

Eye tracking reveals untapped potential in individuals with multiple disabilities

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Using eye-tracking - a technique for recording and analyzing eye movements - a team from the University of Geneva (UNIGE) has shown that individuals with multiple disabilities can improve their social and emotional skills. Although these patients are often considered "untestable", nine young people have undergone personalised training over a period of one year, with promising results in terms of their ability to socialize. This work opens the way to new methods of assessment and support. It is published in *Acta Psychologica*.

Multiple disabilities involve a combination of severe intellectual and motor impairments, resulting in profound dependence. Often unable to express themselves verbally or through gestures, individuals in this population primarily communicate through muscle tone, eye movements, or facial expressions - signals that are sometimes difficult to interpret. As a result, they are often considered challenging to assess and support.

In 2022, using an eye-tracking device that records eye movements in response to specific images, a UNIGE team demonstrated that individuals with multiple disabilities can exhibit visual preferences. These findings paved the way for improved communication with such patients. Today, the same team, in collaboration with the University of Lille, is highlighting the benefits of personalised training using targeted eye-tracking tools.

"We have provided preliminary evidence that, with customised and adapted training, certain socio-emotional skills can be strengthened in children and adolescents with multiple disabilities. This suggests that they possess previously unsuspected learning abilities," explains Thalia Cavadini, a doctoral research assistant at the UNIGE Faculty of Psychology and Educational Sciences, first author of the study and recipient of a research grant from the Swiss National Science Foundation (SNSF) for this project.

Eye-controlled video games

The originality of this training lies in the use of eye-controlled educational video games, developed using three specific software programmes. The first is Gazeplay, an open-source platform featuring a wide range of eye-controlled

games, several of which were customised for the study. The second is Attention Eye, created by a group of master's students at UNIGE to train key socio-emotional skills such as social orientation, emotion recognition, joint attention, and moral judgement. Finally, a game called Climb the hill, developed by an independent creator, was designed to train social and moral skills not addressed by the first two programmes.

Nine children, adolescents, and teenagers, aged between 7 and 18, were monitored over the course of one year, with 40 to 100 individual sessions. The results are promising: all participants showed improvement in their visual exploration by the end of the study. Furthermore, they made progress in at least one of the six socio-emotional skills tested: preferential attention to biological movement, social orientation, face exploration, emotional expression discrimination, joint attention, and socio-moral judgment.

New communication possibilities

“ *These results provide preliminary evidence that, with personalised training using eye-tracking tools, certain socio-emotional skills can be strengthened in these young people. They therefore possess previously unsuspected learning abilities.”*

Thalia Cavadini, doctoral research assistant, UNIGE Faculty of Psychology and Educational Sciences

This pioneering study opens up new avenues for the assessment and support of individuals with multiple disabilities, highlighting the critical role of assistive technologies in enhancing their communication and socialization.

Source:

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Cavadini, T., et al. (2025). Improving social-emotional abilities in children with profound intellectual and multiple disabilities through a person-centred eye-tracking-based training: A pilot study. *Acta Psychologica*. doi.org/10.1016/j.acpsy.2025.104928.