

# Paradigm shift

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**I**t was the philosopher of science Thomas Kuhn (1922-1996) who recognized that the development of knowledge is not continuous, but discontinuous, by leaps and bounds. Incidentally, Jean Piaget and Heinz Werner had previously written beautiful essays on the discontinuous development of scientific knowledge, but they have not summarized that in such a beautiful model - paradigm shift - and therefore they probably never really broke through in this area.

A paradigm shift occurs when scientists stick to their model of reality (theory), while evidence begins to pile up that doesn't fit in there. Often a group of relative outsiders is needed, for example a younger generation of scientists or scientists from a different discipline, who are first seen as a 'dissidents', who then come up with a theory or model that explains the old facts, but also the new evidence that was beyond the old paradigm. When the entire scientific movement finally must come about, a paradigm shift has occurred. Usually such discontinuous shifts take many years. But in the current Corona crisis, we see such a shift taking place within a few months. What's up with that?

After the first acquaintance with the Corona virus last January, the WHO (RIVM in the Netherlands) came at an admirable speed with a model with which the policy with regard to the virus could be determined in various segments - healthcare, public space, politics and policy. From this model it was stated that lockdown and social distancing would slow down the spread. Testing and tracing (by using an app) would lead to detecting the last people with the virus and eventually the virus would disappear completely. In addition, research has been conducted into the development of treatments and medicines (vaccination). The model stated that spread would occur through contact with a contaminated surface and through contact with cough and nasal mucus released during coughing, spitting, and sneezing.

In the Netherlands, at the end of March, social geographer/pollster Maurice de Hond proposed an alternative model based on literature research and data analysis, stating that contamination mainly takes place in dry air and poor ventilation, and especially in super-spread events, via very small droplets (aerosols) that linger in a vapor in the air and are inhaled directly into the lungs. He argues that infection therefore does not primarily occur through contaminated surfaces or sputum or nasal fluid, but directly into the lungs. Social distance is therefore not a suitable answer, but the prevention of large indoor meetings is, as is the correct adjustment of HVAC (heat ventilation air conditioning) installations. This alternative "Maurice" model was, in my opinion, hardly understood by the "official" scientists, but the evidence supporting this model is still growing: slaughterhouses with cooled dry air are now identified worldwide as new sources of Corona infections (transfer takes place mainly indoors with cooler dry air and little ventilation); the absence of super-spreading in George Floyd protests worldwide (outside no or much less danger), etc. Nevertheless, the press and science in the Netherlands have put a lot of effort into retaining the measures that fit the first model: social distancing (called the "1,5 meter society"), washing hands repeatedly, and if necessary, an intelligent lockdown. In short, Maurice de Hond is still ignored.

I am convinced that everyone is of good will. Both scientists sticking to the old model, and scientists embracing the new model. However, if measures that have proved unnecessary are taken from a less well-fitting model and if more suitable measures remain outside the scope, we may be at risk. If, as I read in the *Wired* magazine this week, dry-cooled and not-optimally filtered air does indeed provide optimal soil for corona dispersion in aerosols, then we need to both hurry to optimize HVAC installations everywhere, and invest in indoor masks instead of sticking to social distance.

Most interestingly, however, even now whole disciplines seem to be stuck in a paradigm quickly, and because of the massive scale, a shift does not take many years, but only a few months. It is also interesting that the dissidents here do not come from the established and most appropriate scientific disciplines themselves.