

Study: Children's understanding of alternative courses of events

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"If-then" – Children only start joining the dots of cause and effect at the age of six

The capacity to think about how the present would be if an event in the past had taken a different course is referred to by experts as counterfactual reasoning. A research project funded by the FWF plans to examine how this kind of thinking develops, and identifies what distinguishes counterfactual reasoning from other types of conditional reasoning. Moreover, it will investigate developmental links between counterfactual reasoning and emotions like regret and remorse, and whether counterfactual reasoning plays a central role in the development of scientific reasoning.

Thinking about what could have happened under different circumstances is part of people's everyday lives. This does, however, not apply to children. They seem to acquire this skill later in their cognitive development. The main question of the research [project](#) – funded by the FWF – is what children actually need to understand in order to be able to think counterfactually.

Counterfactual Reasoning

In adults, the process of considering alternatives generally follows this pattern: "We take a real event, for example a car accident, and incorporate an assumption that does not correspond to the facts (hence the assumption is counter to facts). We might then imagine what would have happened had we, for example, not speeded. We then change all of the facts in the chain of events to stay logically and causally coherent with the counterfactual assumption; for example, we then would not have skidded", explains the project leader Dr. Eva Rafetseder from the Department of Cognition and Development at the University of Salzburg. The idea of such a minimally altered parallel world, in which a single aspect could have resulted in a different outcome to an actual event, is something that children only begin to understand from around 6 years on.

In the first part of the project, the scientists plan to carry out a series of studies involving a total of 280 children. The aim is to clarify how [young children](#) interpret and understand counterfactual questions, for example: "If Susie had taken off her shoes would the floor be dirty or clean?" Tests with reference groups of English-speaking children should enable the researchers to identify language-related and educational features of this reasoning.

Crying Over Spilt Milk

However, the project will extend far beyond merely clarifying the onset of this kind of reasoning. In a second phase, scientists intend to examine the emergence of emotions that accompany counterfactual reasoning. "It is generally assumed that counterfactual reasoning triggers emotions like regret and remorse. We can think about how much better our lives would be now if we had taken the right decision at a certain point in the past. And we can regret this decision. Previous studies indicate that regret and remorse develop at a very early age: before the capacity for counterfactual reasoning. We would like to examine this contradiction in more detail", says Dr. Rafetseder. Hence, the second part of the project, which will involve a total of 400 children, will examine the relationship between counterfactual reasoning and counterfactual emotions. It is believed that, from a very early age, children regret it if consequences are negative for them, for example, if they receive less than another child. Counterfactual reasoning, however, so the scientists, is not required for this. They suspect that the ability to regret one's own decisions ("if only I had done it differently") arises later, from around the age of 6 years, as counterfactual reasoning is assumed to provide the basis for this ability. Electrophysiological measurements will help the researchers to map the experience of counterfactual emotions, specifically in young [children](#), who are often vague when it comes to expressing such feelings verbally.

The third part of the project is devoted to examining the way in which counterfactual reasoning is linked with scientific reasoning abilities: "Scientific enquiry involves establishing links between causes and effects. As with the formation of the minimally altered world in counterfactual reasoning, it is also necessary to make an assumption here ('if x is the cause') and to draw logically and causally compatible conclusions ('then we would observe y')", explains Dr. Rafetseder.

Over a total of 260 hours of pure testing time, 780 test subjects will be examined for their capacities for counterfactual [reasoning](#) and counterfactual emotions. The proposed ten studies that make up this FWF project will thereby provide insights into the way in which this key human skill develops.

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