

Research Briefing N° 95

Navigation: How do people with learning difficulties find their way?

Project ELSTRAD uses virtual environments to investigate environmental learning (i.e. navigation) in typically developing children (children with no known learning difficulty), individuals with Down syndrome and individuals with Williams syndrome.

Key words: Down syndrome; Williams syndrome; navigation; route learning; virtual reality



Key findings

Findings are of interest to researchers, practitioners, carers and families of individuals with learning difficulties.

- Landmark knowledge: landmarks at junctions are more useful than landmarks that feature elsewhere along a route (path landmarks); typically developing (TD) children below 7 years and individuals with Down syndrome (DS) or Williams syndrome (WS) do not recognise this distinction.
- Route knowledge: all groups were able to learn a six turn route. The DS group made substantially more errors than the other groups when learning the route.
- Route knowledge: in the TD group, the ability to learn a route was driven by the ability to concentrate and attend to the correct information; in the DS group it was driven by the ability to move their attention from one location to another; and in the WS group by non-verbal ability. This suggests different strategies across groups.
- Cognitive map use: 59% of TD children aged 5 to 11 years, 35% of individuals with WS and 10% of individuals with DS could learn the spatial structure of an environment.

What we did

Project ELSTRAD (Environmental Learning Strategies and Development) (April 2010-June 2014) is funded by the Economic and Social Research Council (ESRC) Grant RES-062-33-0005 and Agence Nationale de la Recherche (ANR) Grant ANR-09-FRBR-035.

The ability to know where you are in an environment and the ability to find, learn, and retrace a route, are crucial aspects of human development. For people with learning difficulties, the ability to learn new environments has a significant impact on daily life and independence. Our past research has shown that both individuals with DS and individuals with WS find it difficult to learn a route. For example, the route to the local shop, or from their class room to the school hall. We aim to determine the nature of the difficulties experienced by these populations by investigating environmental learning in people with DS and WS and in TD children using virtual environments (i.e. participants view a virtual town

on a computer screen and navigate around the town using a mouse).

How we did it

In the typical population, the development of environmental learning begins with knowledge of landmarks (e.g. a park bench, or a church spire) along a route (landmark knowledge). This then develops to knowledge of the sequential order of the turns and landmarks along the route (route knowledge), and finally to what is known as a cognitive map by which the spatial structure of an environment is understood. Across a series of studies we investigated each of these three aspects of environmental learning: landmark knowledge; route knowledge; and cognitive map knowledge in up to 108 TD children, 50 individuals with DS and 19 individuals with WS. We are now developing studies designed to test methods of improving environmental learning in these groups.

Implications

With sufficient practice, individuals with DS and WS can learn a route. However, routes are inflexible to change; these groups are less able to find alternative routes/ shortcuts and find it difficult to orient when lost. This should be taken into account when encouraging these groups to develop their independence. For useful strategies to aid environmental learning see the tips section in our accessible space on: www.elstrad.eu

Further information

For the project website see: www.elstrad.eu

For more information on Emily Farran's research team and its aims see: <http://cogdevlab.weebly.com/>

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