

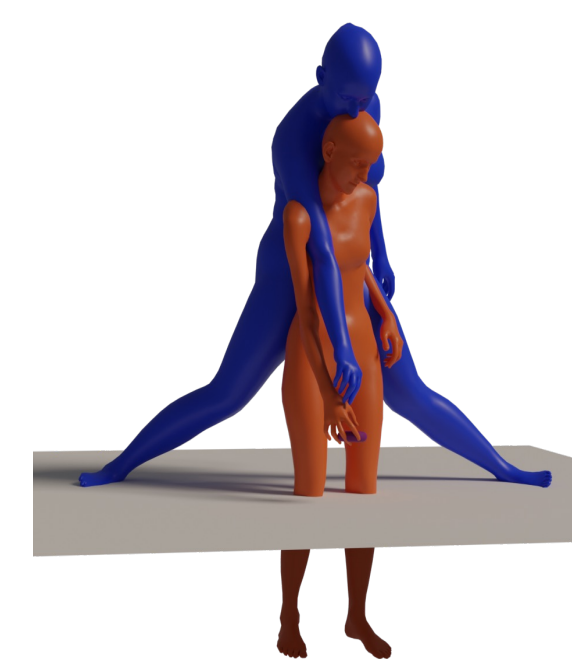
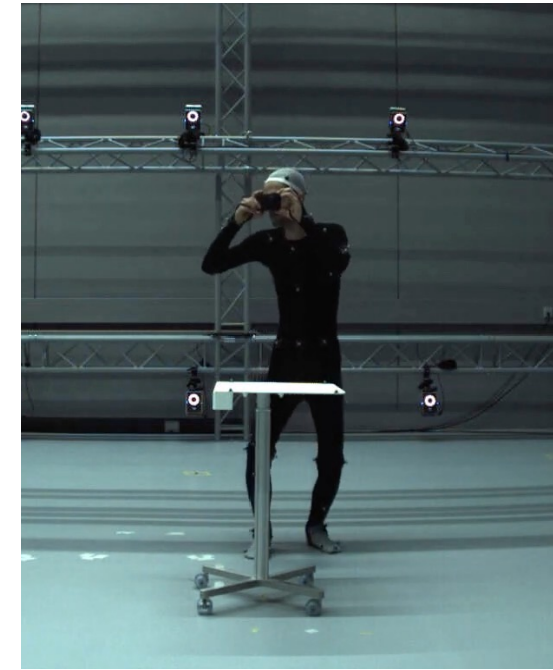


# FLEX: Full-Body Grasping Without Full-Body Grasps

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## Task and Challenges

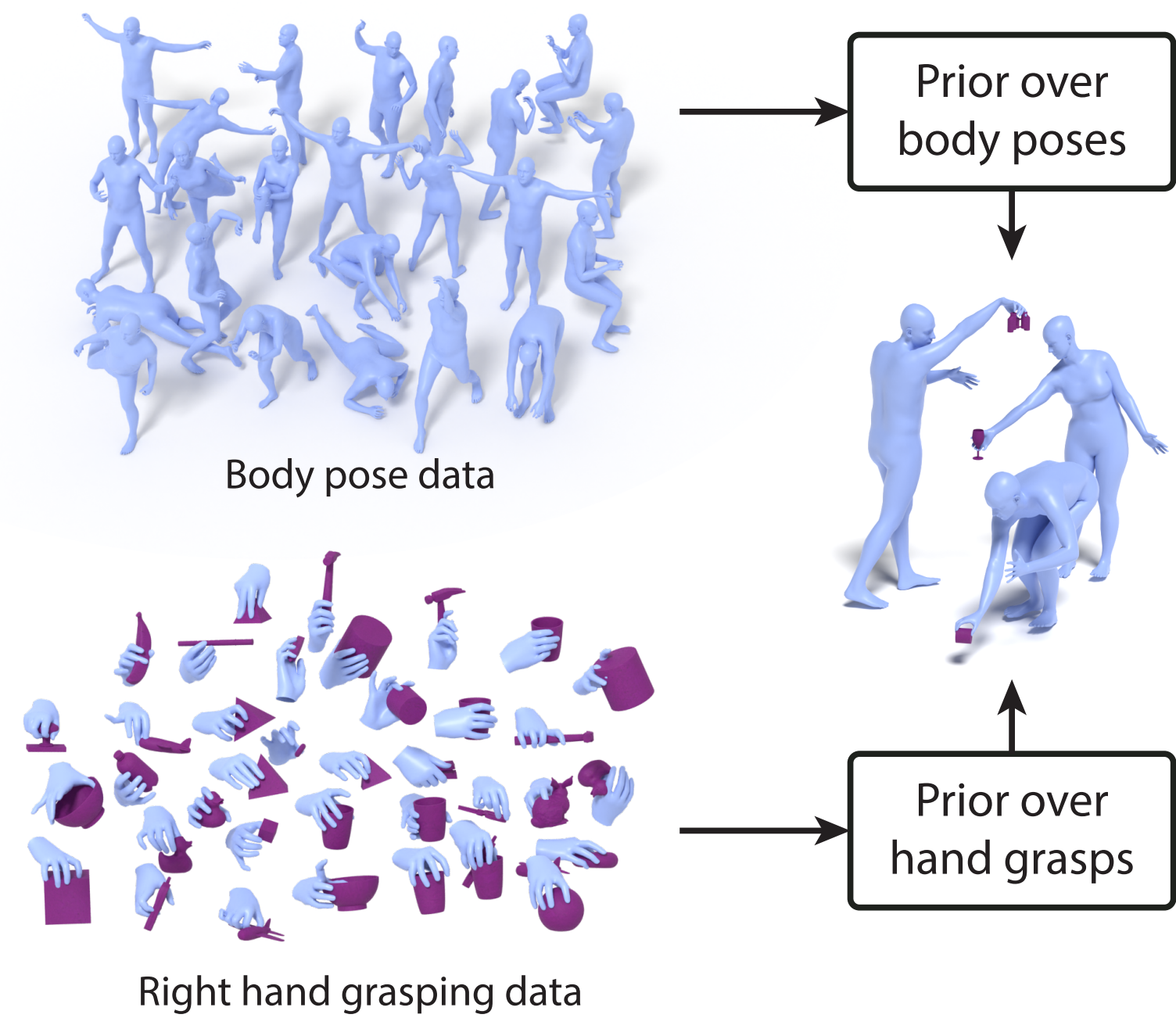
Full-body grasping of objects in presence of obstacles.



MoCap Challenges No Generalization No Obstacle Consideration

## Key Idea

- Full-Body Grasp  $\rightarrow$  Full-Body + Hand-Grasp
- No explicit full-body grasps required for training.



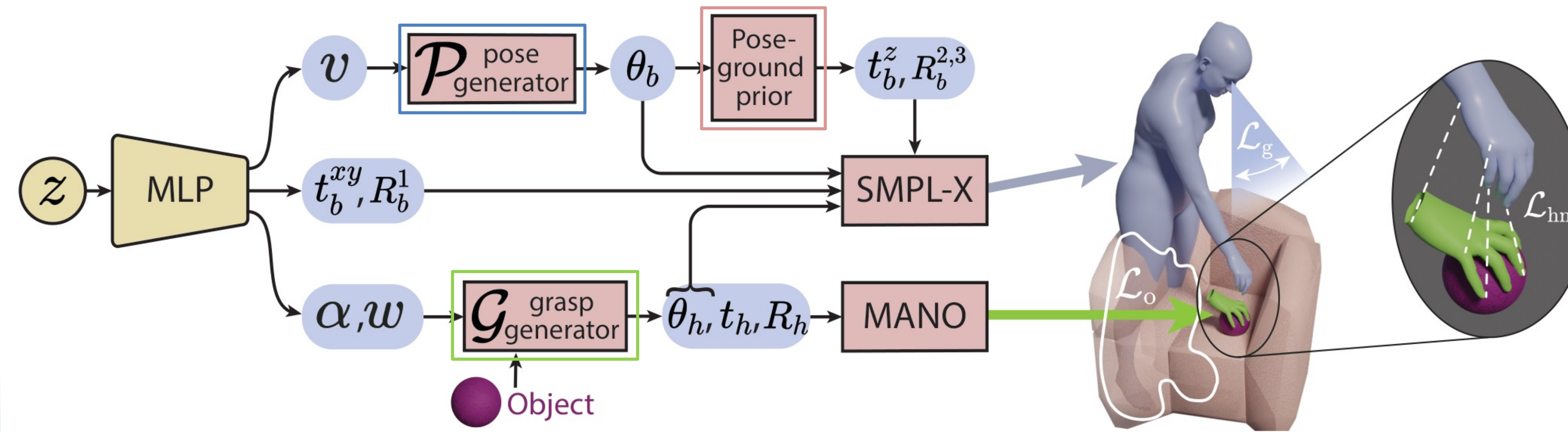
## ReplicaGrasp Dataset



## Approach

**FLEX** (Full-Body Latent Exploration) generates a 3D human grasping the desired object, given

- Pre-trained right-hand grasping model  $\mathcal{G}$  that can predict global MANO parameters  $\{\theta_h, t_h, R_h\}$
- Pre-trained full-body pose prior  $\mathcal{P}$  that can generate feasible full-body poses  $\theta_b$
- Learnt pose-ground prior which predicts the floor given the human pose  $\theta_b$



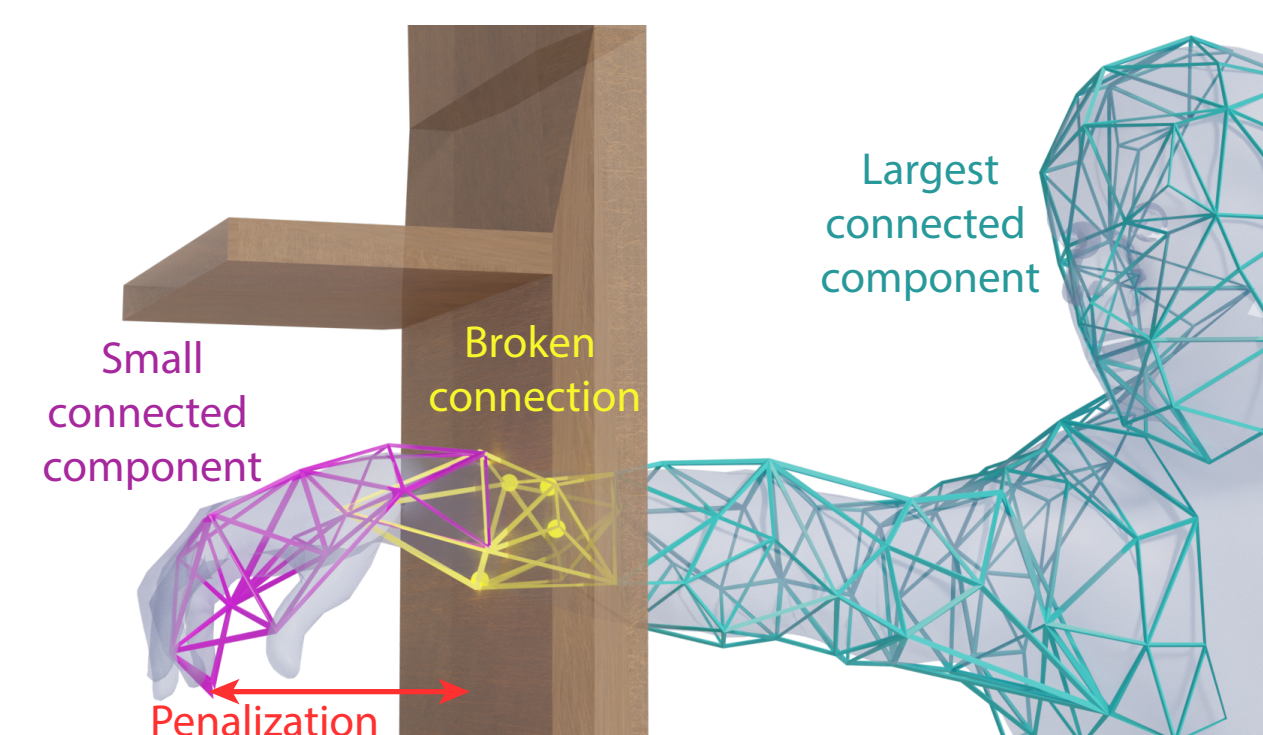
FLEX performs a gradient-based search over hand & body priors to minimize hand-matching and obstacle losses.

## Key Insights

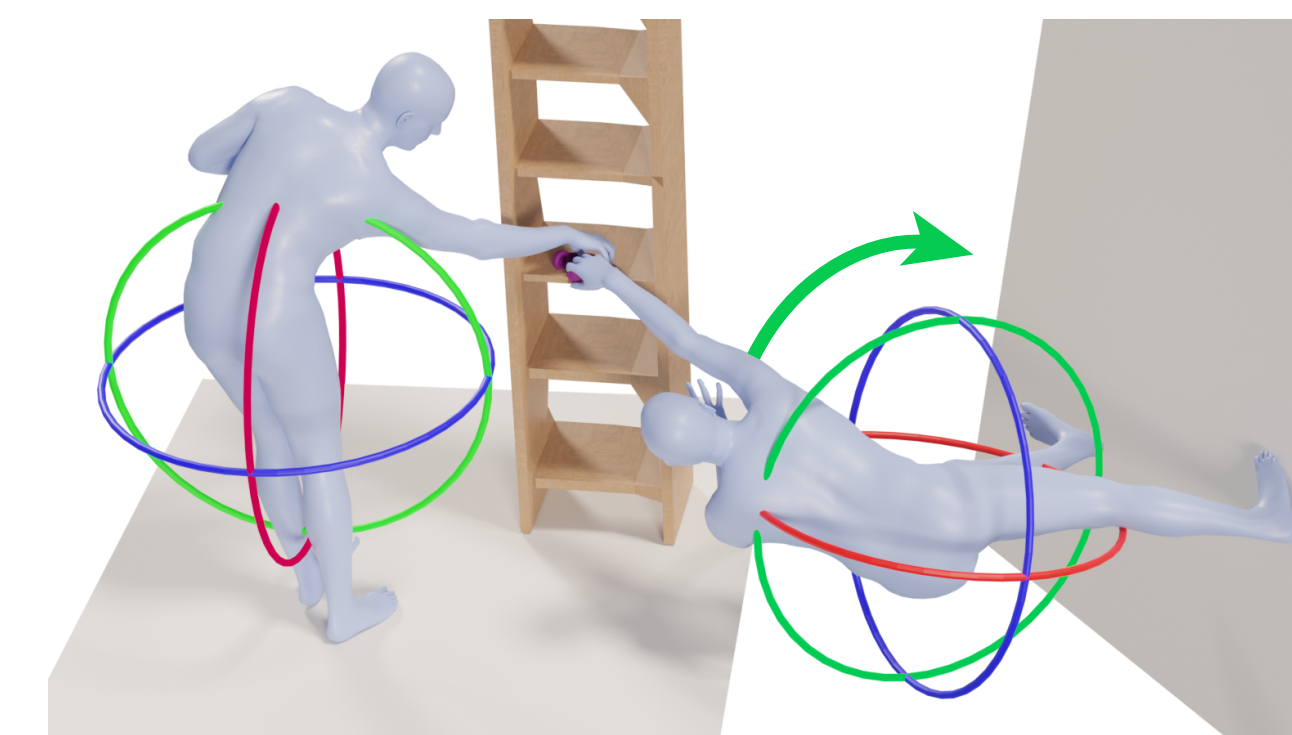
- Searching in the latent space of the hand-grasping model  $\mathcal{G}$  allows full-body obstacle consideration.
- We penalize *all* vertices in the connected components of the resulting body graph other than the largest one.
- The ground position can be predicted from the body pose. This removes 2 DoFs from the optimization.



Hand-grasp search

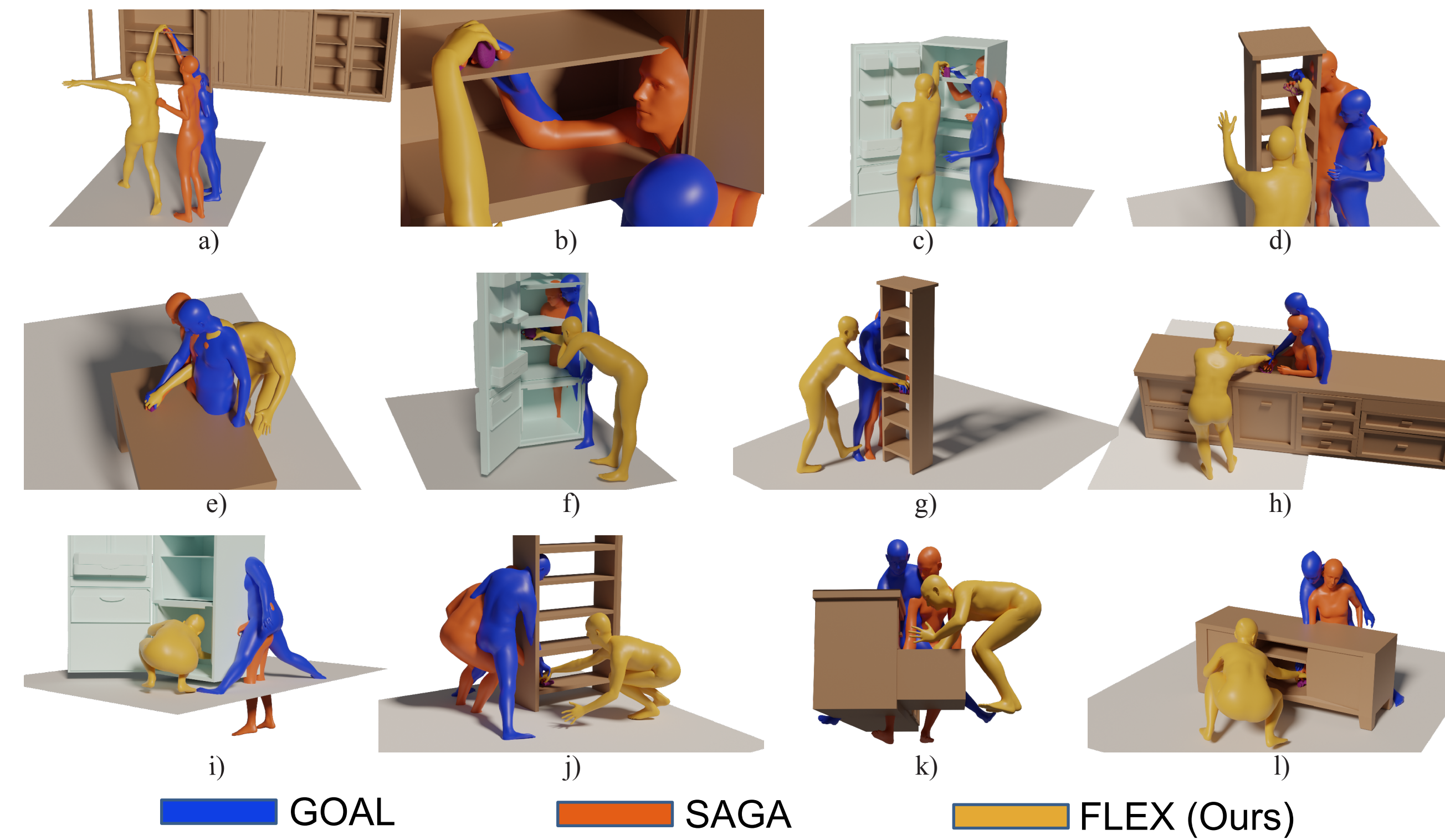


Obstacle avoidance loss

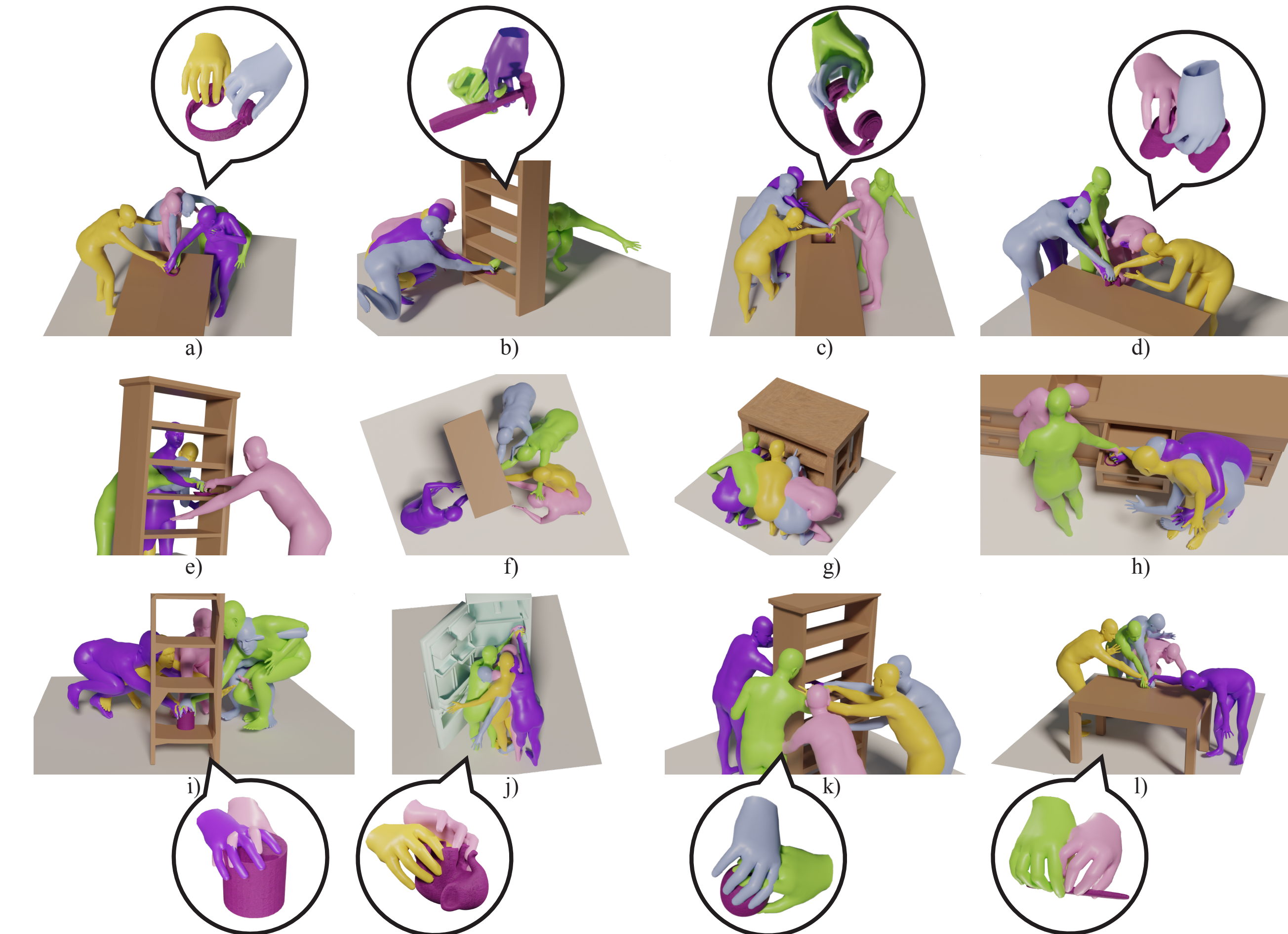


Pose-ground Prior

## Comparison Results



## Diversity Results



All humans are samples from FLEX