

Understanding “What” or “How”: Mirroring or Mentalizing Other Person’s Actions

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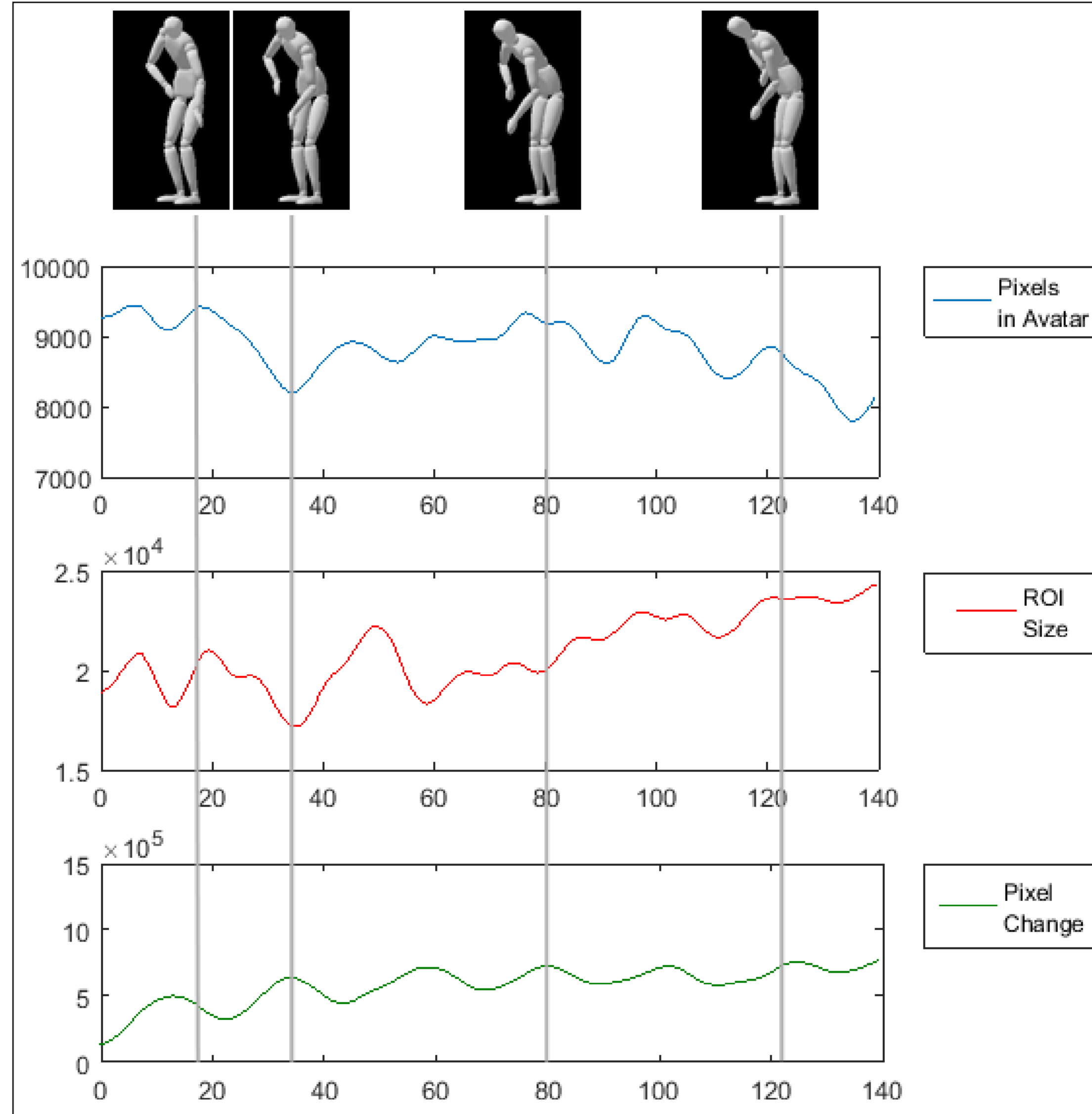
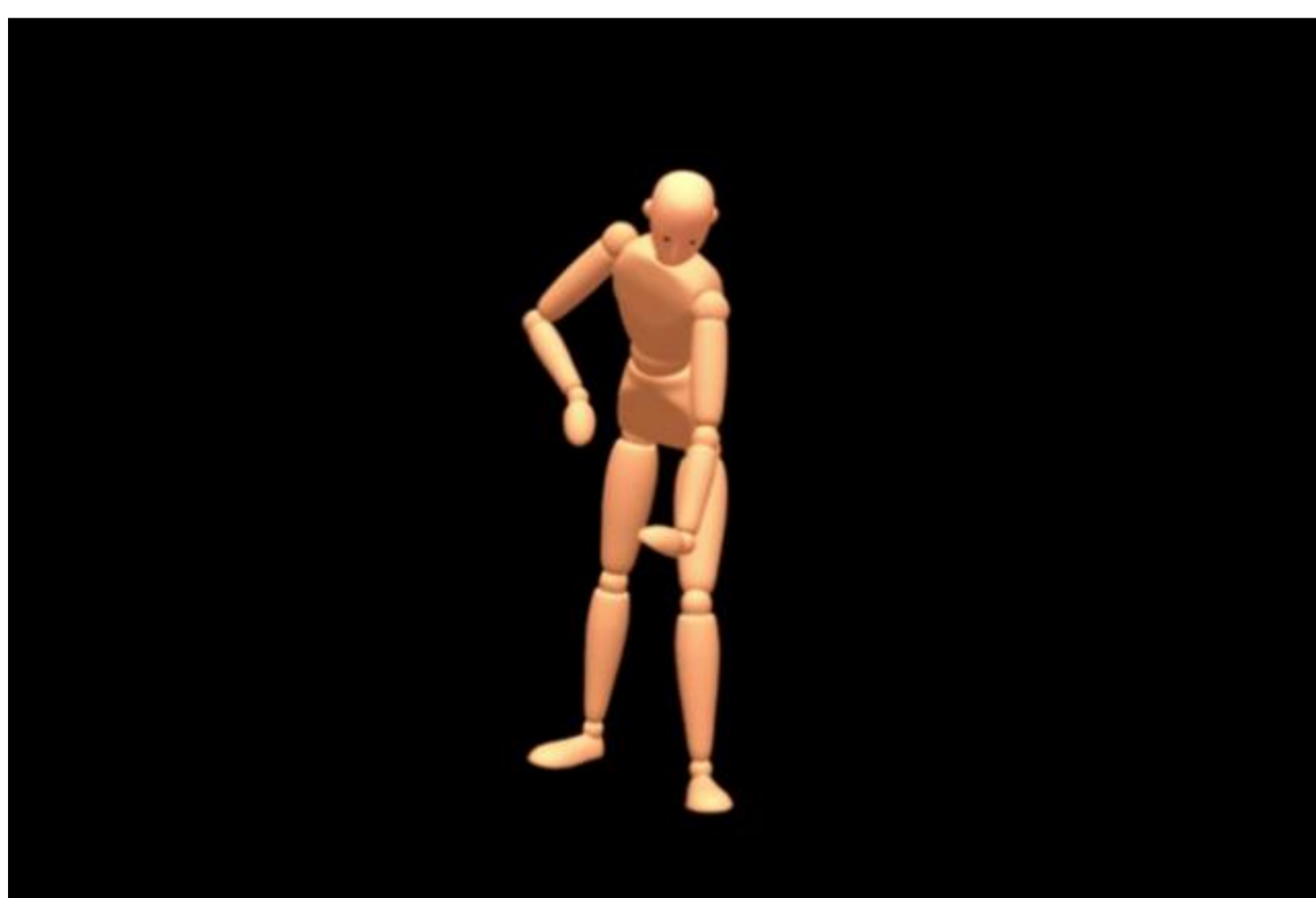
Summary

The **mirror neuron system (MNS)** and the **mentalizing system (MENT)** play important roles in social interaction [1], however, only very few studies in the field of social cognitive neuroscience investigated both neural systems simultaneously [2]. To allow the systematic study of the functional roles

of both systems, we designed video-stimuli that present virtual characters performing different movements (e.g. painting, sweeping, cleaning) in different emotions (e.g. sad, happy, angry). The usage of virtual characters for the investigation of nonverbal behavior has been proven to be ecologically valid [3]. Driven by instructions that either require to identify the type of movement or the

presented emotion, we expect the differential activation of both neural systems employing functional magnetic resonance imaging (fMRI). This study design will allow to discriminate the functional roles of both systems. Furthermore, it may provide new insights into the neurobiology of psychopathological conditions including autism spectrum disorder (ASD).

Methods



Actions What?	
Wiping	Sweeping
Cleaning a Table with a Rag	Sanding a Piece of Wood on a Table
Painting the Wall with a Brush	Painting the Wall with a Roll

X

Emotions How?
happy
angry
sad

Stimulus Creation

22 participants performed 6 different actions in 3 different emotions. Actions were recorded via motion capturing and mapped onto a wooden mannequin to avoid any gender- or stereotype-associated influences during the perception of the stimuli.

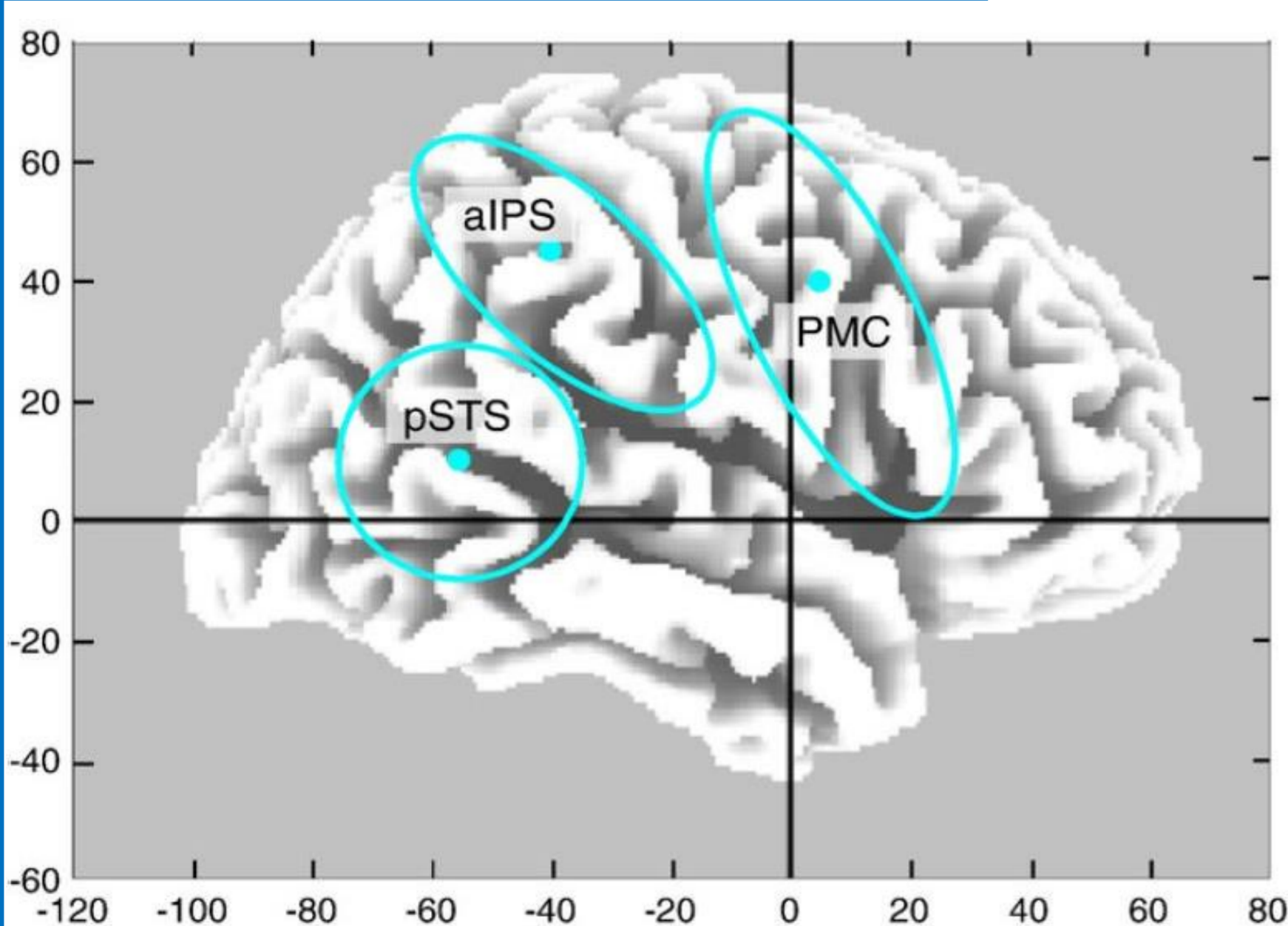
Stimulus Selection

We created video files of 5 seconds duration for each movement and emotion, 18 video files per subject in total. We controlled for luminance, pixel change (speed of the movement) and for the extension of the overall movement on the basis of each time frame.

Study Idea

Every video will be shown twice to the participant. Participants are required either to discriminate what action was performed by the avatar („What?“) or to discriminate in which particular emotion the avatar was performing the action („How?“).

Hypotheses

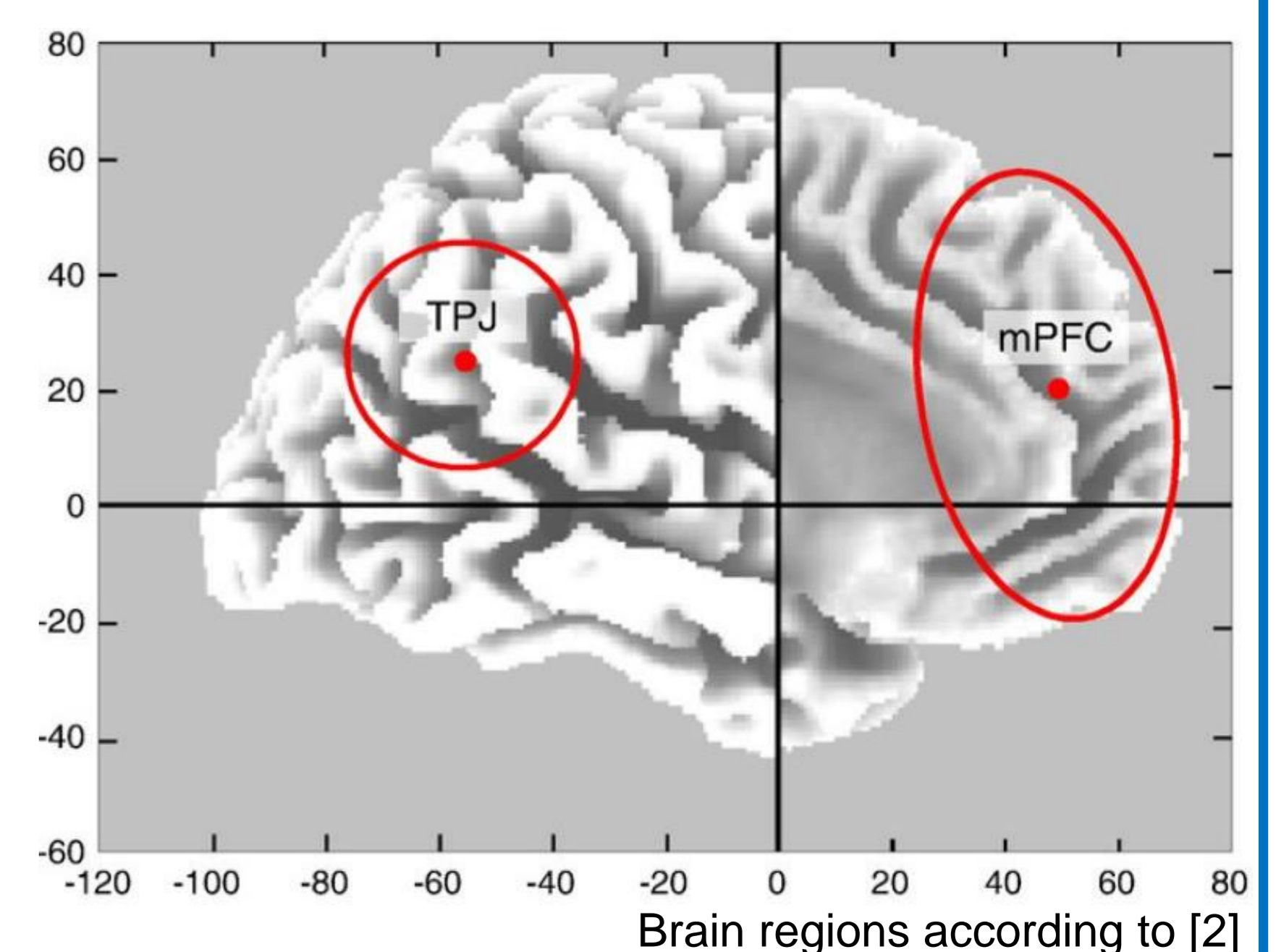


What? MNS

When asking what action was performed („What?“), we expect the recruitment of the MNS, allowing to recognize an action by matching it to previous movement representations in our memory.

Why? MENT

When asking in which emotion the avatar performed an action („How?“), we expect the recruitment of MENT associated with understanding other’s inner experiences including emotions.



References

- [1] Sperduti, M., Guionnet, S., Fossati, P., & Nadel, J. (2014). Mirror Neuron System and Mentalizing System connect during online social interaction.
 [2] Van Overwalle, F., & Baetens, K. (2009). Understanding others’ actions and goals by mirror and mentalizing systems: A meta-analysis.
 [3] Vogeley, K., & Bente, G. (2010). ‘Artificial humans’: Psychology and neuroscience perspectives on embodiment and nonverbal communication.