How do Humans Recognize Biological Motion?

When biological and non-biological object motion are presented to a human, is there a significant difference in the sensitivity to motion recognition? Ultimately, do humans perceive the motion of biological objects differently then non-biological objects? This is important since motion of an object is a major factor in how humans differentiate between life and non-life. Through the technique of habituation it was shown that newborn babies contain a predisposition that allows them to differentiate between biological motion and non-biological point-light animations (Francesca Simion, Lucia Regolin, and Hermann Bulf). Although these newborns showed preference to the biological motion, this does not show that the processes for perceiving these motions are the same. The observation of the emotion disgust was shown to stimulate the same site of the anterior insula of the observer (Bruno Wicker, Christian Keysers, Jane Plailly, 2003). Therefore, I support the hypothesis that motion cells involved in perceiving motion correlate with the area of the brain that directs physical movement. On the other hand, the perception of motion may activate different motion cells when observing either biological or non-biological movement.

Hypothesis one suggests motion cells are activated when observing motion. These motion cells then relay the information to other areas in the primary motor cortex that dictate motion, as while as the insula itself. This allows the primary cortex to understand the motion and confirm the movement as biological. Children with autism were significantly impaired when an emotion perception task was conducted (Hobson, 1986). Autistic children are also significantly impaired when taking on the task of visual recognition of biological motion (Blake, Turner, Smoski, 2003). Could this coincidence be attributed to a damaged insula? A major role

of the insula is human awareness, which allows us to empathize and understand others. Could this comprehension of others extend to the comprehension of biological motion? Hypothesis two suggests different motion cells are activated depending on wether the motion is conducted by a biological or non-biological object. Therefore it would be relatively simple to distinguish between two forms of motion. Studies have shown that specialized visual mechanisms are present in the superior temporal sulcus (Puce, Perrett, 2003). Studies extend to show a more specified area in the STS, the superior temporal polysensory area that only respond to the visual perception of certain body movements (Oram, Perrett, 2007). This supports the idea that particular areas of the cortex selectively activate when biological motion is present.

In order to test my hypothesis I must conduct an experiment. The experiment that I will conduct correlates with single cell recording. I will present animate images of point light lasers that are simulating biological movement. I will also present animate images that have no biological notion (simply nonsense).The cells that will be recorded include various cells in the STS and other motion cells that have been discussed previously. These cells will be assessed regarding there activation throughout the experiment. Throughout this period of time, the insula must be under close evaluation. By using an fMRI we can measure the activity of the insula throughout this period and comprehend the most affected areas.

Ultimately, the question remains what grants us the ability to recognize biological motion? Although I still conclude the insula is vital for the assumption of biological motion, i believe the latter hypothesis is deemed more appropriate when confronting the question. The concept of the insula still is intriguing, however although it facilitates human awareness, I do not believe it is the primary ability that grants us the skill to perceive biological motion. However, it

does seem that the selective biological motion cells located in the STS are only activated if there is no lesions in the insula.

References

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