**////Title: Exploring How Humans Describe Tasks Using Gestures**

**////Standfirst:**

For decades, linguists and psychologists have been trying to understand the fascinating ways in which humans communicate with each other in different real-world settings. Overall, spoken communication involves a mixture of words, facial expressions, and gestures. Dr Holly Keily, a researcher at the University at Buffalo, has recently carried out a study specifically exploring how speakers explain events to partners who will need to identify them, particularly focusing on their use of gestures.

**////Main text:**

Verbal communication among humans typically involves far more than just spoken words. In fact, while talking to others, humans often produce hand gestures and other movements, which emphasise or visually describe what they are saying.

Past linguistics studies have investigated this unified ‘word and gesture’ communication system, to build a deeper understanding of it. A set of theoretical constructs that offers a good representation of this system are embodied cognition theories.

Theories of embodied cognition explore how physical actions performed by humans contribute to their psychological and mental experiences. In this context, the human tendency to communicate using simultaneous speech and hand gestures would help to effectively build mental constructs, internalise information, and convey it to others.

By examining the ways in which humans convey something they experienced to others, and particularly their use of gestures, linguists and psychologists could better understand the process through which people internalise new information.

Dr Holly Keily of the University at Buffalo recently carried out a study investigating the possibility that when people are presented with information about new and unfamiliar events, the action-related attributes of these events could guide the way in which humans understand and verbally communicate them to others.

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To test her hypothesis, Dr Keily carried out an experiment involving 22 students at the University at Buffalo, between the ages of 18 and 24. These students were split into pairs, each comprising a ‘speaker’ and a ‘matcher’.

The speaker in each pair watched a short video clip in which one or two people used a specific instrument to cut or break an object. After they finished watching a clip, each speaker was asked to describe what they had observed to their partner, who had to perform a task matching images of various events to the one described.

The videos that Dr Keily showed the participants are part of the ‘Cut and Break’ dataset, compiled by a team of researchers at the Max Planck Institute for Psycholinguistics. In these videos, characters specifically used either a knife, hammer, axe or a pointy instrument to cut a carrot, cloth, rope, or stick.

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Dr Keily also asked the speakers to rate how familiar they were with specific attributes of the events they observed, including the actions performed and the instruments used. This allowed her to determine whether the level of familiarity could be linked to the gestures the participants performed while explaining what they observed to their partners.

Overall, she found that speakers produced gestures for about 70% of the verbal descriptions they provided to their partners. Out of all the gestures produced, almost 15% gave additional information about objects, 22% about instruments, and almost 65% about actions.

Dr Keily’s analyses suggested that speakers tended to gesture less when giving their partners longer verbal descriptions. On the other hand, the participants’ familiarity with attributes in the video did not appear to affect the quantity and length of gestures they produced.

Interestingly, video clips that participants had rated as containing more familiar attributes and which they described to partners using fewer words were associated with shorter gestures. On the other hand, speakers gestured more and for longer when some attribute of the event was unfamiliar.

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To better understand how individual attributes of a task affected the quantity and length of gestures produced by speakers, Dr Keily conducted some additional analyses. She found that the number of gestures that speakers used when explaining specific actions increased proportionately with the time that they invested in describing these actions.

In addition, participants appeared to produce more gestures when describing actions that they were unfamiliar with. In contrast, the number and length of gestures did not appear to be impacted by the time used to describe objects and instruments, nor by the extent to which speakers were familiar with them.

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Overall, Dr Keily’s findings suggest that when people are verbally describing tasks and other actions, their use of gestures can be influenced by how familiar they are with these actions. In other words, when we describe physical actions that are unfamiliar, we tend to elaborate by using more gestures.

To explain this relationship between gestures and action familiarity, Dr Keily suggests that humans tend to form ‘action images’ in their mind while they watch events or experience them. If these actions are familiar, they quickly activate a pre-existing cognitive ‘schema’. If they are unfamiliar, however, humans must maintain the action images for longer and associate them with mental representations for other actions that they are more familiar with.

In this context, gestures could compensate for the limits of human memory, allowing us to retain an image of an unfamiliar action for longer and convey it more effectively to others. Moreover, when humans are unfamiliar with an action, they might assume that their listeners are too, and they might use more gestures to improve the listener’s understanding.

Dr Keily also tried to explain the reason why participants used more gestures when describing unfamiliar actions, yet this did not occur for unfamiliar objects or instruments. In her paper, she highlights the complexity of actions compared to objects or instruments, adding that actions include a variety of information related to speed, trajectories, and force applied to objects. Because of this complexity, gestures could be a far more valuable aid for describing actions than they are for describing objects.

Dr Keily’s recent work offers precious insight about what influences the extent to which humans use gestures while verbally describing a task or action to others. In the future, it could inspire new works examining the relationships she uncovered more in depth.

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