

Q1. What is the difference between a Modality and a Medium:

Modality:

- Modality in simple terms is the way the information is being inferred and processed using sensory channels.
- The information is passed or retrieved using the channels like visually or auditorily.
- Language is a modality but a computer speaking a language is Medium.

Medium:

- Medium is generally about transferring the information by using channels and is not about processing it.
- Medium is about representing the information to either the user or the machine.
- Social Media is a Medium to broadcast information using Text modality.

Q2. What are the CARE properties? Give an example of each property:

CARE properties are basically way to define and describe the relation between Modalities in the frame of Human Computer Interaction. It is basically based upon general dimensions of Modality relation.

CARE Properties:

- **Complementarity:** Different modalities are used in conjugation to convey the message effectively and these different modalities complement each other. For example, when explaining a world map to students. A pointing gesture is used to point out a place on a map along with speech modality to describe that place. Also, in various racing game pointing gesture is used to specify the direction of the racing car, left or right or straight, and audio commands are used to apply brakes or accelerate.
- **Assignment:** The assignment is to assign a single type of modality for communication with a system or another human being. For example, in many applications when we use speech control all other controls remain disabled. Like, while playing a game either we can either use a joystick as a controller or phones movement sensors to control the characters of the game but not both. A great example is "OK Google" application of android which generally disables the input search box once the speech assistance is active.
- **Redundancy:** Redundancy in modalities occurs when multiple modalities are used to convey the same message. Generally, we combine gestures with our speech to convey the message and sometimes they lead to redundancy. For example, replying

YES with a nod using speech and gesture at the same time (Parallel) or even one after another (Sequentially). While playing some games sometimes, people tend to use the joystick along with verbal commands, which confuses the system.

- **Equivalence:** Equivalence enables the human-computer interaction to use any modality in any temporal order (parallelly or sequentially). This property is useful when trying to understand the human behavior or emotions. For example, Polygraphy, where gesture reading is used to validate the authentication of speech. Also, in the study of human psychology equivalence type or multimodel relation is very useful.