

「社会能力の神経基盤と発達過程の解明とその評価・計測技術の開発」

Exploration of Neural Basis of Social Cognition and its Developmental Process by Means of the Quantitative Measurements



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■ 研究内容

実際のヒト社会行動における社会能力計測技術として，集団の脳機能・視線・行動計測法を開発します。具体的には，複数の個体の相互作用を，個体の発する社会的信号を視線の動きとして捉え，近赤外光を用いた光学式動態計測を行うことにより，視線の位置と方向を時系列データとして記録します。動的因果関係に基づいた時系列解析モデルを用いて解析することにより，複数の個体間の相互作用を定量する一方，これらの行動に反映されている心的過程の神経基盤を抽出するために，2台のMRIを用い，視線を含む個体間の相互作用を伴う行動課題を遂行している最中の脳活動を描出します。従来の発達心理学分野における行動観察技術に立脚しつつ，脳機能イメージングを有機的に組み合わせることにより，自己と他者の関係を考慮しつつ行動を決定していく人間の社会能力が，脳神経活動レベルから解明されるとともに，自閉症をはじめとする社会能力障害の病態解明に資することが予想されます。社会能力の素過程としての対面コミュニケーションにおける機能的MRIによる複数個体の同時計測はいまだ試みられておらず，社会神経科学に新しい局面を開くことが期待されます。

■ Research works

The purpose of our project is to develop the system for quantitative measurements of the interaction of multiple individuals by means of behavior, eye-gaze, and neural activity. Specifically, interactions between multiple individuals are observed in terms of social signals that individuals generate through their eye movements. Time-series data of eye position and direction are recorded by optical movement measurements using infrared light. Interactions between multiple individuals are analyzed and quantified using time-series analysis models based on dynamic causality. To extract the neural substrates of mental processes that give rise to these activities, we use two magnetic resonance imaging (MRI) scanners to assess participants while they perform behavioral tasks associated with interpersonal activities that include eye contact. By utilizing functional neuroimaging along with conventional behavioral observation techniques used in developmental psychology, we elucidate the neural substrates of social skills that guide behavior by enabling consideration of the relationship between oneself and others. Consequently, we anticipate that our methods will shed light on the pathophysiology that leads to social disabilities such as autism. An elementary process of social skill development can be investigated in face-to-face communication. To date, no simultaneous measurement of multiple individuals during practice of face-to-face communication has been assessed by functional MRI (fMRI). The dynamic evaluation of social skill using visual interactions and functional neuroimaging is a novel approach that will spawn a new phase of social neuroscience.