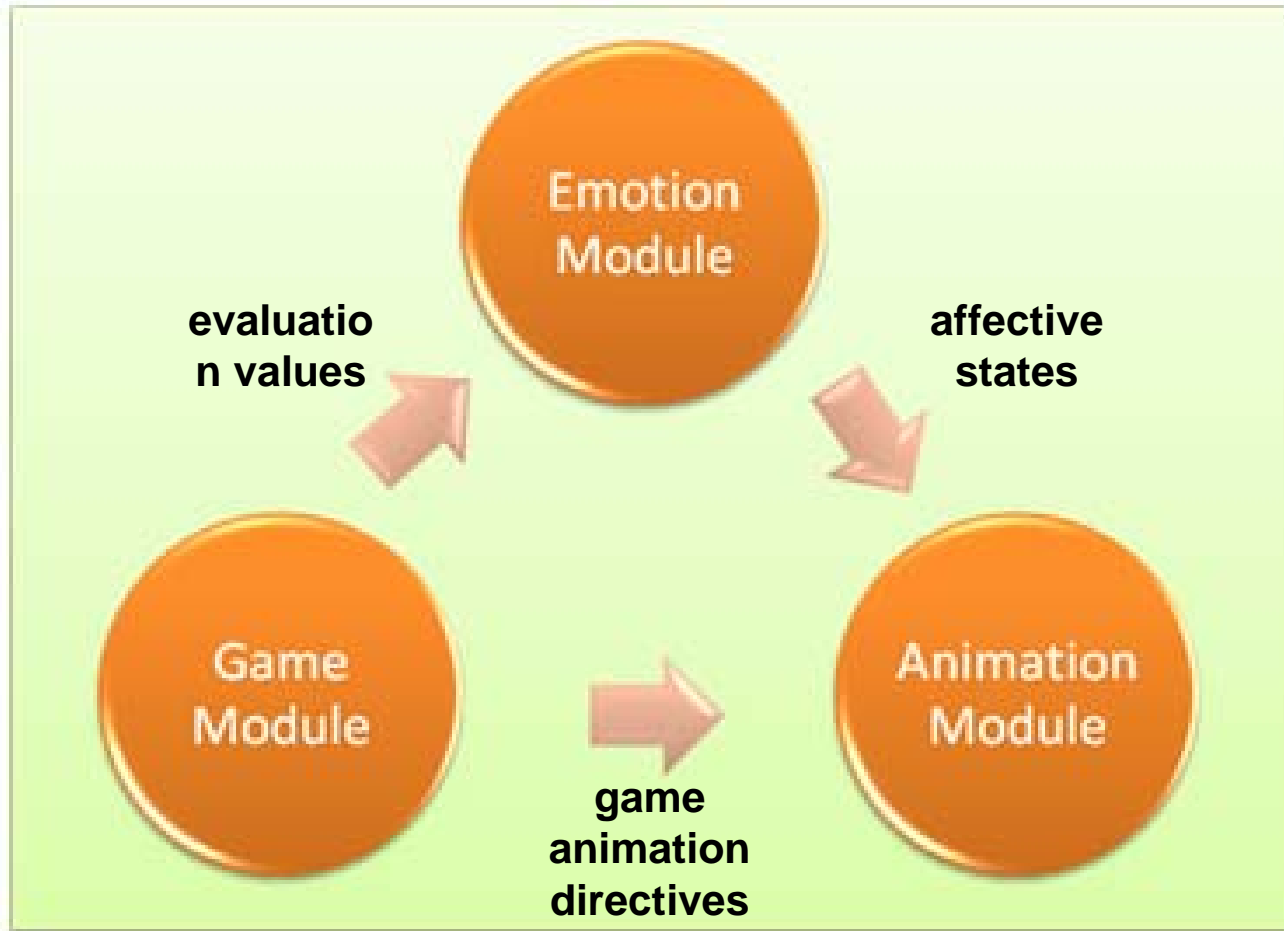


By evaluating **user's perceived social presence over time**, some indicators about what intelligent agents should have to engage users in long-term interactions can be retrieved.

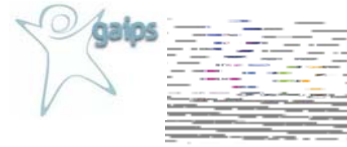
# iCat, the Affective Chess Player



# Agent's Architecture



# Long-term experiment



- Objectives:
  - ▣ Evaluate if the user's perceived social presence changes over time
  - ▣ Identify the aspects of social presence that are most affected over time
- Subjects:
  - ▣ 4 children (3 males and 1 female) between 4 and 16 years old
  - ▣ Belong to a chess club where they play every week

# Long-term experiment



- Procedure:
  - ▣ Children played one chess exercise every week, over 5 consecutive weeks
  - ▣ While iCat was playing with one subject, the others could be watching the game or playing against each other
- Measurements:
  - ▣ Social Presence Questionnaire
  - ▣ Video Observation (~15 hours of video)

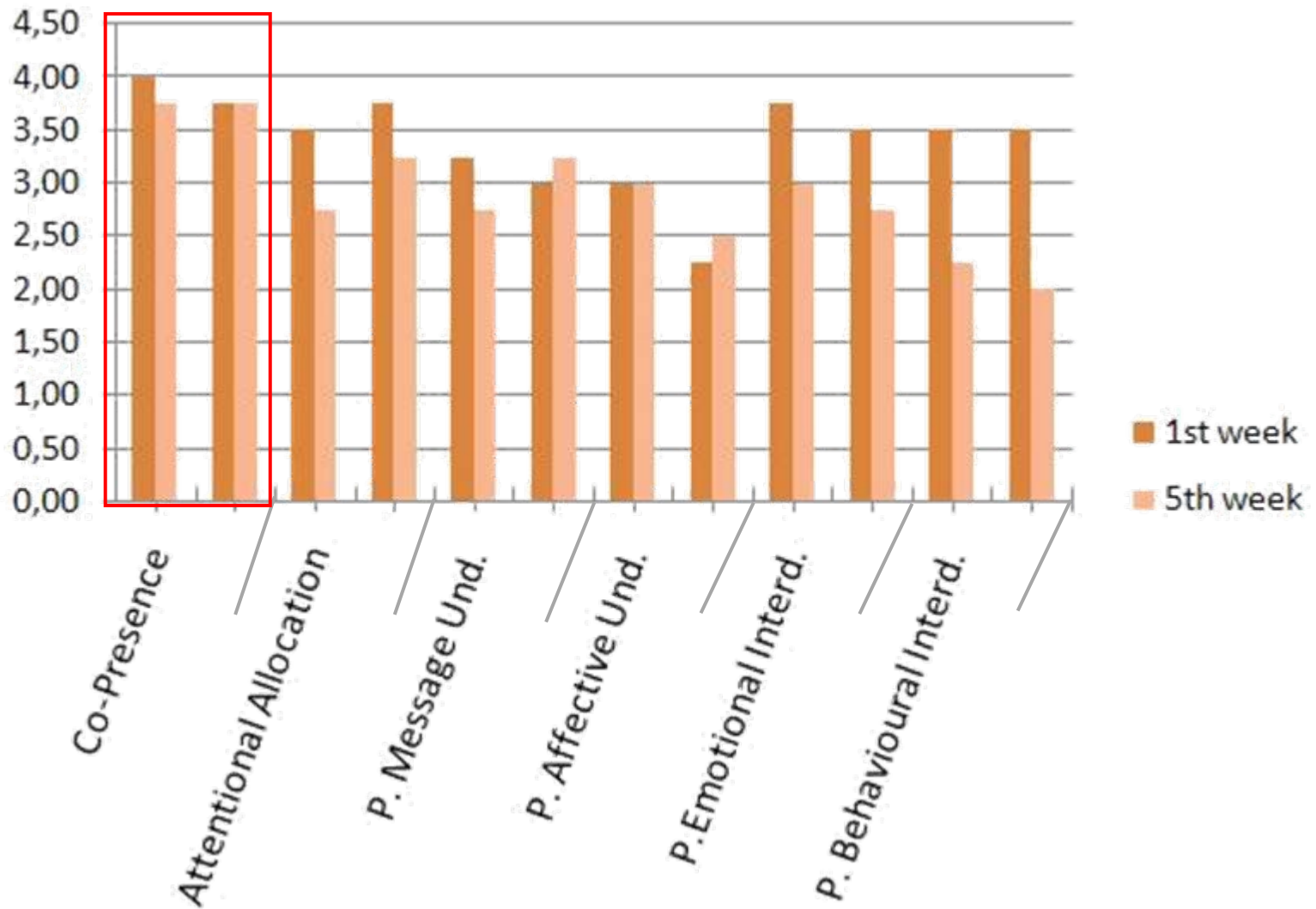
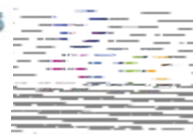
# Social Presence Questionnaire

(Harms and Biocca, 2004)

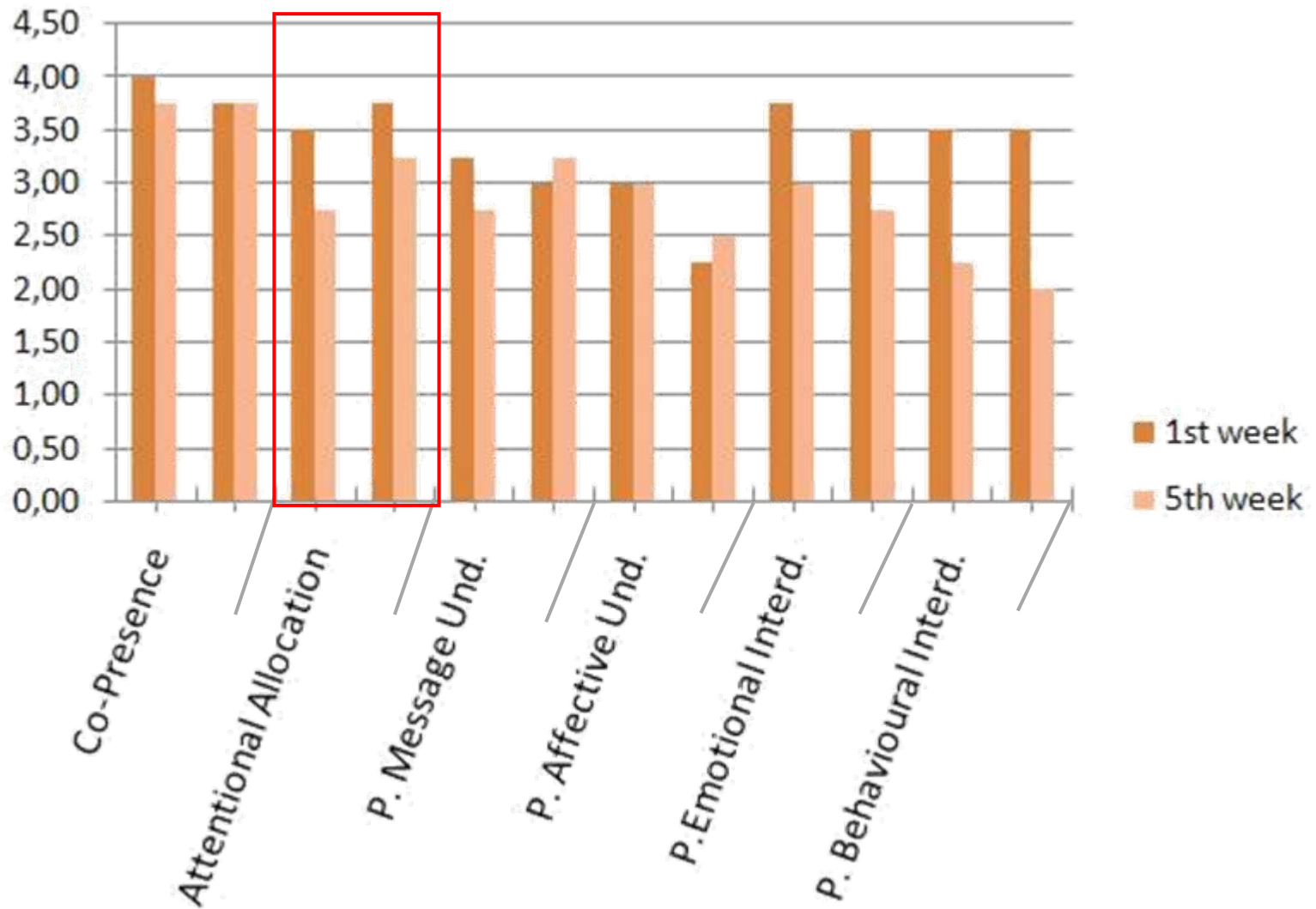


- **Co-presence** – the degree to which the observer believes s/he is not alone.
- **Attentional allocation** – the amount of attention the user allocates to and receives from an interactant.
- **Perceived message understanding** – the ability of the user to understand the message from the interactant.
- **Perceived affective understanding** – the user's ability to understand the interactant's emotional states.
- **Perceived affective interdependence** – the extent to which the user's emotional state affects and is affected by the interactant's emotional states.
- **Perceived behavioural interdependence** – the extent to which a user's behaviour affects and is affected by the interactant's behaviour.

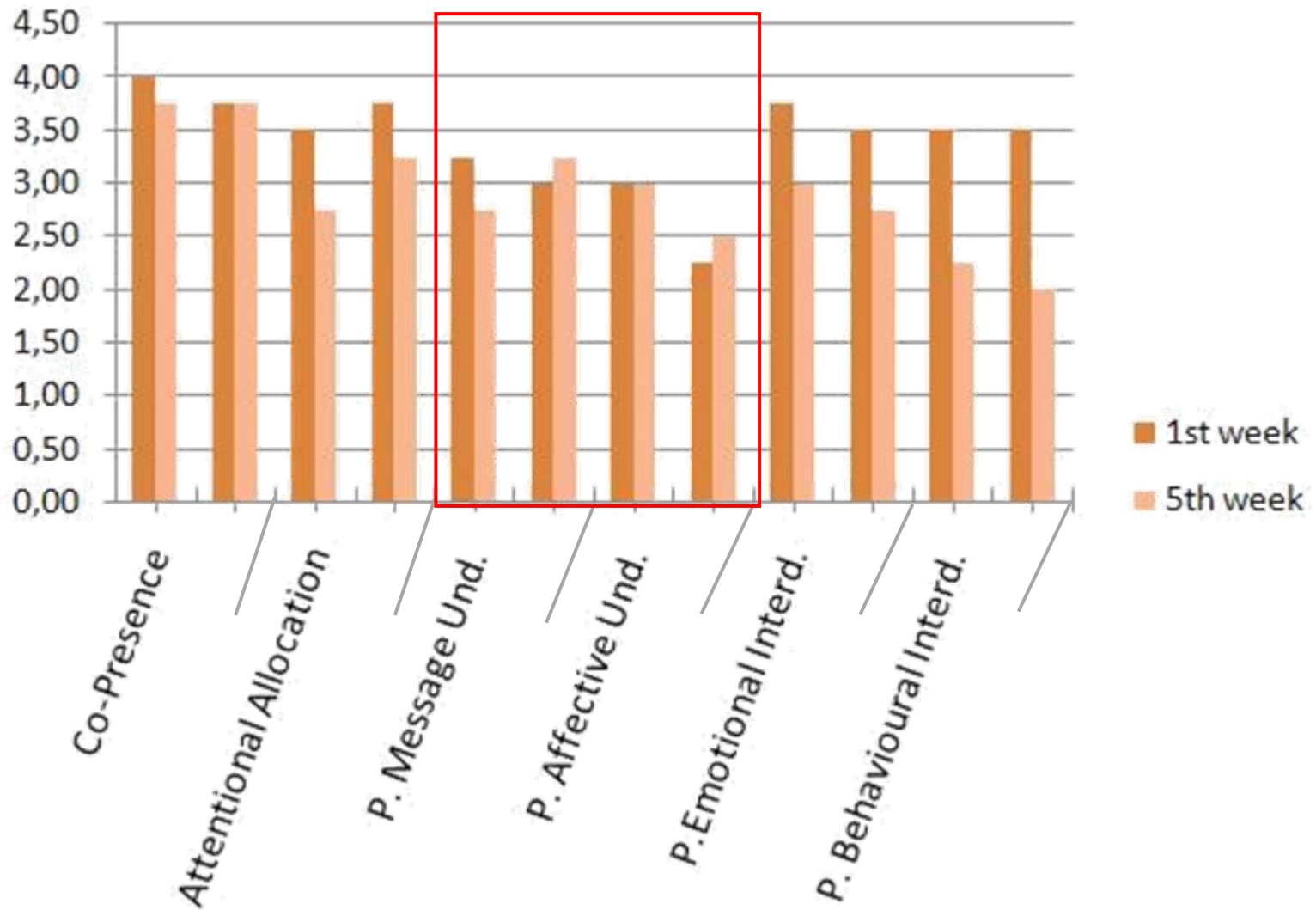
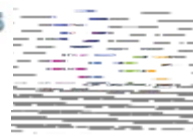
# Questionnaire results



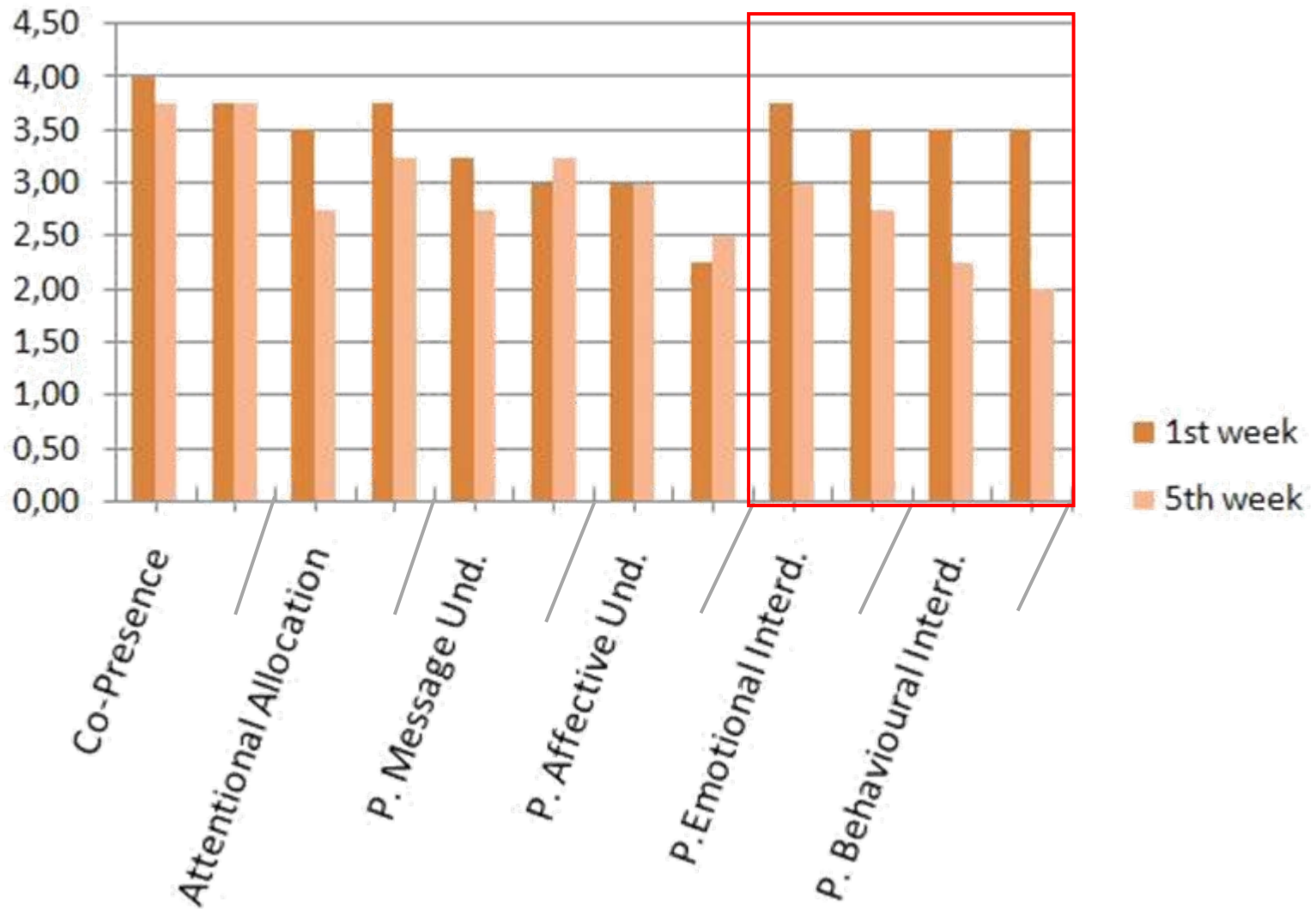
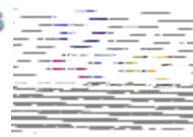
# Questionnaire results



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# Questionnaire results



# Video Annotations

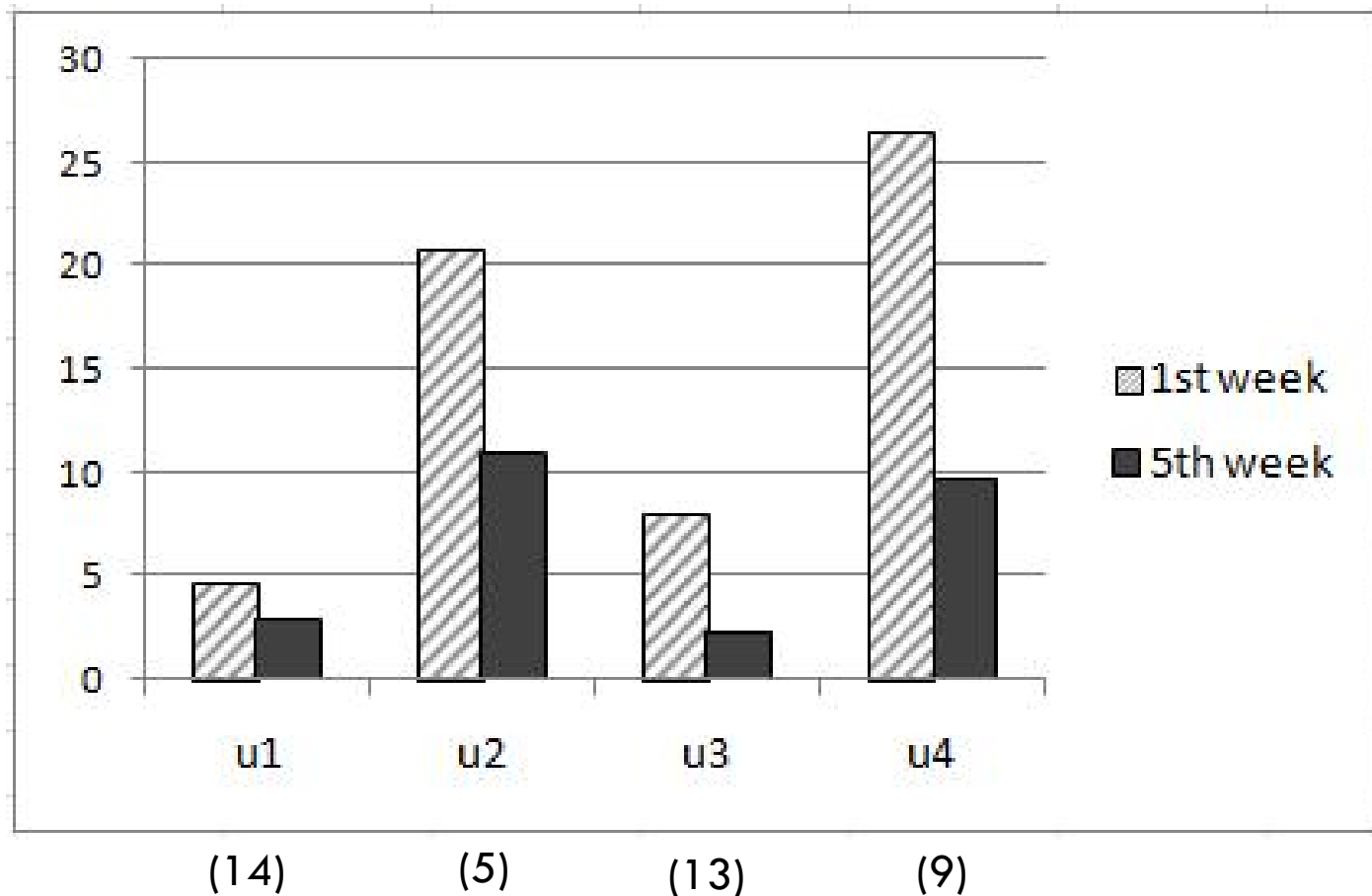


- User looking at iCat
  - ▣ After user's own move
  - ▣ After playing iCat's move
  - ▣ During the game
- User looking sideways
- User talking to iCat
  - ▣ Utterance
- User's facial expressions
  - ▣ Type
  - ▣ Reason

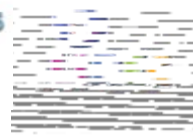
# Video Annotation Results



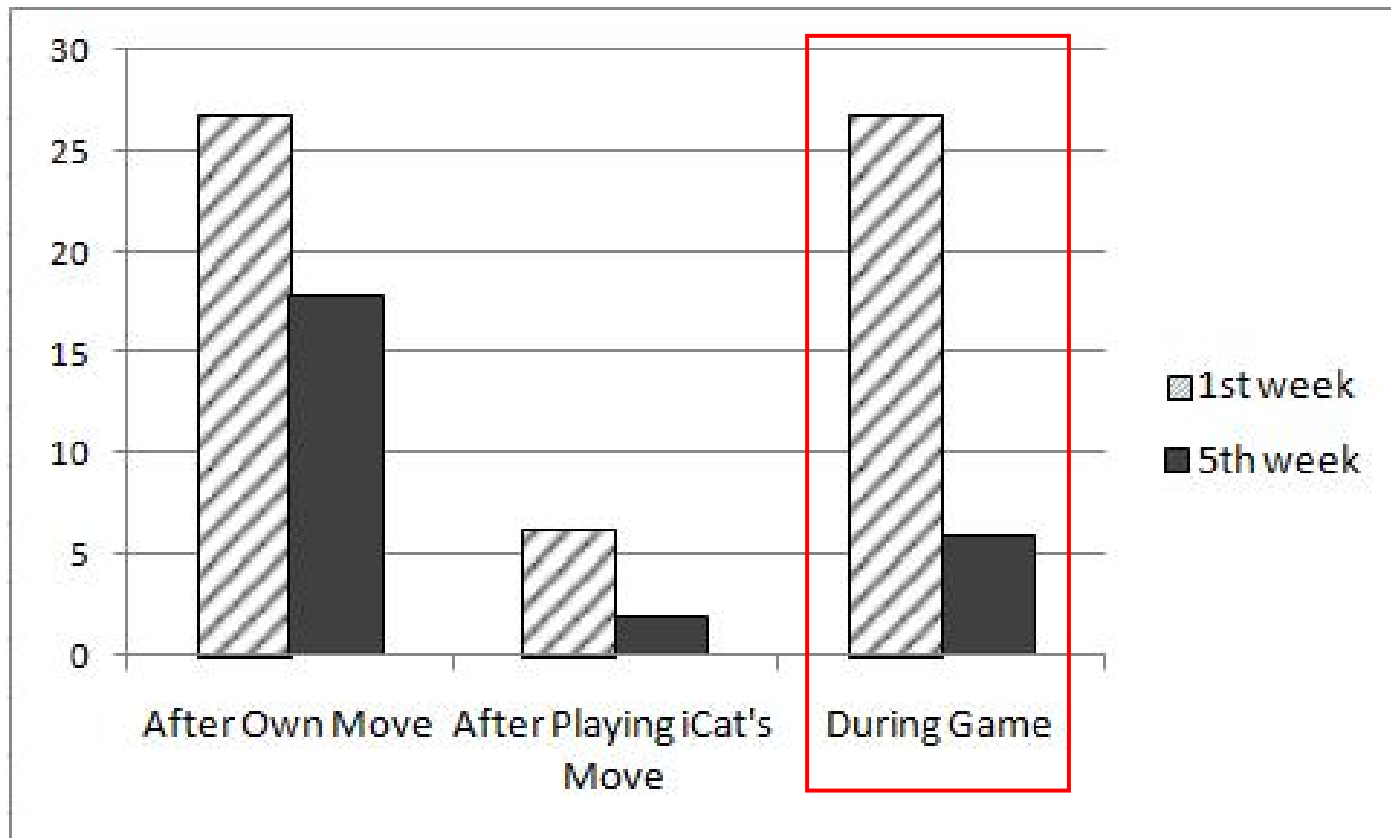
- Percentage of time users spent looking at iCat



# Video Annotation Results



- Total percentage of each attribute of the “looking at iCat” track (for all users)



# Conclusions



- User's perception of social presence towards the agent decreased after five weeks of interaction
  - ▣ attentional allocation
  - ▣ perceived emotional interdependence
  - ▣ perceived behavioural interdependence
- The robot's current behaviour is not enough to create and maintain the perception of social presence after several interactions

# Future Work



- Evaluate intermediate sessions
- Memory:
  - iCat remembering the **user's "profile"** and the results of the **previous interactions** and refer to that during the game
- Dialogue capabilities and small talk

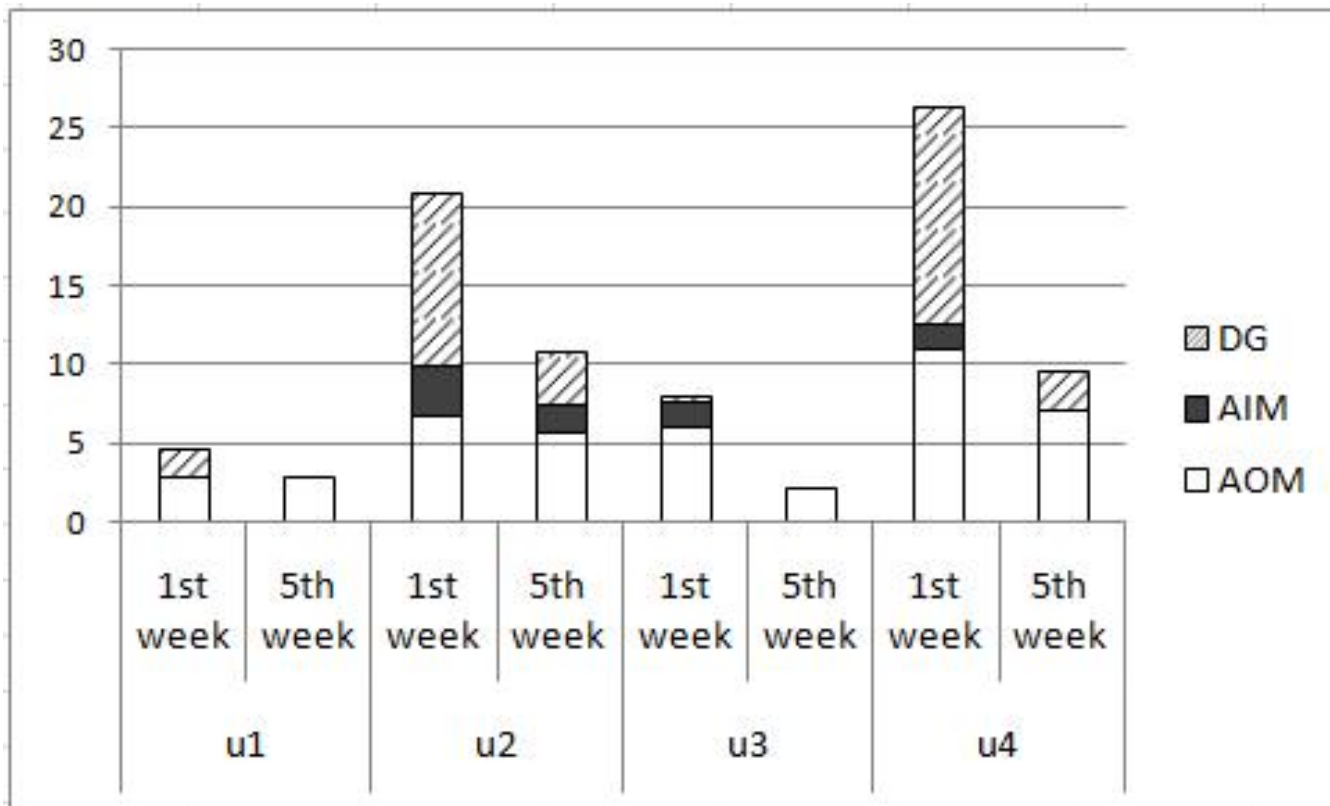


Questions?

# Video Annotation Results



- Percentages of the “looking at iCat” track broken down by its attributes: during the game (DG), after playing iCat’s move (AIM) and after user’s own move (AOM).



# Social Presence Questionnaire Items



		1 <sup>st</sup> week	5 <sup>th</sup> week
<b>Co-Presence</b>			
Q1	I noticed iCat.	4,00	3,75
Q2	iCat noticed me.	3,75	3,75
<b>Attentional Allocation</b>			
Q3	I remained focused on iCat.	3,50	2,75
Q4	iCat remained focused on me.	3,75	3,25
<b>Perceived Message Understanding</b>			
Q5	My thoughts were clear to iCat.	3,25	2,75
Q6	iCat's thoughts were clear to me.	3,00	3,25
<b>Perceived Affective Understanding</b>			
Q7	I could tell how iCat felt during the game.	3,00	3,00
Q8	iCat could tell how I felt during the game.	2,25	2,50
<b>Perceived Emotional Interdependence</b>			
Q9	I was sometimes influenced by iCat's moods.	3,75	3,00
Q10	iCat was sometimes influenced by my moods.	3,50	2,75
<b>Perceived Behavioural interdependence</b>			
Q11	My behaviour was closely tied to iCat's behaviour.	3,50	2,25
Q12	iCat's behaviour was closely tied to my behaviour.	3,50	2,00