

[Entry – Taking up the call]

Remember that part of what we're trying to do is become aware of what is sometimes an intuitive and informal process so that we can improve.

So we break it down into phases, entry, attack and review. Within each of these phases, there's certain thinking that is helpful to engage in, and more formally we can think of the processes that are surrounding this thinking and some of the states we find ourselves in. So let's look in detail at the entry stage.

In this stage, we usually try to identify the important features of the problem, the information we require, how we are actually going to interpret the problem, whether the problem is similar to something we have seen before. We might ask ourselves questions like: What exactly is the problem about?
What do I know that is relevant to the problem?
How can I organise the information I have?
Could the problem be interpreted in multiple ways?
Do some parts of the problem need to be solved before others?

Let's think back to our handshake problem. It's good to take a step back and read the question carefully so that we can clarify the information we have and where we want to get to. In reading this problem, we take note that include you, there are 20 people in the room, everyone shakes hands, and we want to know how many handshakes. Are there other facts that seem relevant? In this case it's probably pretty straightforward as long as we know how a handshake works. And then even in this entry stage, we might have a bit of a play around to work out the mechanics of the problem. This is called specialising – whether it's looking at a simpler case or

just how a potential solution might look. With two people we'd get one handshake, with three we'd get three and with four we get six, so we see that it's not just a simple relationship of one person equals one handshake – but we also see one strategy that could be used to determine the solution (although it might take a long time). We might ask about whether there are similar problems – and our knowledge of these will depend on our background and experience with problem solving. In drawing the diagram, we might recognise that this looks similar to a network, we might recognise that it's the same problem as asking how many games we need in order for a set of sports teams to play against each other, since a game and a handshake both require a pair of participants. Or we might already recognise the pattern that's going on here, and that this is similar mathematically to a staircase kind of problem. If you've studied sequences, then you might even know that there's a formula for calculating this – but it will depend, and having no knowledge of these things doesn't mean we can't solve it.

We can then look at what we **want**, here we're interested in the number of handshakes for 20 people – but maybe we're also interested in the solution to the general problem? If there's n people then how many handshakes would there be? If I know this, then I can always work out the answer. In playing around with the scenario I might have recognised that when we add a person, they shake everyone's hands, but that only adds as many shakes as the number there – two people shaking doesn't count as two shakes, and we generally don't shake hands with ourselves. It's straightforward in this case but such ambiguities might be present and will change the way we solve a problem. For example, suppose instead of handshakes, we were considering a random prize draw of two prizes and wondering how many combinations of first prize and second prize there could be – in this case, maybe it is possible for someone to win both prizes, and Boris and Doris winning first and second prize is different to Doris winning first and Boris winning the second.

We're free to set the parameters of the problem and decide whether someone is "allowed" to shake hands with themselves, but false assumptions can obviously create problems too. With some problems there might not be someone to clarify and at other times (e.g. if you're solving a problem for a company) there will be.

In determining what we want we can be organised about the information we have and as we specialise we might see where the real 'problem' is – especially when we do problem solving as a subject, it's these interesting patterns that are important to us – it's a valid point that no-one actually cares about the number of handshakes that might have taken place but the more general problem of finding pairs and the pattern that leads to there is definitely useful.

Another key type of question we might ask here is what can be introduced. We already introduced these diagrams, the question didn't ask specifically for those – we might also introduce illustrative diagrams to help get our head around the problem, we might introduce tables, we might introduce symbols and algebra.

And it's when we're intrigued about a problem and we're organised in starting that we can be considered to have taken up the call (to adventure). We need to not only understand the problem but also what is "difficult" or "interesting" about the problem, and perhaps even the ramifications of being able to solve this problem. A well executed entry can avoid an unproductive attack phase!