Physical constraints of action matter :
Their effect on perceived distances

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Background

- It was shown that variations in **reaching constraints influence distance perception**.
- Past studies focused on the effect of reach-relevant properties of **people's body** (e.g., arm length [1]) and on the effect of **reach-relevant properties of the object** people intend to reach (e.g., orientation [2]).

Question :

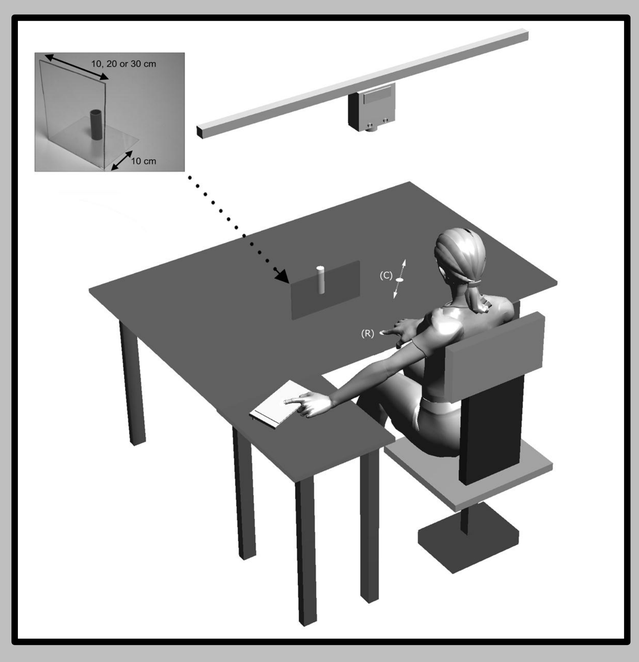
Does reach –relevant properties of the surrounding environment influence distance perception ?

Method

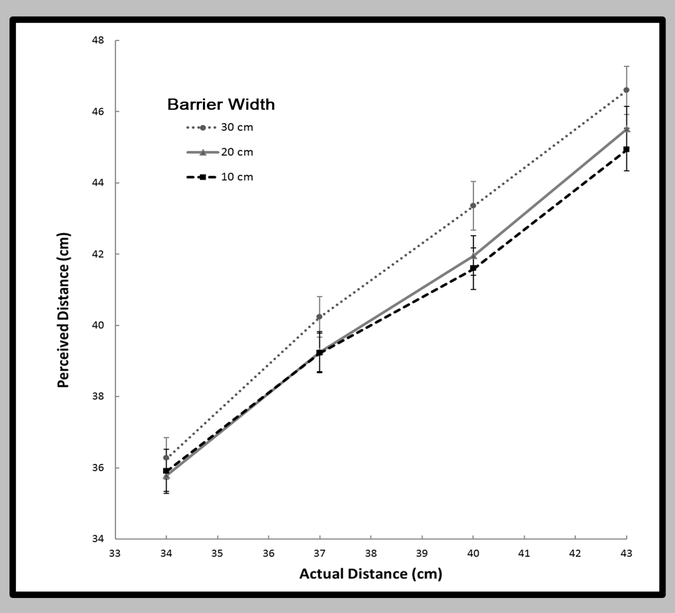
- 24 **participants estimated** Euclidean **distances** between **their right forefinger** and a **cylinder** presented at **43 cm, 40 cm, 37 cm, or 34 cm**

- **Task: Visual Matching Task** : Using a keyboard, they adjusted the distance between their index and a comparison point projected onto the table until it matched the Euclidean distance between their finger and the cylinder.

- The **cylinder** was presented at **10 cm behind a transparent barrier** (height: 25 cm) whose trial-to-trial width (**wide: 30 cm, medium: 20 cm, and small 10 cm**) changed in a random order.



Results



(To avoid the frequent problem of sphericity assumption, we broke the ANOVA down into a group of orthogonal contrasts with one degree of freedom (Judd et al. 2009)

- Main effect of the Actual Distance , $F(1, 19) = 847.79$, $p < .001$.
- **Main effect of the Barrier Width**, $F(1, 19) = 4.43$, $p = .049$.
- The **interaction** between the Barrier Width and the Actual Distance was marginal, $F(1, 19) = 4.23$, $p = .054$.

- The **one-way ANOVA** with **Barrier Width as within-subject** factor and with the **rating of Anticipated Effort as dependent variable** showed that the Anticipated Effort increased significantly with the Barrier Width, $F(1, 19) = 69.28$, $p < .001$. This **increase** was significantly **greater between the medium and the wide barrier than between the small and the medium one,** $F(1, 19) = 5$, $p = .038$.

Conclusion

Here, we demonstrate that **obstacle** width plays a role in visual perception. These results provide a strong support to the claim that **action costs influence visual perception,** thereby supporting an embodied view of visual perception of space. Indeed, **participants perceived longer Euclidean distances to the cylinder in presence of the wide barrier compared with in presence of the medium and the small barriers**. As suggested by the manipulation-check analysis, **this might reflects that the difference of anticipated effort between the wide barrier and the two others was greater than those between the medium and the small barriers**. However, further studies will have to confirm this interpretation by using a more subtle measure of the anticipated effort