Abstraction

It is customary to divide the subject-matter of our thinking into 'concrete' and 'abstract'. This distinction has metaphysical and logical aspects, but there are also psychological questions about how we generate abstract concepts. In modern times the psychological approach has been criticised, and has been replaced by a more rigorous formal approach, but this conflict between two attitudes to abstract objects ('abstracta') is also illuminating.

The older and newer approaches also arrive at different concepts of an 'abstract' object. The older view says it is what is generated by an act of abstraction, where the newer view just cites its presumed characteristics. In the **modern view**, abstract objects are characterised negatively, as entities which are presumed to count as 'objects', but which do not seem to exist at any particular place or time, and are not 'concrete' (in the sense of being made of anything, such as physical particles), and hence they also lack causal powers. In the **older view**, an abstract concept is one formed by focusing on aspects of objects, rather than on their entirety, and attaching labels to properties, shared characteristics, patterns of relationships, and so on. There is thus a hierarchy of abstractions, as when we move from the level of particular dogs, to 'dog', to 'animal', to 'living thing', to 'object', to 'existence'. In each case we are said to 'abstract' some shared feature (and abstract further features from the abstractions), labelling them as we progress. There are even levels of abstraction within mathematics. Many thinkers saw all ideas beyond particular physical things as generated in this way, so that psychological **abstractionism** was the explanation of mathematics, logic and all general theorising. Rivals to this naturalistic view of abstracta said that they were eternal, and existed before human thought, and were perhaps even concepts in the mind of God.

The modern view arose because some strong **objections** to traditional abstractionism were developed. The whole process of selecting some features and ignoring others, to produce a new concept, seemed rather obscure. If you are looking for features shared in common, how do you distinguish the significant ones from the trivial? If you actually 'abstract' features, you are left with less than the complete object, and if you abstract all of the features (as seemed needed to get objects down to 'units', for counting) you were left with no features at all, and all objects are thus identical. Abstraction also failed to explain how you get two concepts from one object, or two ways of expressing the same concept (such as active and passive versions of a verb). Very pure abstract ideas, such as the connectives of logic ('or', 'and', 'not') don't seem attainable by the method of abstraction. The whole theory implausibly suggested that abstract ideas were hidden in objects, waiting to be picked out by us.

The alternative modern account was developed using the example of a 'direction'. We have an idea of going in a direction, or some place being in a direction, but it is a very vague notion. However, we have a much clearer notion of a 'straight line', and also the concept of 'parallel'. If we consider the entire infinite set of lines which are parallel to a given line, this new set embodies the 'direction' of the lines. Any line in the set goes in the same direction as itself (so 'parallel' is a *reflexive* relation), if line x has the same direction as line y then that is reciprocated (it is *symmetric*), and if x is parallel to y, and y to z, then x is parallel to z (it is *transitive*). When set members have a relationship as close as this, it is called an 'equivalence' class, and the new method is called abstraction **by equivalence**. This set of parallel lines is complete, and admits no other members, and so a collection of particular lines has been 'carved' out of the totality of straight lines. Thus new abstract ideas can be carved out of our existing concepts, by identifying equivalence classes, and the obscure abstractions can be explained in terms of what is better understood. Thus we might carve out the concept of 'suicide' from all the instances of 'person A kills person A'.

This modern account of abstraction seems much clearer and more precise. Not everyone, however, is happy. Abstraction by equivalence shows a relationship between current concepts and new ones, but no one thinks this is how people actually produce concepts like 'direction' and 'suicide'. It also fails to capture the entirety of a concept, missing out the fact that London-to-Paris and Paris-to-London are opposite directions, or that we recognise 'assisted suicide'. Since the carriages of a train can be sufficiently identical to produce an equivalence class, that seems to make 'train' an abstract concept, which is doubtful. You may even need an implicit grasp of 'direction' to understand the meaning of 'parallel'. In the philosophy of mathematics abstraction by equivalence is a powerful idea, but in the messier real world, where a fuller account is needed, the original idea of psychological abstractionism won't go away.

There are possible **replies** in defence of abstractionism. There is evidence that small children distinguish the essential features of a dog from those which are trivial or accidental, and so one would expect a consensus on which features are important for 'dog'.. If we already possess concepts like 'animal' and 'mammal', that too will focus what is selected. Perhaps the most important role for the resulting abstract concepts is in induction (learning from experience), and so feedback from successes and failures in such reasoning will gradually refine our concepts. Dolphins are excluded from the general class of 'fish', once we learn more about them.

We think of daily experience as concrete, and intellectual activities as abstract, but this is misleading. A proper name like 'Fido' may pick out a concrete instance of a dog, but 'that dog', which seems just as concrete, uses the highly general word 'dog', covering all possible dogs, so it has implications beyond what is concrete. As soon as I talk of a 'pack' of dogs, even if they are standing in front of me, I accept a non-physical aspect to the idea, because dogs can leave or join a pack, so 'pack' is more of an idea than a group of actual animals. Similarly, very abstract entities such as 'centre of gravity' or 'equator' don't fit the modern idea of abstracta very well, because they can have a physical location. Disentangling the concrete and abstract aspects of a concept is more challenging than it seems.

Our knowledge of mathematics and the laws of physics depends on the perception of patterns, which is a clear case of perceiving something abstract within the physical world. The puzzle is to tell what is contributed by the world, and what by us. We have an account of how our psychology might work here, and we have a rigorous formal account of how abstracta relate to other concepts. But what an abstract object or concept actually *is*, once you have given its origin and pinned it down, remains frustratingly obscure.