The role of tacit knowledge in expertise

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Daniel Kahneman, in his book 'Thinking - Fast and Slow' talks about how the humans employ two different types of processes to process information [Kah12]:

- Automatic and quick uncontrollable processes, collectively called the 'unconscious mind'
- Effortful and slow processes which require attention and complex computations, collectively called the 'conscious mind'

From an evolutionary viewpoint, most tasks that our ancestors had to do required just the first kind of information processing. It is only a very tiny number of tasks that actually require the second kind of processing. A very strong evidence of this hypothesis is the fact that 'consciousness' can process between 10 and 60 bits per second, whereas the entire human system can process around 11 million bits per second. [DN06]

Since conscious thought is so slow, a task which can be performed both consciously and unconsciously can be performed much faster when done unconsciously. What, then, is it that enables one to do certain tasks unconsciously? There is very little known about the brain to answer that question. But it is definitely some sort of neural networks which encode the rules of performing the particular task. The said encoding is the same as tacit knowledge, because the encoded knowledge is not accessible.

Analogies can be drawn between the nature of this knowledge and a computer program. A computer program in a high level language is a list of explicit commands. However, compiling into machine code causes the implicitization of this program. The machine code is much longer but at the same time much more efficient. The high level and machine codes correspond to conscious processing and unconscious processing respectively.

The network of neurons would be extremely efficient at performing the said task, but would be resource consuming, i.e. would require dedicated brain cells. Arguing from a purely evolutionary perspective, it would be greatly advantageous to have brains that could build and improve such networks for processing tasks we frequently do, and erase those which we don't require anymore. By personal experience, we know that this indeed is the case.

Consider any task, say playing a piano. An absolute beginner would have to think very hard about moving their fingers to the right key when they look at the next note on the sheet. As they practice more, they will concentrate less on the hand movement, thus eliminating the rapid oscillation of attention. Eventually, they will not have to think about hand movement at all, only focusing on the sheet in front, thus making them much more efficient at playing the piano.

We can say that this transformation from a

beginner to an expert pianist transferred the burden of hand movement from the conscious to the unconscious mind, thereby freeing the conscious mind to concentrate on the novel information, i.e. the notes. This applies to all tasks which can be learned. Thus, the process of learning includes consciously performing a certain task several times, which results in the development of unconscious 'expert networks' which can perform the said task automatically and quickly. Therefore, it would be appropriate to say that expertise in a task is simply the conversion of explicit knowledge into tacit knowledge by means of learning.

References

[DN06] A. Dijksterhuis and L.F. Nordgren. A theory of unconscious thought. *Perspectives on Psychological science*, 1(2):95–109, 2006.

[Kah12] D. Kahneman. *Thinking, Fast and Slow.* Penguin Books, 2012.