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The Limits of Intuition

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Abstract

Intuition is often considered a powerful complement for rational thinking in decision-making. But it has its limits, as every other tool has. When is it advisable to rely on intuition, and when should we be careful when we are following it? Where are the limits of intuition to guide our decisions?

As behavioural sciences have decoded fundamental mechanisms of intuition, these questions can be properly addressed on a scientific basis. Intuition may be a good guide on short-term decisions in social environments. Whenever there is a long-term aspect in our decisions, we should cross-check our intuition with rational thinking.

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The Limits of Intuition

Intuition is often praised as an alternative to rational thinking, as the natural way for decision-making, guiding us effortlessly and infallibly to the right decision, even when we have little information to work with. In fact, there are situations where intuition leads us to amazing insights, in particular when we are dealing with other persons, although we cannot rationalize how we got the insight. In other situations, however, our intuition is hopelessly lost, for example in technical issues, and our technological development is completely based on rational thinking. Thus, it is important to know: How powerful is our intuition, and where are its limits? When can we rely on it, and when should we be careful and counter-check its signals with rational thought?

Intuition

Intuition is an activity of our brain, as well as rational thinking is. It is quite effortless, unintentional, and it materializes as emotions or feelings, almost immediately after a triggering event. But unlike with rational thought, we have no access to the machinery, we cannot identify the reasoning behind the result; the feelings reach us holistic and unexplained. Nonetheless, behavioural scientists have been successful in decoding at least part of the mechanics of our intuition by methods of backtracking. Intuition works as a set of heuristics, applying built-in rules on our experiences and perceptions. An excellent overview on these heuristics is given by Kahnemann (1), who calls it “fast thinking”.

While the experience and perceptions intuition draws upon are necessarily our own, the built-in rules seem to have developed evolutionary, drawing on some 100,000 years of trial and error. The processing rules are proxies that deliver imperfect but fast and in most cases reliable results, even on very scarce input: fastness and stability were more important for survival than precision. An example is the anchoring heuristics: In lack of a reference value, intuition takes the first value at hand as a starter, no matter whether it is linked to the problem that we have to solve or not. The result of our intuition is presented to us as emotions, directly urging us to act without the byway of insight.

On the other hand, rational thinking (slow thinking, by Kahnemann) focuses on the principle of causality. We either elicit the rules of causality from own observations, or we learn them from others. Unlike intuition, rational thinking thus enables us to accumulate and transfer knowledge. Rational thinking is the particular activity that distinguishes us humans from other animals. But rational thinking is slow and arduous, and it is difficult to apply under uncertainty.

Induction

Fundamentally, when making predictions about what will happen in the future, intuition uses the same process as rational thinking, the process of induction. In fact, induction is the only way of predicting that we have: From observations from the past, we detect regularities that can be formulated as rules, and then we apply these rules on our present perceptions to predict their future development (2). Just the rules that are applied, and the process of their application are different between intuition and rational thinking: Intuition uses – at least in part – rules that have been developed

during evolution, not being restricted to causality. As a consequence, it has no access to intellectual learning.

Induction is based on the principle of uniformity: the future will be like the past – at least in certain fundamental aspects. As we know from experience, this works quite well, but it also has its limits. Unfortunately, we are still very weak at pinpointing these limits. Some 150 years ago, at the climax of the age of enlightenment, scientists were convinced that we could completely determine the future, just given enough data. This idea of complete determinability, called Laplace's demon, fell to pieces with further insights like the quantum theory, or Gödel's incompleteness theorem.

Limits of Induction

There seem to be some fundamental mechanisms in nature that – as far as we know by today – limit the predictability of the future. One of them is chance, which seems to be built into quantum mechanics, leaving us no way to escape from it. Amazingly, chance itself does not prevent predictability, but makes it a statistical enterprise: every prediction is a matter of probability. As long as we have an ensemble with a big number of identical objects, like gas molecules, we can still make highly precise predictions *on the ensemble*, while not on the individual elements. However, when the ensemble consists of highly individual elements, like people or enterprises, predictions get very difficult. Chance limits every prediction, whether by intuition or by rational thinking. Unfortunately, in most cases except some very simple ones, we don't even know how insecure our predictions are. In everyday life, we tend to grossly overestimate our capabilities of prediction, and grossly underestimate the role of chance (3).

Another mechanism that limits predictability is complexity. A complex system consists of various elements or subsystems that are linked to each other by various feedback mechanisms (4). Given the abundance of complex systems around us, it is amazing how little we know about complexity. Complex systems behave in unexpected ways, even if the feedback rules are simple: They show properties called emergent that cannot be explained by the behaviour of its elements alone. An example are thoughts of the brain that cannot be derived from the knowledge of nerve impulses. We still know very little about complex systems in general, and can predict them only within a very limited scope, like a weather forecast: Their short-term development is quite predictable, while their long-term tendencies disappear in the fog. Maybe our intuition has rules about complex systems that we still cannot rationalize, and help us in dealing with them in social settings.

Strength and Limits of Intuition

So both intuition and rational thinking have their strengths, while none of both is perfect. When should we prefer intuition, and when should we rely on rational thought? When a decision has to be taken instantaneously, we have no choice. Intuition is immediate, while rational thinking is slow. In addition, we cannot switch off intuition. Emotions come up, if we want them or not. When you bounce your head at a cupboard door that you left open, the immediate reaction is anger, together with the thought: "which idiot left the door open?" The only thing we can do is to catch the emotion and subject it to rational scrutiny. But we cannot make intuition undone: it will always have influence on our decisions, if we like it or not.

The strength of intuition certainly lies in social interactions. Despite all psychology and social sciences, our rational knowledge on how humans feel and act is still fragmentary. Rational simplifications, like the *homo oeconomicus*, are so misleading that they are rarely useful. Our intuition is excellent in recognising and interpreting even tiny signals sent by others, and getting us to act accordingly. It is also good at estimating the behaviour of groups. On the other hand, when dealing with technical equipment, which in general is not complex but just complicated, our intuition is of no help, and we have to rely on rational thinking.

As intuition is working with proxies rather than exact rules, its results are somewhat displaced and, worse, systematically so. As a consequence, our intuition consistently makes the same errors, or biases (5) in certain situations. Others may exploit these errors to get us into a behaviour that is in their interest rather than ours, as you can easily explore when you are dealing in an oriental bazaar. On the other hand, these biases may be used to nudge us into decisions that are favourable for us, but we otherwise hesitate to make (6). Knowing these errors is crucial to happily use one's own intuition without getting fooled by it. Two of them shall be mentioned here.

Probably the most important shortcoming of intuition is its focus on short-term consequences. In survival mode, you discount any long-term consequences in favour of short-term achievements, and this is exactly what our intuition does. This is the reason why people smoke, eat unhealthy food, buy on credit, and engage in other risky ventures, well-knowing but ignoring the consequences. Most certainly this is also the reason why sustainability is so hard to accomplish: There are no emotions for long-term benefits. Whenever you are contemplating a decision with long-term consequences, you should therefore make sure that your intuition is cross-checked with rationality.

Another problem with intuition is that it conveys assertiveness, whether it is justified or not: Intuition is not self-critical. Intuition has a self-reinforcing mechanism that leads to a stable result no matter how weak the initial tendency is, leaving us no indication about its reliability. That is helpful in situations where any decision is better than no decision, but it lures us into trusting on our intuition even when it is not reliable. Many investors, for example, are fond of their intuition within the stock market. That sounds sensible on first sight, because stock markets are interactions among humans, but studies have proven unanimously that intuition (as well as rational thinking) is not capable to outperform the markets. Stock markets are well randomized, although this may be less obvious as with roulette.

Conclusion

Our intuition is a powerful tool, but it has its limits as every other tool. Provided that we are aware of these limits and do not blindly rely on our intuition, it will serve us well in everyday life. In most cases, intuition combined with some rational thought is the best way to solve a problem. Concerning the long-term issues of our society, however, intuition is rather part of the problem than part of the solution, and we should better apply rational thought.

Literature

1. **Kahnemann, Daniel.** *Thinking - Fast and Slow.* New York, NY : Penguin Random House, 2011. ISBN 978-0-141-03357-0.
2. **Mill, John Stuart.** *On Induction. A System of Logic.* New York : Harper and Brothers, 1882.
3. **Taleb, Nassim Nicholas.** *Foiled by Randomness.* London : Penguin Books, 2004. ISBN 978-0-141-03148-4.
4. **Mitchell, Melanie.** *Complexity: A Guided Tour.* Oxford : Oxford University Press, 2009. ISBN 978-0-19-979810-0.
5. **Ariely, Dan.** *Predictably Irrational.* New York, NY : Harper, 2009. ISBN 978-0-06-201820-5.
6. **Thaler, Richard H., and Sunstein, Cass.** *Nudge - Improving Decisions in Health, Wealth, and Happiness.* London : Penguin Books, 2008. ISBN 978-0-14-311526-7.