Abstract of thesis entitled:

Physical and Social Factors for Perspective Taking and Theory of Mind

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Typical adults have sophisticated social abilities to adopt abundant physical and social information to understand other people's visuospatial experiences (i.e., perspective taking) and mental states (i.e., theory of mind) in social interaction. However, we do not know exactly what physical and social information is involved and how it is used. In this dissertation, I examine the roles of some physical (i.e., spatial reference frame and position) and social (i.e., social context) factors in perspective taking and theory of mind.

Within a spatial reference frame, people usually associate positive valences with the right, upper, near, and front sides and save the opposite sides for negative valences. In Study 1, I tested how the participants inferred other people's space-valence association. In two pencil-and-paper experiments, the participants saw an agent standing between two boxes and inferred how the agent would put one good and one bad animal into these boxes separately. In Experiment 1a, the results showed that participants inferred that the agent would put the good animal into the box at the agent's right, near, and front sides and the bad animal in the other box. I also manipulated the relative distances between the boxes and agent in Experiment 1b. The results showed that participants inferred that agent would like to put the good animal into the near box.

Study 2 tested whether people mentally transformed themselves into the position of the other to understand her/his beliefs. In two behavioural and one event-related potentials experiments, the participants saw scenarios from five visual angles. Each scenario presented that an agent placed a ball into one box and left. Then the ball rolled out and moved into a different or the same box. The participants inferred in which box the agent would find his ball when he returned. The results showed that when the visual angles were increased the participants' reaction times became slower, accuracy became lower, and amplitude of the rotation related negativity component at the parietal electrodes decreased. These results support mental transformation in belief reasoning.

In Study 3, I tested how social context in which the false belief arose affected people's performance in false belief reasoning. In one behavioural and one event-related potentials experiments, the participants saw an agent A placed his ball into one box and left. Then an agent B put it into a different (i.e., false belief) or the same box (i.e., true belief) with deceptive or non-deceptive intention. The participants inferred in which box agent A would find his ball when he returned. The results showed that, when the participants inferred the agent's false beliefs, the participants' reaction times were slower and amplitude of a P300-like component were more negative in the deceptive than non-deceptive condition. Hence, the participants might allocate more resources to understand deception.

In sum, the current dissertation revealed that people would adopt other people's spatial reference frames, positions, and social context to understand others' minds.

論文摘要: 觀點采擇和心理理論中的自然和社會因素

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在社會互動中，健康的成人擁有精巧的社會能力通過採用豐富的自然和社會信息來理解他人的視空體驗(即觀點采擇)和心理狀態(即心理理論)。然而，人們採用何種自然和社會因素還不清楚。本論文探討了自然(即空間參考系和位置)和社會因素(即社會環境)在觀點採擇和心理理論中的作用。

人們傾向於將積極與右、上、近和前相聯繫，而將消極與相反的空間相聯繫。實驗 1 研究了被試如何推斷他人的這種空間-效價联合。在兩個紙筆測驗中，被試推斷一個人如何將一個好的和一個壞的動物分別放置到他身邊的兩個箱子裡。結果顯示，被試傾向於認為這個人會將好的動物放到自己右邊、近處和前面的箱子裡，而將壞的動物放到另外一邊。實驗 1b 同時操縱了箱子與這個人的距離。結果發現，被試傾向於認為這個人會將好的動物放到近處的盒子裡。

實驗 2 探討了在理解他人的信念時人們是否會在大腦中想像自己位於他人的位置。在兩個行為和一個事件相關電位實驗中，被試從五個角度觀看一些視頻。每個視頻中，一個人將球放到一個盒子裡面後離開。之後，這個球滾動到另外的盒子裡或滾動回原位。被試需推測這個人會從哪裡尋找這個球。結果發現，當觀察角度增加時，被試的反應時更長，正確率更低，與心理旋轉相關的腦電成分的波幅更負。因此，結果支持了心理旋轉參與了信念推理。

實驗 3 探討了虛假信念產生的社會環境如何影響虛假概念的推理。在一個行為和一個事件相關電位實驗中，被試看到人物 A 把球放到一個盒子裡面後離開。之後，人物 B 根據欺騙或不欺騙 A 的意圖將球移動到其他的盒子(即虛假信念)或放回原處(即真實信念)。被試需推測 A 會從哪裡尋找這個球。結果發現， 當 A 擁有虛假信念且 B 欺騙了 A 時，與 B 不欺騙 A 相比，被試的反應時更長，與 P300 類似的腦電成分也更負。因此，被試可能調用更多的資源來理解欺騙信息。

綜上，本論文發現人們會利用空間參考系、位置和社會環境來幫助自己理解他人的思想。