

# The body in the extra-personal space



Perception is for action



SAPIENZA  
UNIVERSITÀ DI ROMA



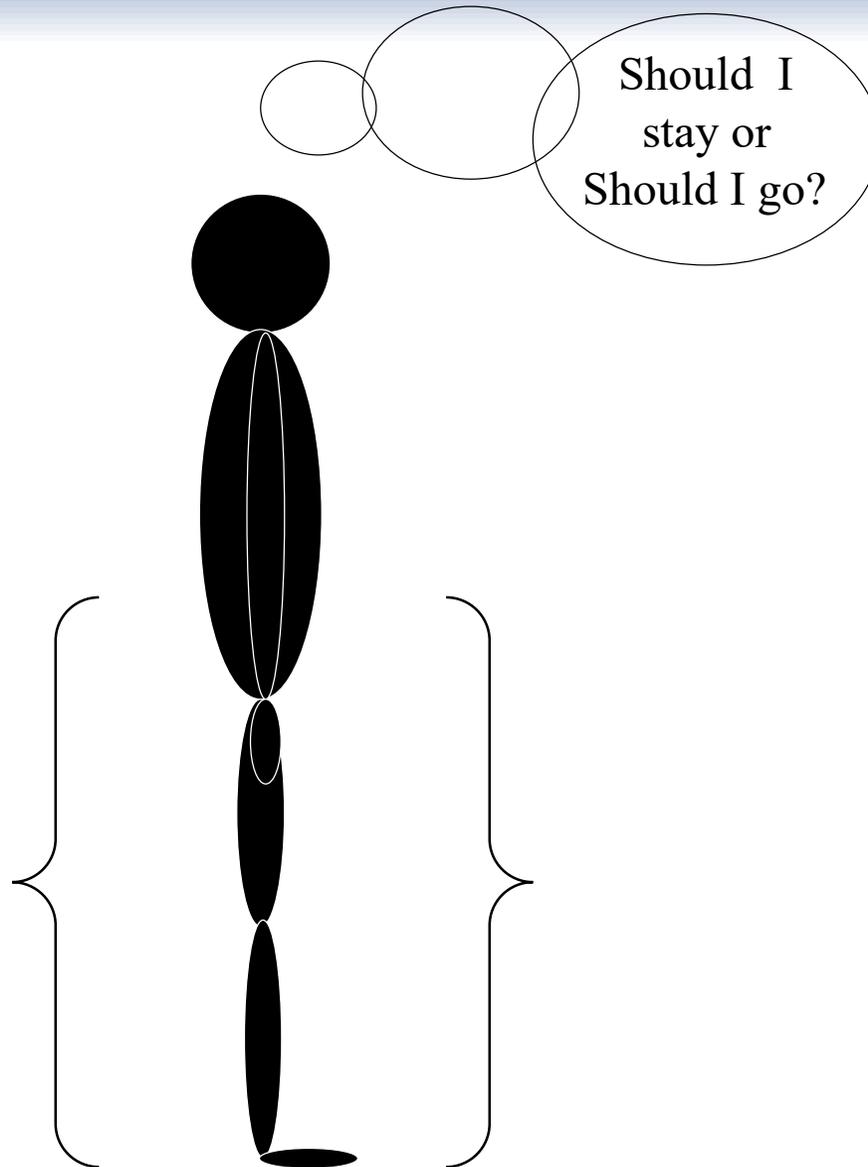
Chiara Fini

# The body in the extra-personal space

## The space categorization

Space portions	Area buccale pericutanea	< 30 cm	30 cm-2 m	2m-30m	> 30 m
Rizzolatti et al., 1985, 1987	Personal & Peripersonal space		Extraperpersonal space		
Cutting & Vishton 1995	Personal space			Action space	Vista space
Previc 1998	Peripersonal space		Focal-extraperpersonal space	Action-extraperpersonal space	Ambient-extraperpersonal space

# The body in the extra-personal space



- Body
- Motor Potential
- Intention

# The body in the extra-personal space



- The units used to scale the space are action specific
- The motor potential and the action intention affect the space categorization

*Proffitt et al., 2003; Witt et al., 2004; Sugovic et al., 2013; Schnall et al., 2013*

# The body in the extra-personal space

## Studies Overview:

**Which processes drive our space representation when considering another acting body?**

- How the presence of another person affects the Extrapersonal space categorization
- How we categorize the Extrapersonal Space when the other person is adopted as allocentric reference frame
- How the observation of biological movement impacts the Extrapersonal space categorization
- The role of belief about the animacy of the reference frame in the Extrapersonal space categorization
- A tDCS study about the Extrapersonal Space categorization

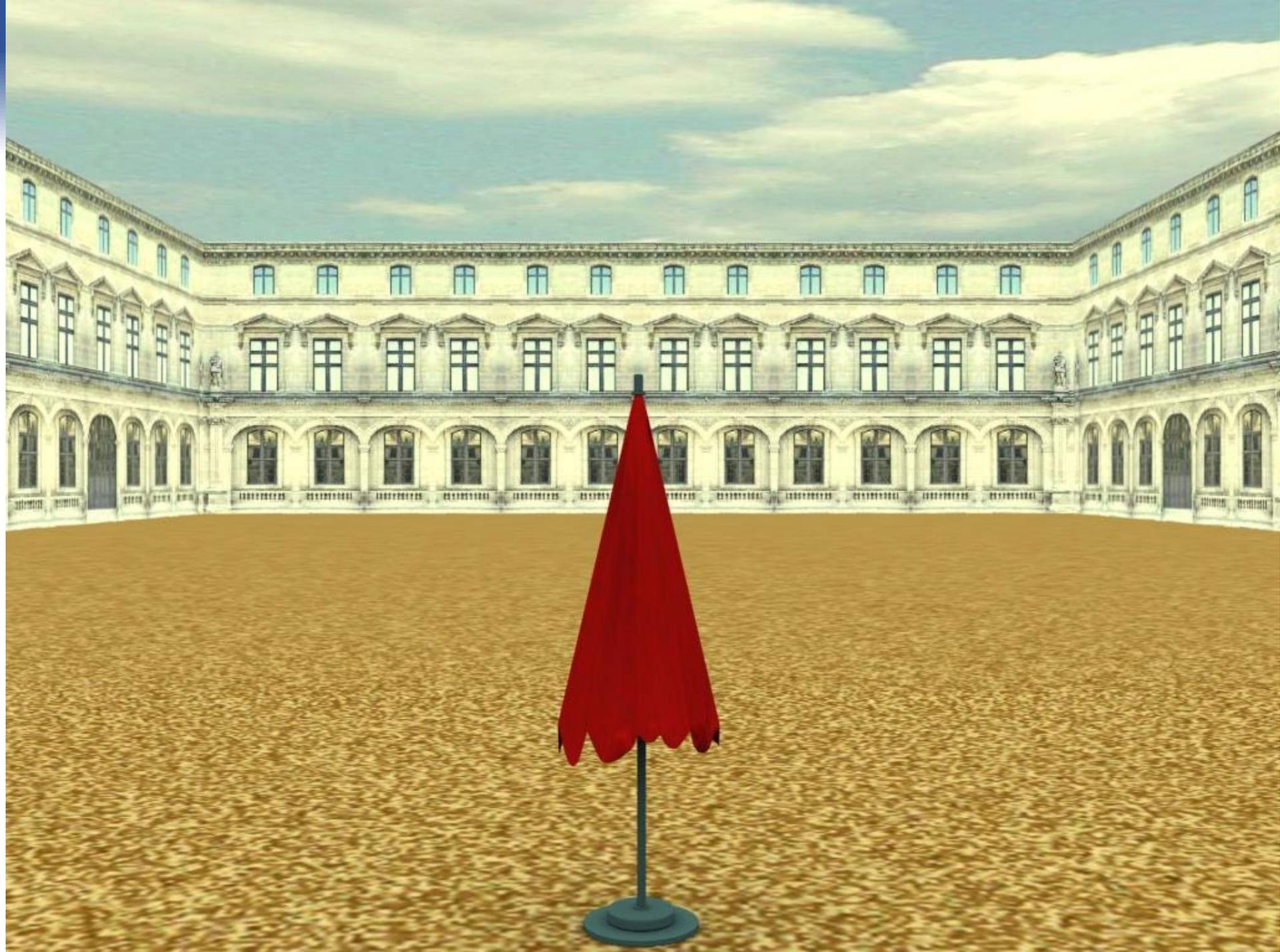
# The body in the extra-personal space

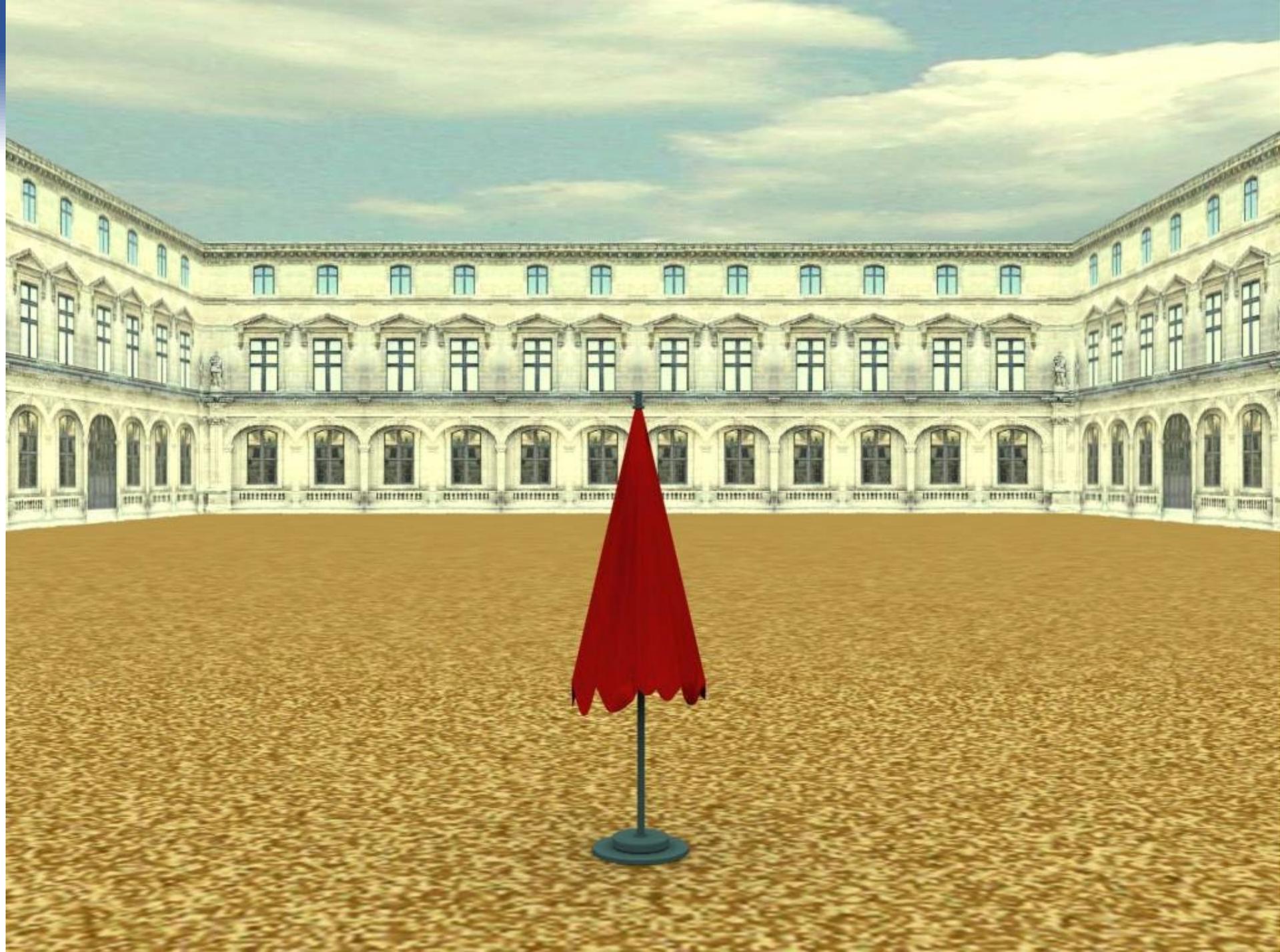
- **How the presence of another person affects the Extrapersonal space categorization**

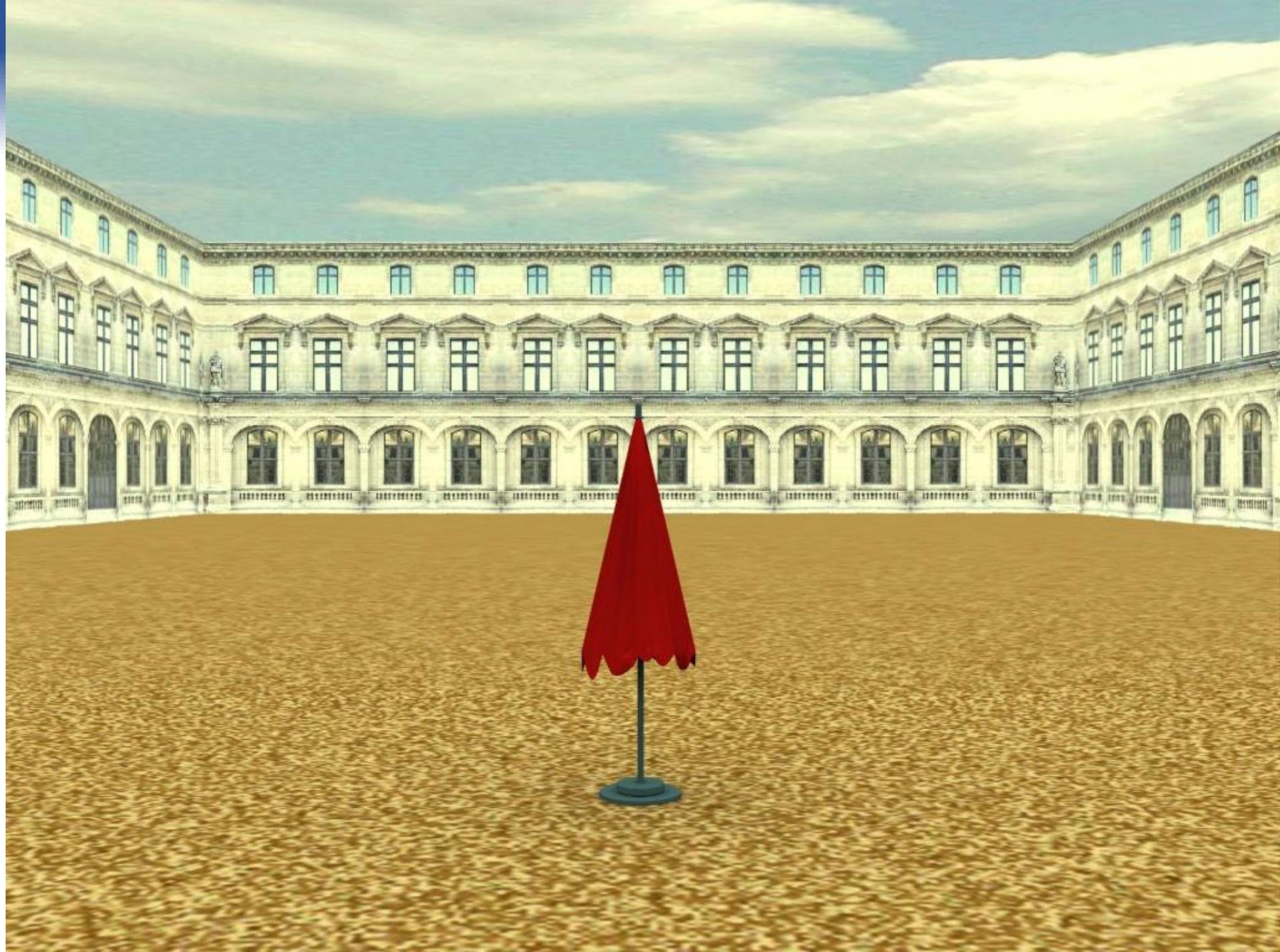
**TASK: dicotomic categorization** “Near”/“Far” of a target distance respect with different reference frames

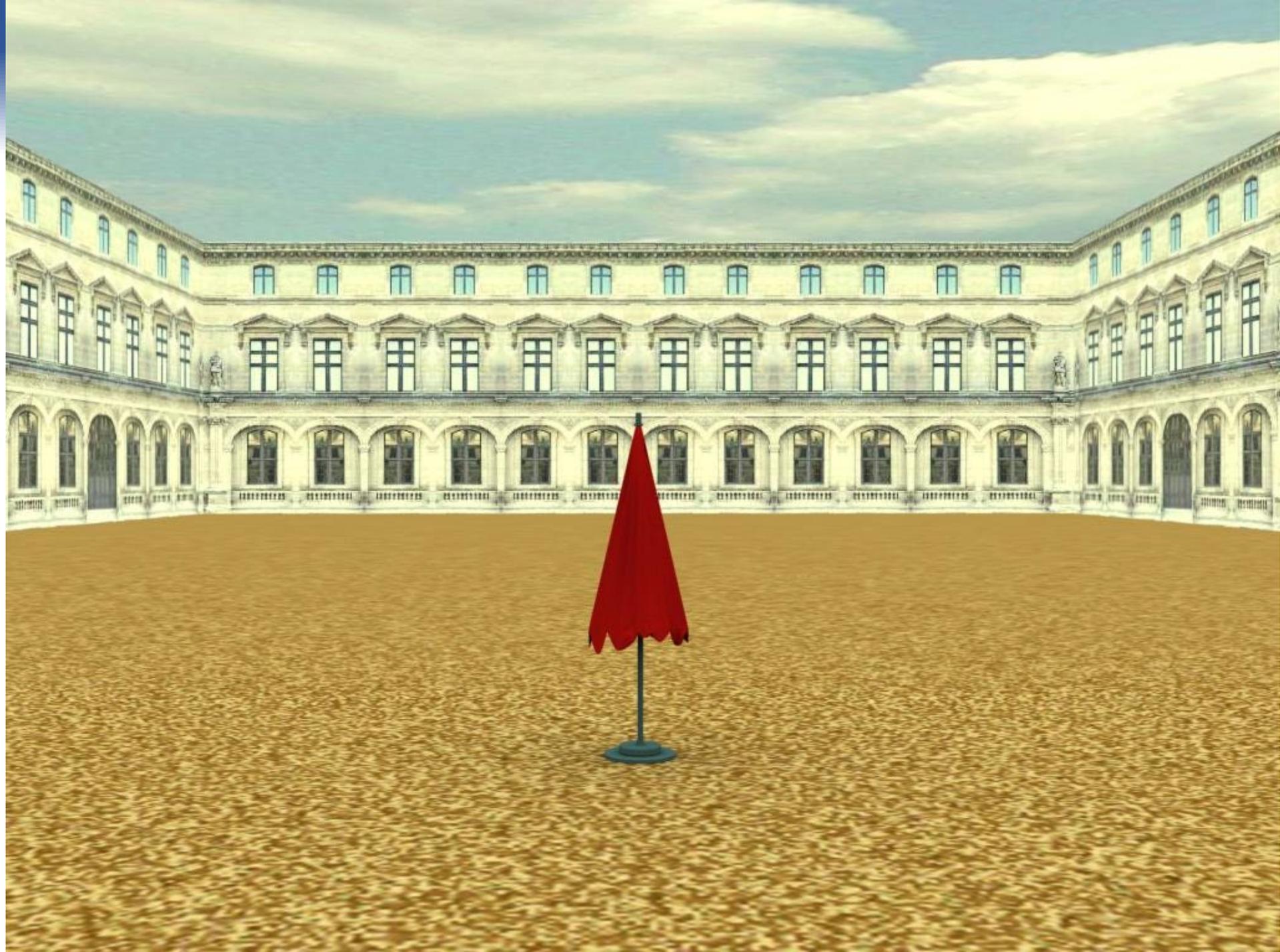
**Limit Method:** measures the perceptual threshold in which stimuli with increasing or decreasing intensity are presented until the subject changes the perceptual judgment

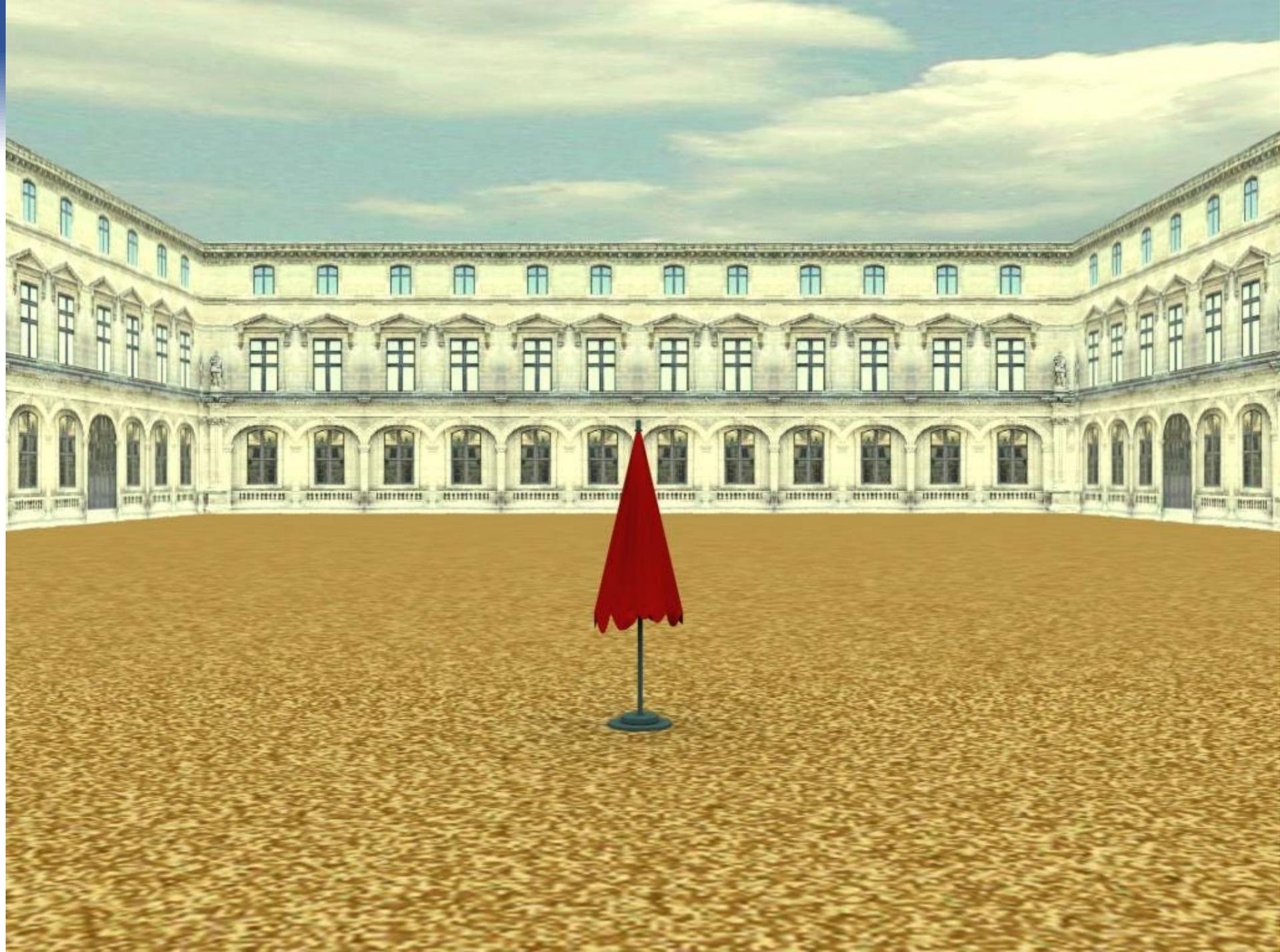
**JUDGMENT TRANSITION’S THRESHOLD (JTT)**











# Study 1

- How the presence of another person affects the Extrapersonal space categorization



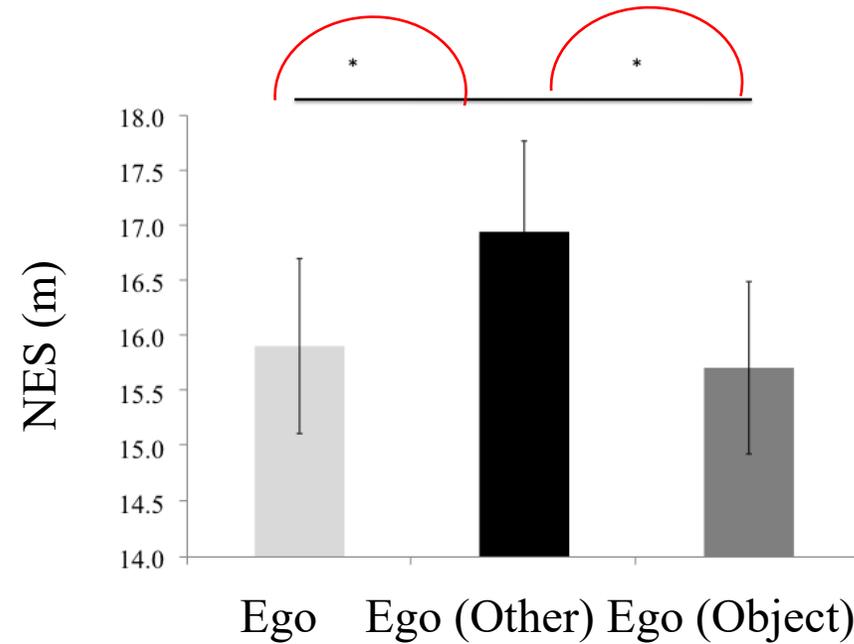
Egocentric



Egocentric with Other



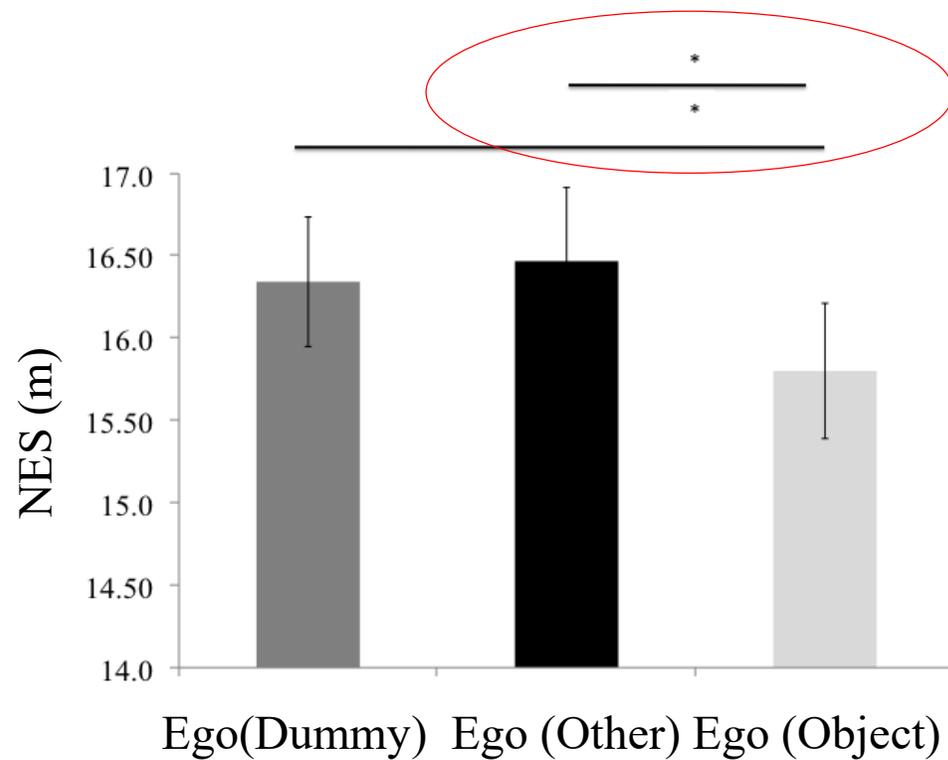
Egocentric with Object



$F_{(2,28)}=14.89, p<0.001$

*Fini, Costantini & Committeri, 2015 Plos One*

# Study 1



$F_{(2,46)}=3,64, p<0.03$

# Study 1

- A human body located in the scene impacts on the space categorization
- According with the data on the peripersonal space, the presence of another agent modulates the distance perception (Costantini et al., 2011; Bloesch et al., 2012)
- A body affects the space perception when is real and when is fake:  
not fine-grained processing during the egocentric distance judgment
- A human shape would be represented as a competitor, the reduced distance would have the evolutionary meaning to provide an advantage in the behavior to be performed in order to reach the target.

# Study 2

- How we categorize the Extrapersonal Space when the other person is adopted as allocentric reference frame



A) Object RF



B) Other RF

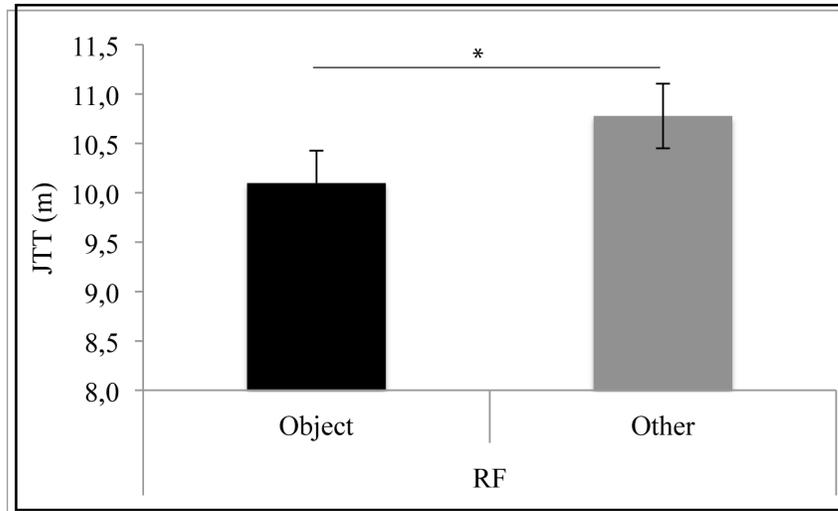


C) Dummy RF

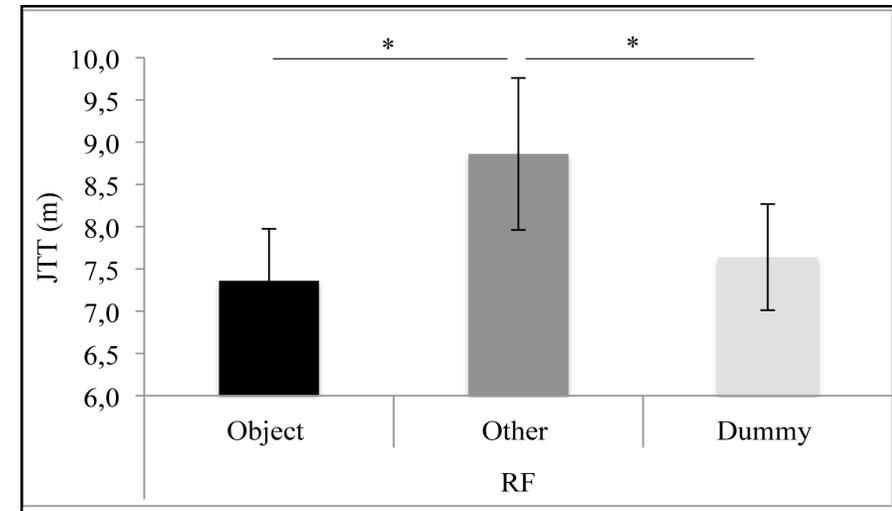


D) Tied-Other RF

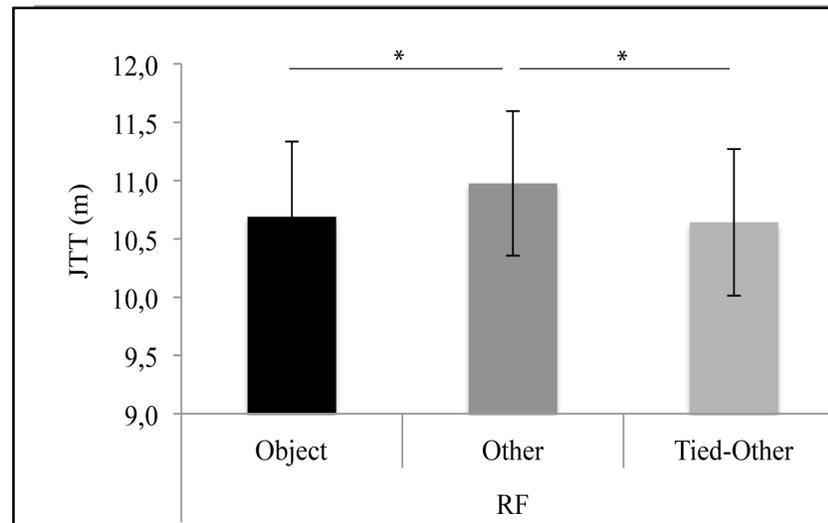
# Study 2



$F(2,44)=72.4, p<0.001$



$F(2,32)=9.88, p<0.001$



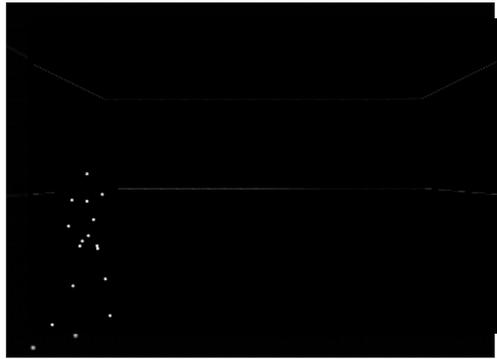
$F(2,58)=2.81, p<0.5$

# Study 2

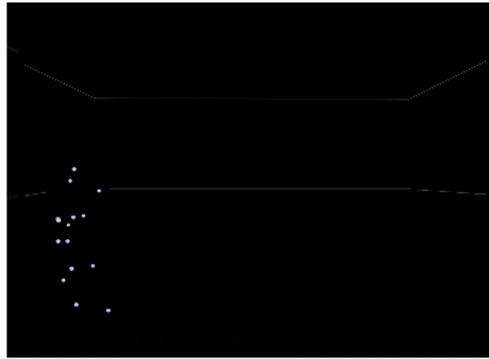
- Motion potentialities attributed to the allocentric reference frame determine the reduction of perceived distance
- Compared to the egocentric judgment, in the allocentric judgment the processing of the human body is more fine-grained
- In line with Committeri et al., 2004; Galati et al., 2010 it would be an involvement of the visual ventral stream during the allocentric more than during the egocentric judgment.

# Study 3

- How the observation of biological movement impacts the Extrapersonal space categorization



Biological movement



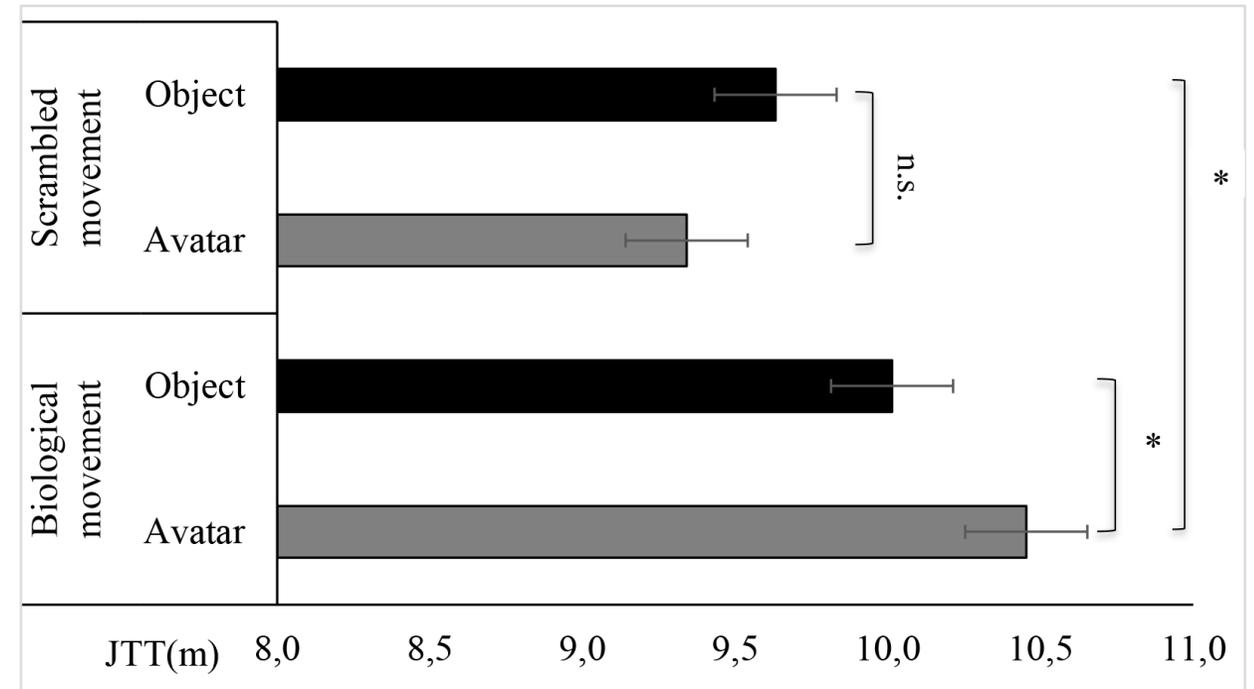
Scrambled movement



Avatar RF

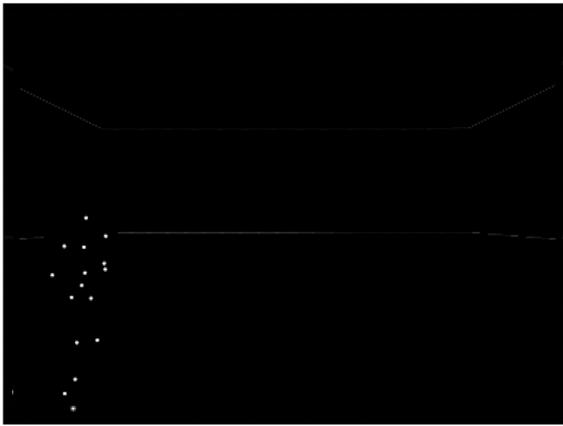


Object RF

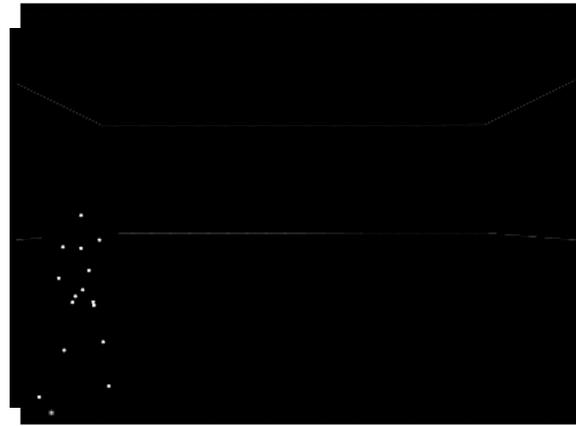


$F(1,29) = 7,23, p < 0.03$

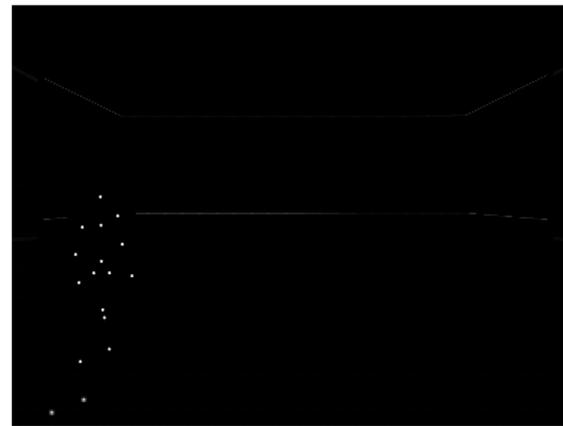
# Study 3



Runner

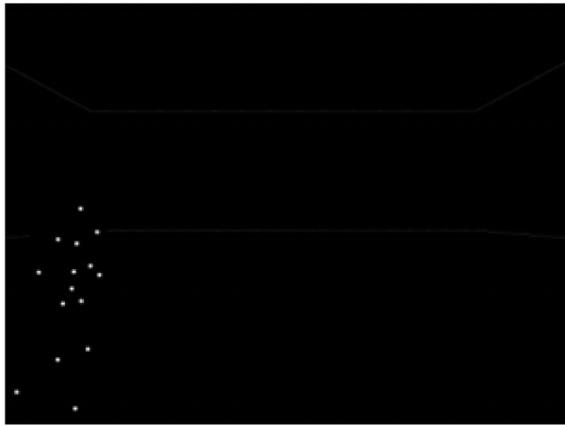


Canonical walker

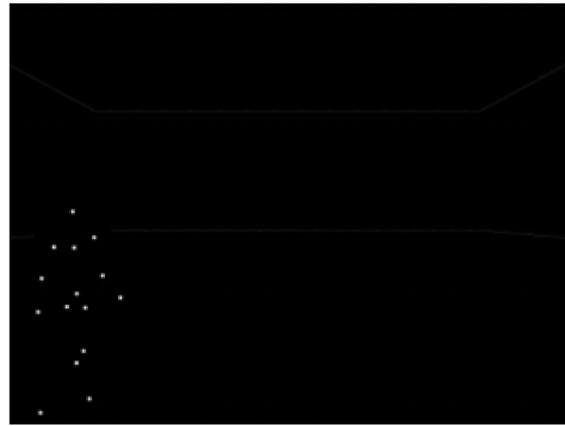


Slow walker

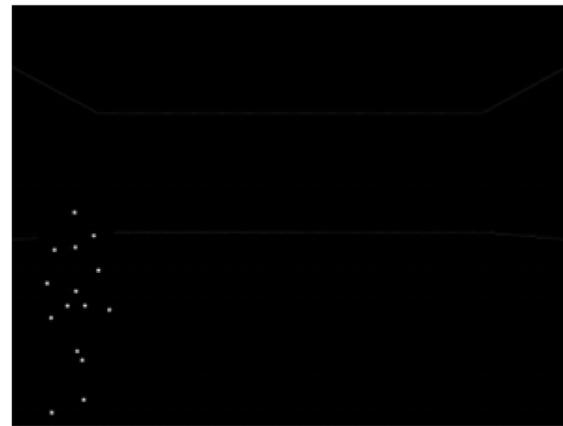
# Study 3



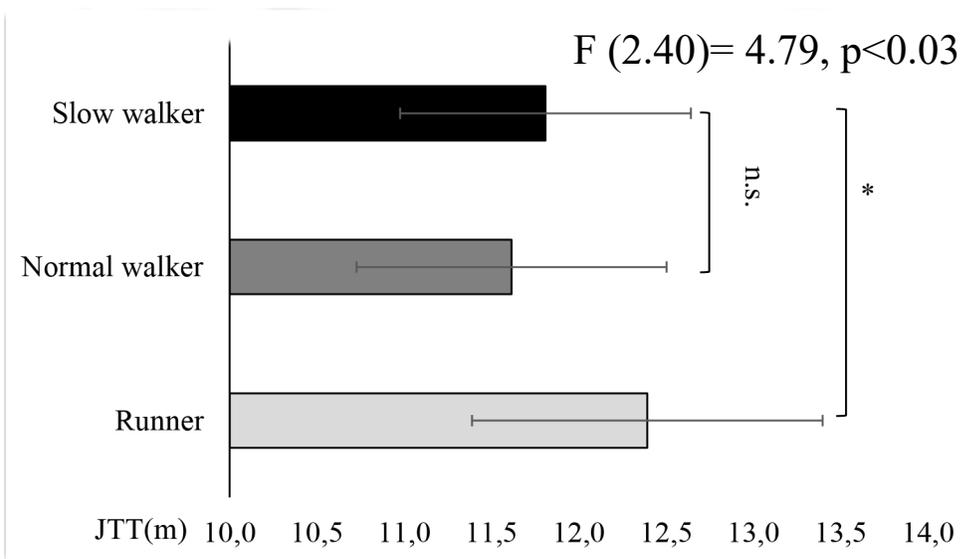
Runner



Canonical walker

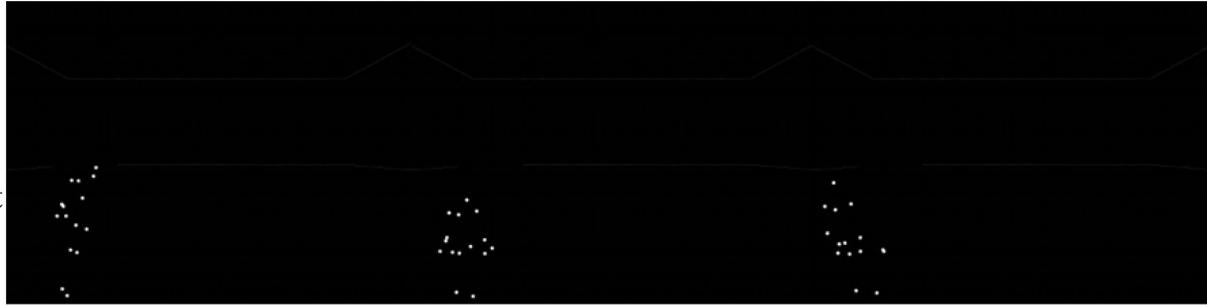


Slow walker

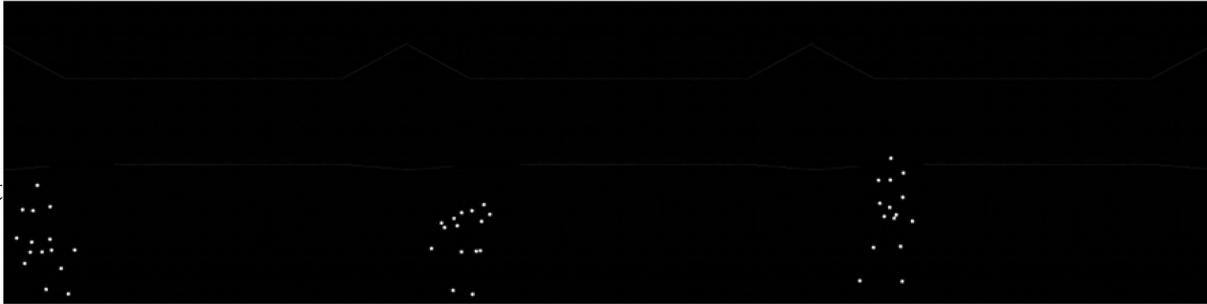


# Study 3

Sitting down movement



Standing up movement

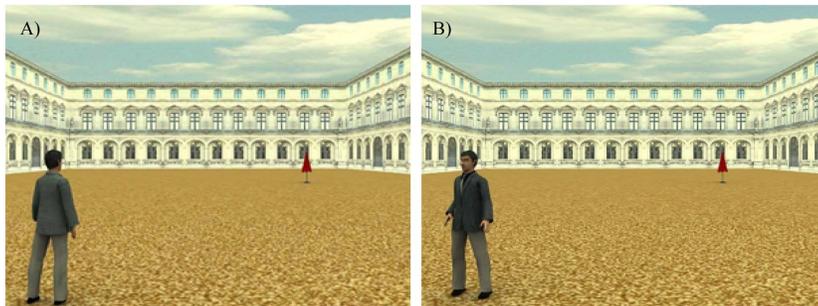
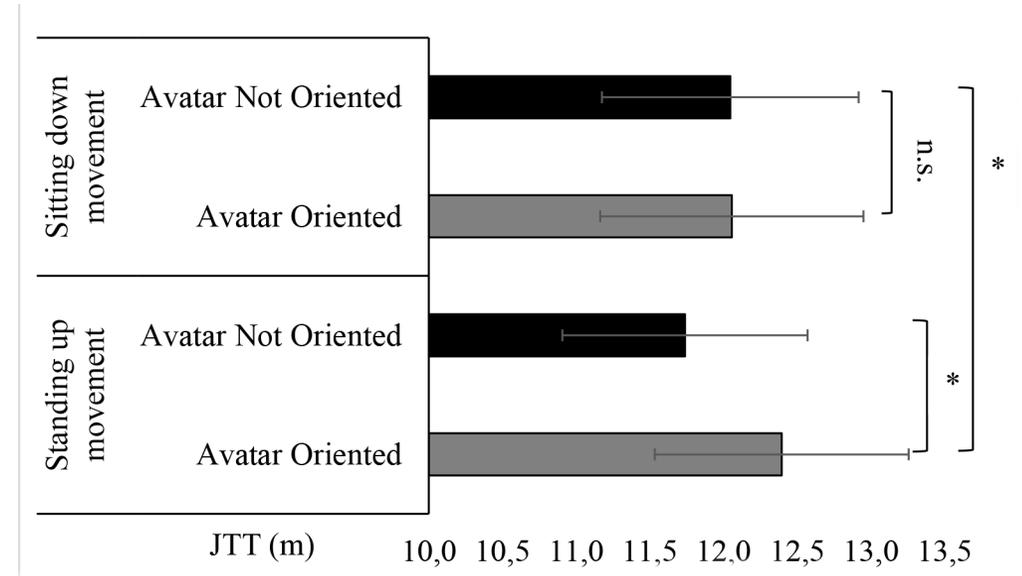
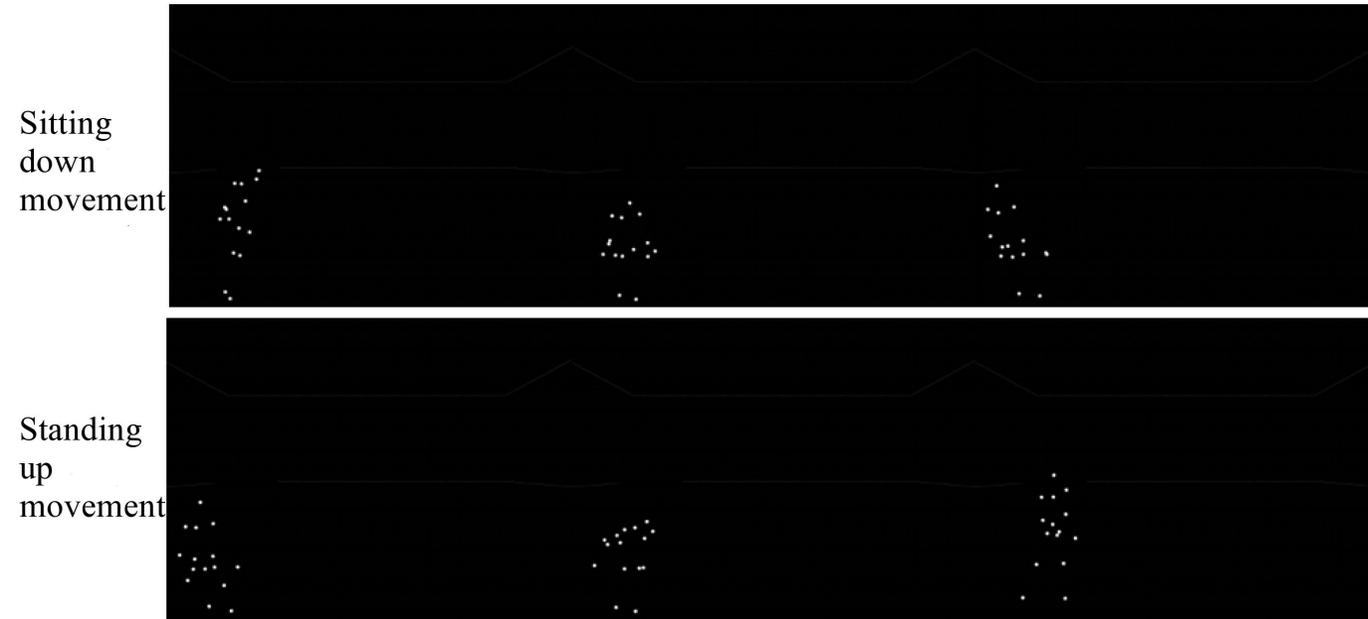


Oriented Avatar



Not Oriented Avatar

# Study 3



Oriented Avatar

Not Oriented Avatar

$F(1,31) = 7,82, p < 0.0$

# Study 3

- Subjective social scaling of extrapersonal space is related not only to the RF's motion potential, but also to the actual activation of a specific movement pattern.
- The motion type affects the subjective social scaling of extrapersonal : the more the action is efficient to cover the distance, the more the distance is categorized as reduced.
- The general motion potential of a human body is not a sufficient condition to filter extrapersonal distance, but a critical role is also played by the attribution of a motor intention and of a coherent pattern of movement associated with it

# Study 4

- The role of belief about the animacy of the reference frame in the Extrapersonal space categorization

Questionnaire statements	LT<25 percentile	HT>75 percentile
Q1: " During the vision of the film I could construct a representation of Pinocchio as living one"	4.45 (1,03)	5,63 (0,92)
Q2: " During the vision of the film I had the impression that Pinocchio had its own will"	2.72 (1,10)	6,36 (0,92)
Q3: " During the vision of the film I could construct a representation of Geppetto as living one"	5.18 (0,87)	6,36 (0,92)
Q4: " During the vision of the film I had the impression that Pinocchio followed its own intentions"	3,09 (1,13)	6,45 (0,68)
Q5: " In the film Pinocchio behaved as a normal person"	2,73 (1,00)	5,63 (1,20)
Q6: " I'm identified in Pinocchio"	2 (0,89)	5 (1,34)
Q7: "I'm identified in Geppetto"	3,45 (1,43)	4,36 (2,11)

Other

a)

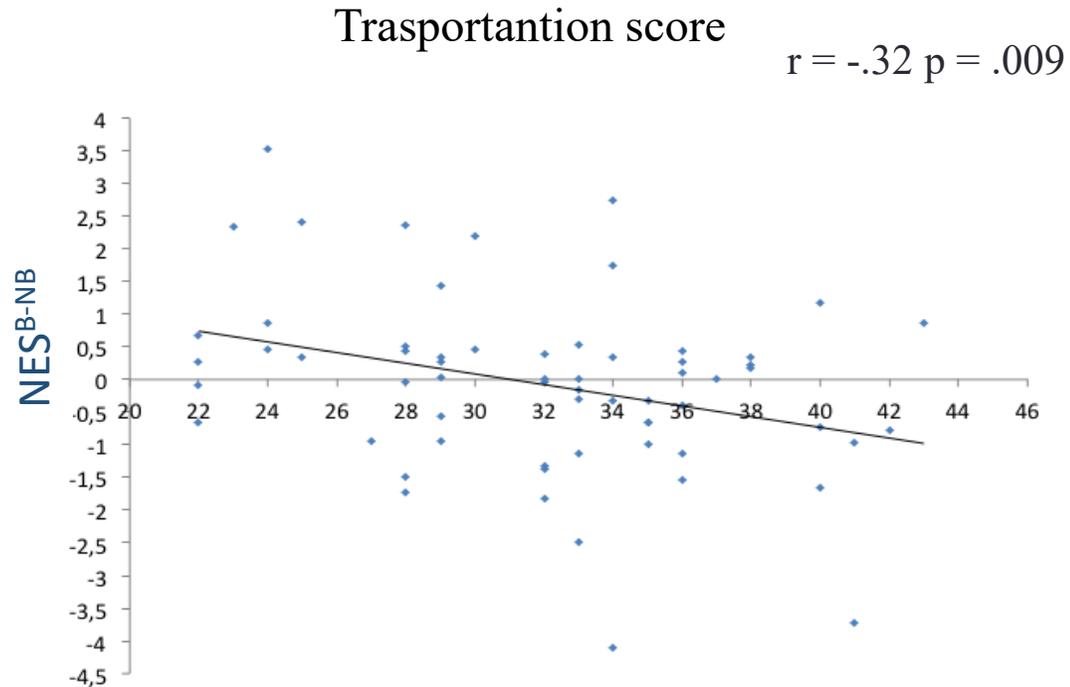


Dummy

b)



# Study 4

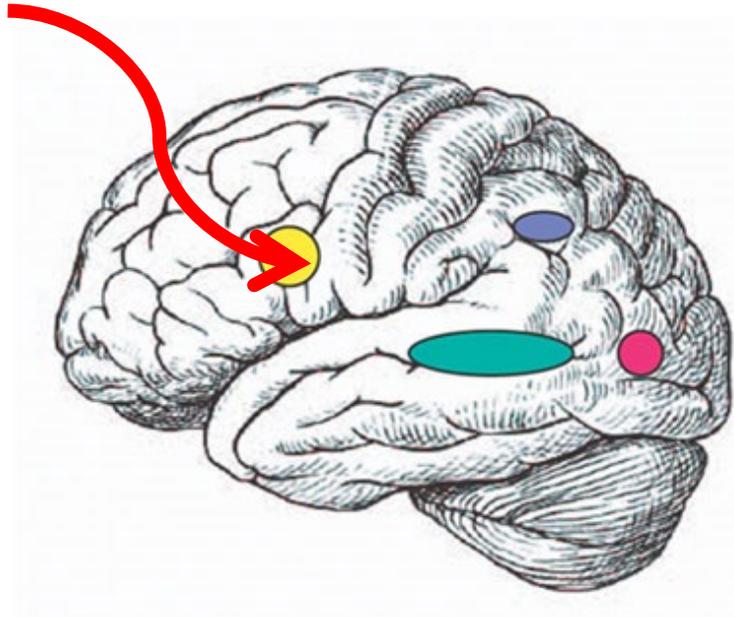


The more people identify themselves with this character, the more they consider the wooden dummy as an intentional agent, so endowed with a potential biological motion that filters the space perception.

This phenomena is called ANTHROPOMORPHISM (Epley et al., 2008)

# Study 5

- A tDCS study about the Extrapersonal Space categorization



INFERIOR FRONTAL GYRUS

Figure 1)

a)



Other RF

b)



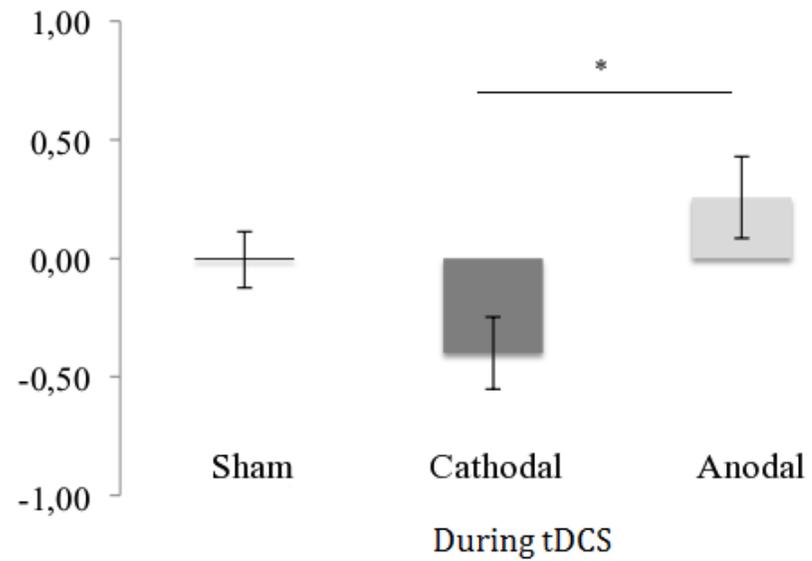
Object RF

# Study 5

Figure 2)

a)

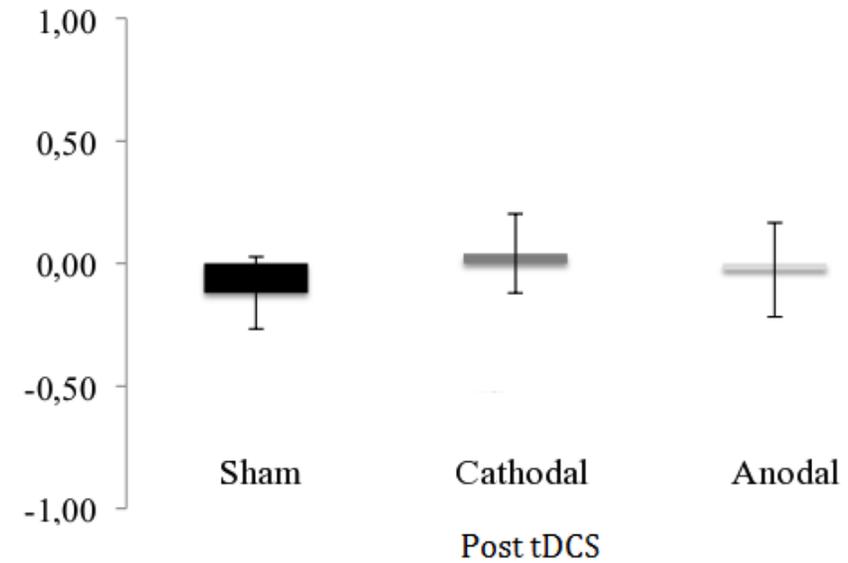
JTT(other-object)



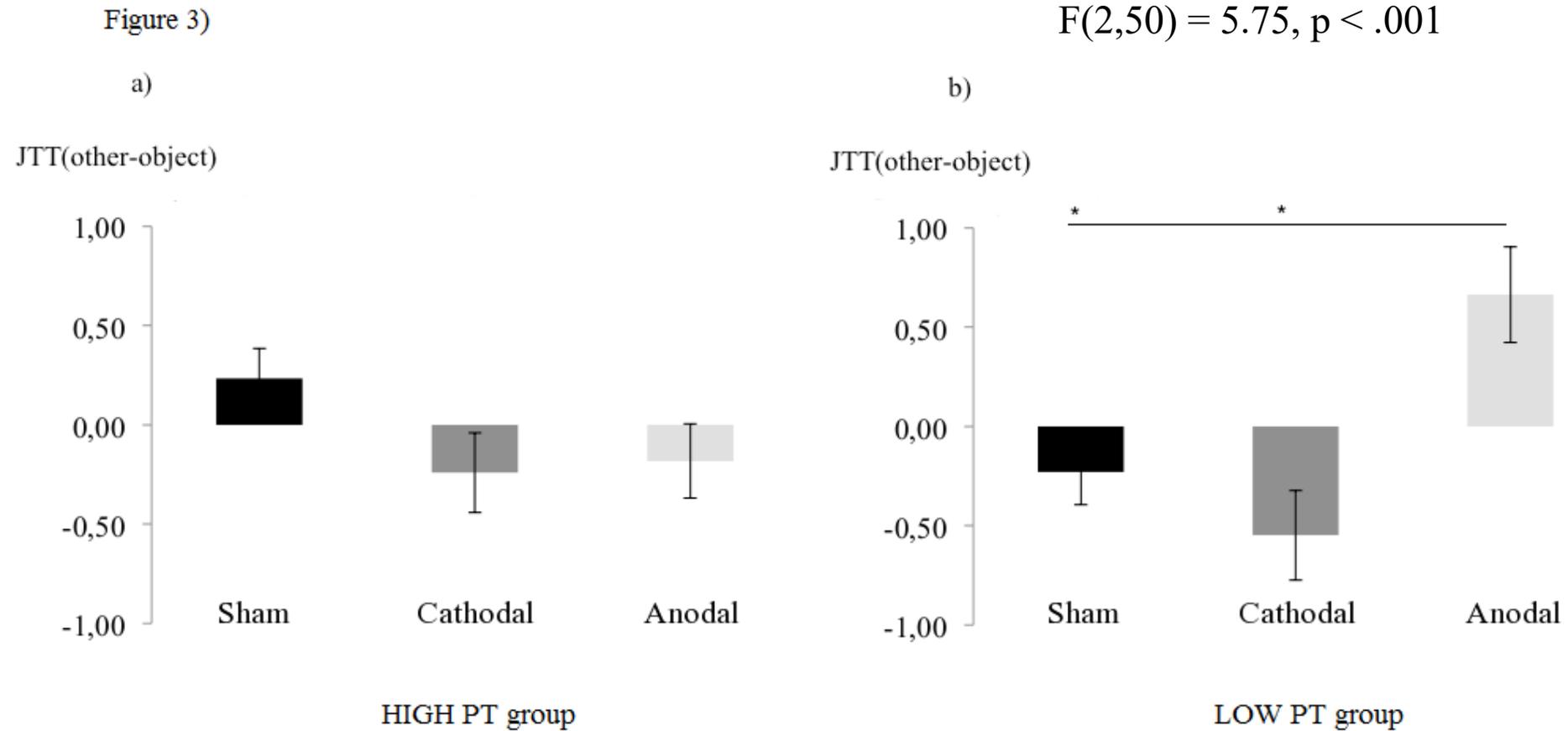
b)

$F(2,52) = 3.5, p < .05$

JTT(other-object)



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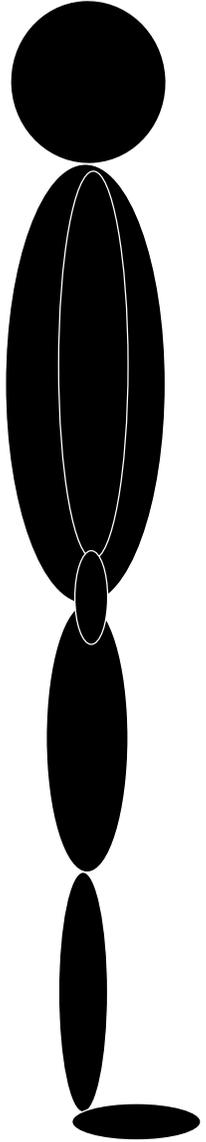


# Study 5

- IFC is recruited during the extrapersonal space categorization task
- the underlying mechanisms behind the reduced perceived distance could be the semantic attribution of the biological nature to a human, an automatic visual–spatial perspective taking and consequently the promotion of the interpersonal motor resonance
- these processes are modulated by the individual level of cognitive perspective taking, with a weak level allowing responsivity to IFC activity boosting

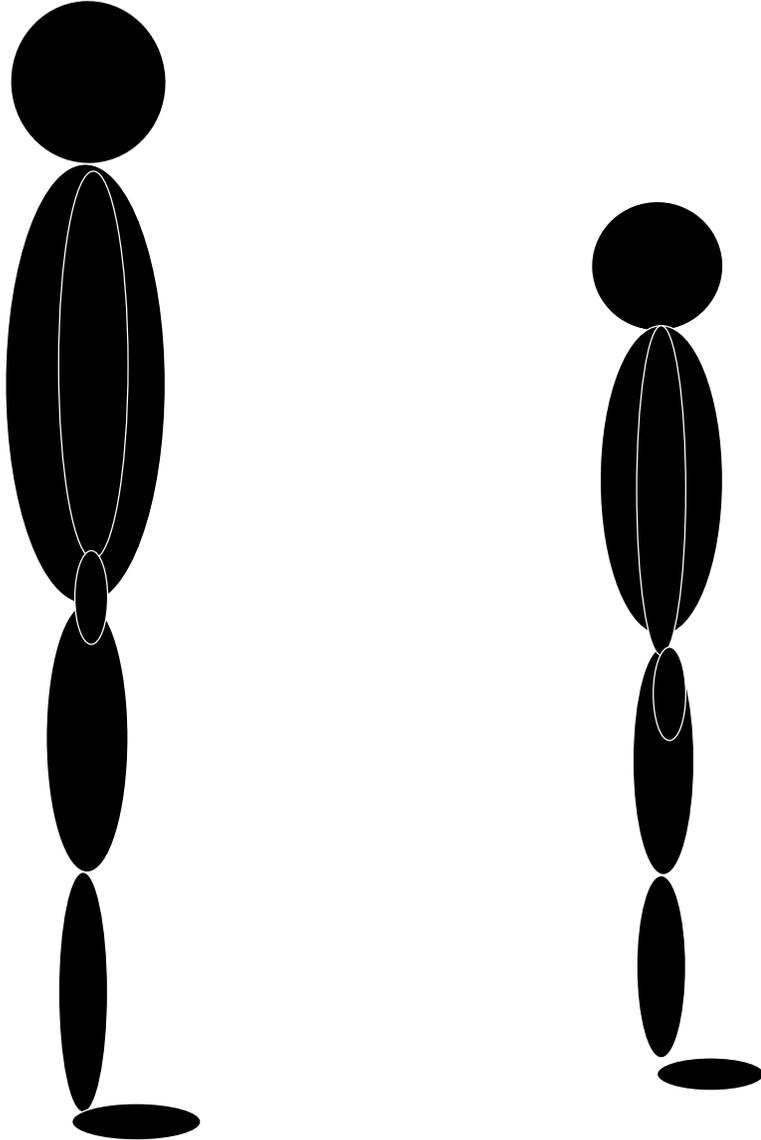
# The body in the extra-personal space

General Conclusions:



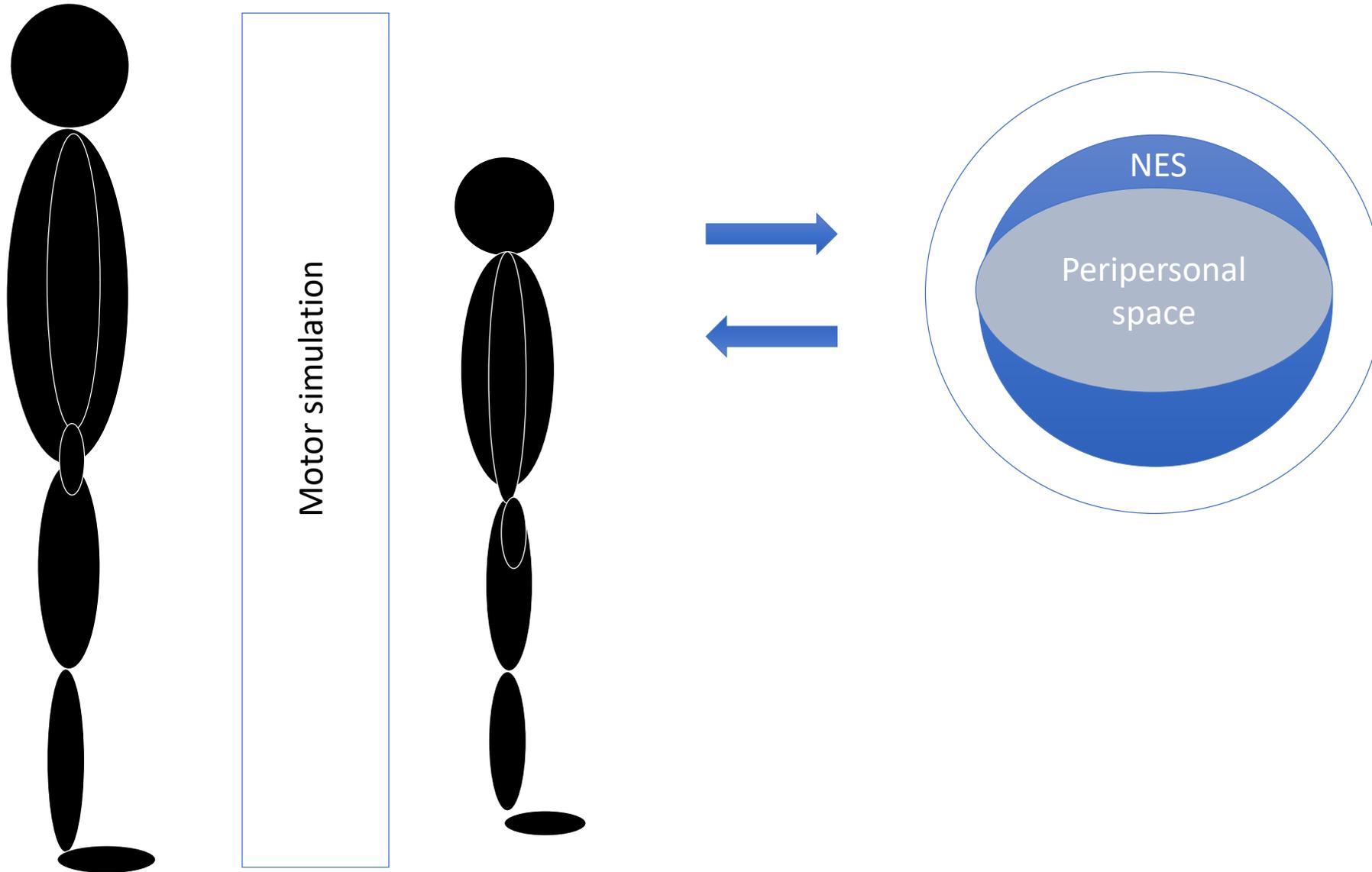
# The body in the extra-personal space

General Conclusions:



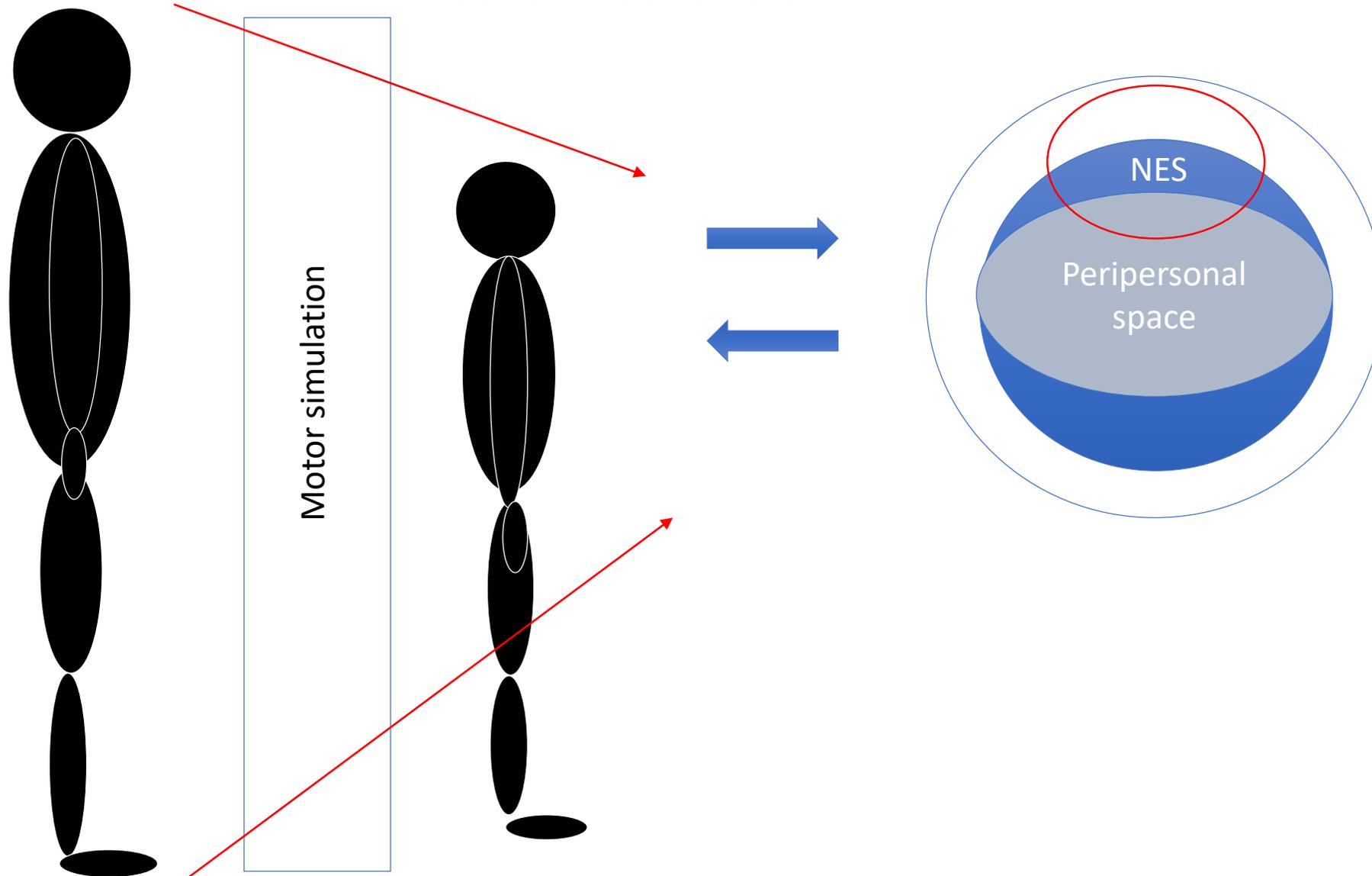
# The body in the extra-personal space

General Conclusions:



# The body in the extra-personal space

General Conclusions:





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*Thanks for the attention*



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