

**Neuroscience of Human Movement
Department of Multidisciplinary
Indian Institute of Technology, Madras**

**Lecture - 80
Parietal and Premotor Cortex - Part - 4**

Welcome to this class on Neuroscience of Human Movement. This is part 4 of our discussion on Parietal and Premotor cortex, ok.

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In this class...

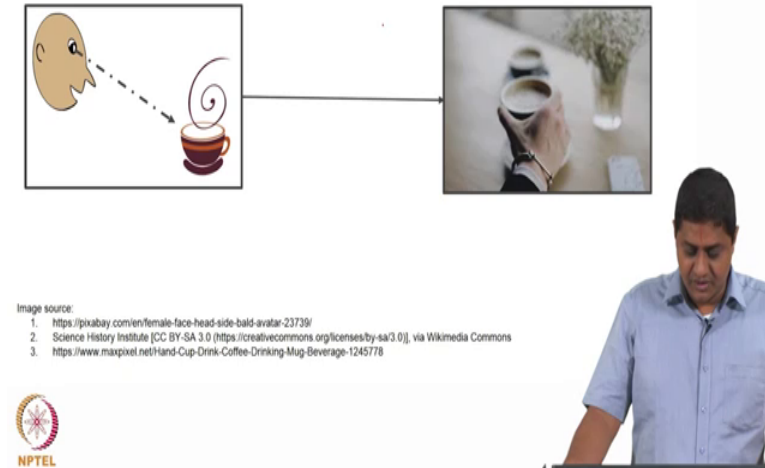
- Grasping plan
- Disorders of voluntary movement control .



So, in this class will discuss grasping plan and disorders of voluntary movement control especially, those that are cause by lesions of the motor association areas right.

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Grasping plan



So, again let us go back to the coffee examples. So, you want to grasp cup of coffee. So, there is an object that you want to grasp, and this object you want to how do you grasp this object?

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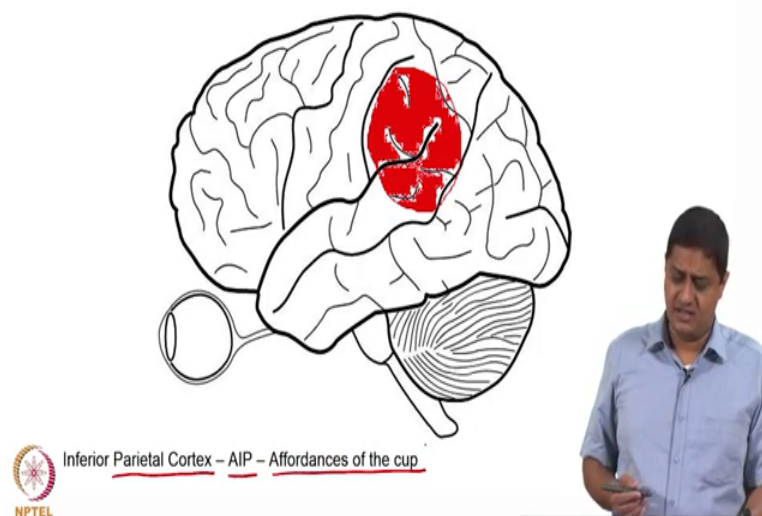


Turns out that this involves several steps right; grasping plan to start with involves information from the visual systems. So, here what is shown here is information collected through the eyes right. So, this gives us crucial information about object properties right; so, such as dimension etcetera right.

Note grasping by itself is not an independent action performed. For example, when there is an object that I will have to grasp. It turns out that reaching and grasping are coordinated right. So, as I am reaching the grip aperture, so essentially the distance between the thumb and the fingers increases as the function of the object size, and as I go closer to the object it becomes smaller so that I can actually grasp and lift it. So, essentially there is coordination between the arm movements and the finger movements, how is this achieved? This must be achieved through reciprocal projections, coordination between those neurons that control reaching and those neurons that control grasping.

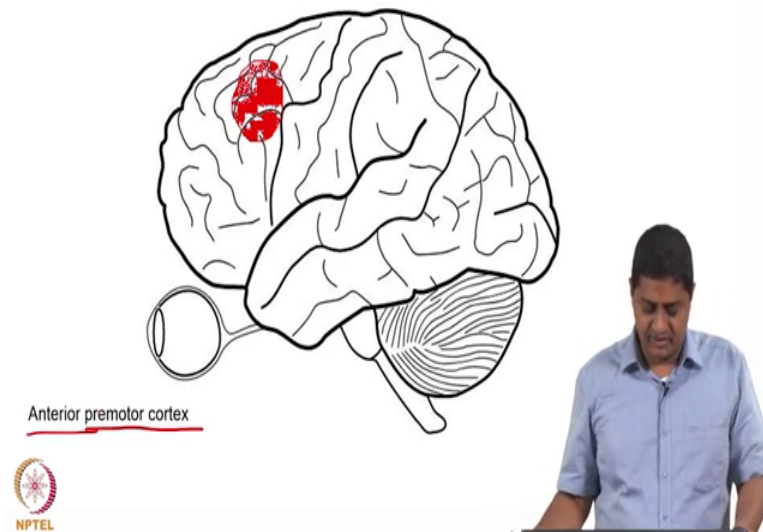
Once again there is not absolute clarity and the boundary between these sets of neurons, but what is known is that there are neurons that are more specialized for reaching when compared with grasping. And then there are neurons that are more specialized for grasping when compared with reaching.

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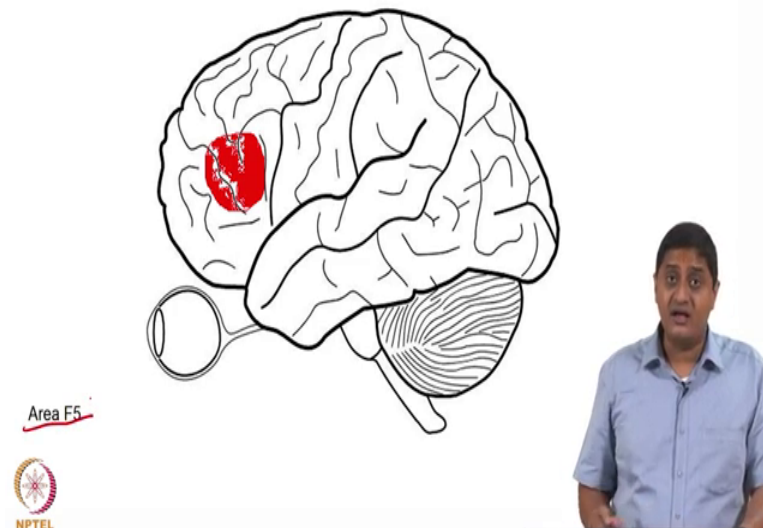
So, this visual information reaches the inferior parietal cortex. The AIP region, that gives us information about the affordances of the cup right. These are the properties of the cup. What kind of handle does it have? Does it even have a handle? Can you hold hold it by a handle or is that is that something that you can hold with one hand or thus it is it large enough that it needs to be held by 2 hands or does it, what are the various properties of this object; so, affordances of the cup that you want.

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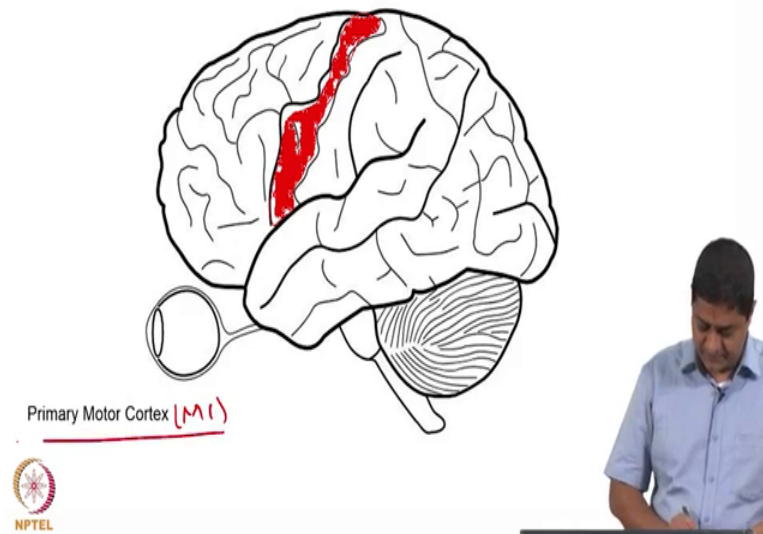
And then this information further reaches the anterior premotor cortex.

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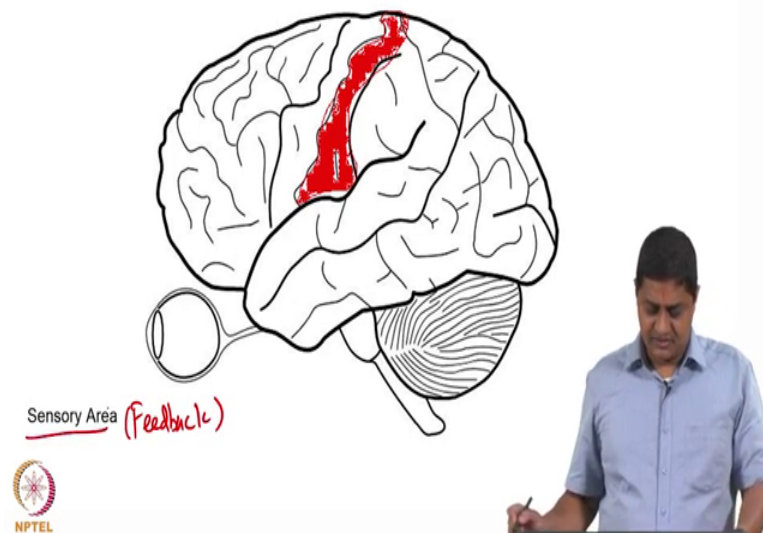
From where it reaches area F 5; let us remember what area F 5 has, area F 5 has neurons that are specialized for controlling hand to mouth movements.

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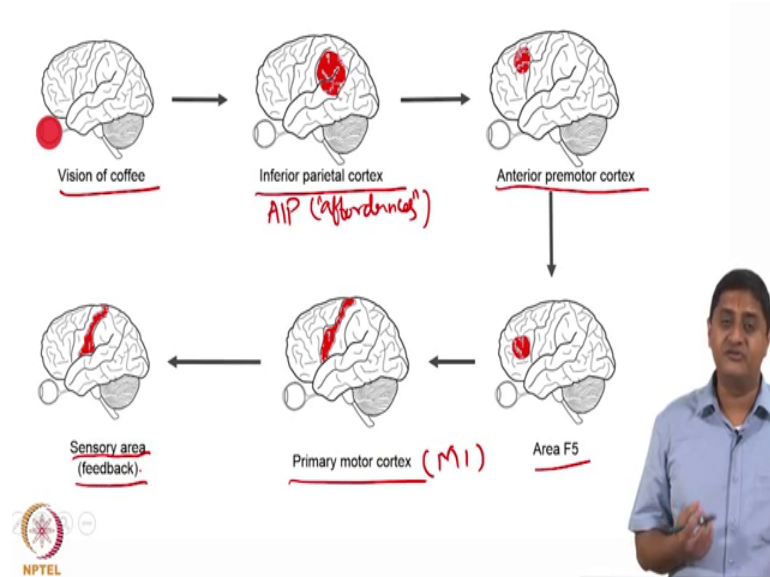
And of course, movement execution is something that is performed by the primary motor cortex also called as M 1.

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And have you actually achieved the motor task. So, we need to get feedback that feedback comes from the sensory area.

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So, essentially vision of the coffee cup is first step. And then that information goes to the inferior parietal cortex; specifically, the AIP area to get information about the affordances. Please check this word it is technical word psychology, please check, what is the meaning of affordance. From there goes for planning of moment to the anterior premotor cortex from there area F 5 for hand to mouth movements, from there M 1 for movement execution and finally, feedback is received through the sensory area.

So, this is a schematic note this is not a complete picture, we are still working on this topic, this is still a work in progress, there is still active research to understand how exactly grasping is been performed. But this is a very rough birds eye view or this is a rough schematic picture of what could probably be going on right in a simple task right.

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Summary

- Grasp plan involves:
 - Vision of object
 - Inferior parietal cortex (AIP - affordances)
 - Anterior premotor cortex
 - Area F5
 - Primary motor cortex (M1)
 - Sensory motor cortex (Feedback for maintenance of stable grasp)



So, essentially grasp plan is something that involves vision of the object, inferior parietal cortex information AIP and affordances and anterior premotor cortex area F 5 M 1, and the sensory areas for feedback, for maintenance of a stable grasp.