## Decision table exercise

The fare types mentioned include an 'over 60s' rail card, a family rail card, and whether you are traveling with a child or not. With three conditions or causes, we have eight columns in our decision table below.

| **Causes (inputs)** | **R1** | **R2** | **R3** | **R4** | **R5** | **R6** | **R7** | **R8** |
|---|---|---|---|---|---|---|---|---|
| over 60s rail card? | Y | Y | Y | Y | N | N | N | N |
| family rail card? | Y | Y | N | N | Y | Y | N | N |
| child also traveling? | Y | N | Y | N | Y | N | Y | N |
| **Effects (outputs)** | | | | | | | | |
| Discount (%) | X/?/50% | X/?/34% | 34% | 34% | 50% | 0% | 10% | 0% |

When we come to fill in the effects, we may find this a bit more difficult. For the first two rules, for example, what should the output be? Is it an X because holding more than one rail card should not be possible? The specification doesn't actually say what happens if someone does hold more than one card, i.e. it has not specified the output, so perhaps we should put a question mark in this column. Of course, if someone does hold two rail cards, they probably wouldn't admit this, and perhaps they would claim the 50% discount with their family rail card if they are traveling with a child, so perhaps we should put 50% for Rule 1 and 34% for Rule 2 in this column. Our notation shows that we don't know what the expected outcome should be for these rules!

This highlights the fact that our natural language (English) specification is not very clear as to what the effects should actually be. A strength of this technique is that it forces greater clarity. If the answers are spelled out in a decision table, then it is clear what the effect should be. When different people come up with different answers for the outputs, then you have an unclear specification!

The word 'otherwise' in the specification is ambiguous. Does 'otherwise' mean that you always get at least a 10% discount or does it mean that if you travel with a child and an over 60s card but not a family card you get 10% and 34%? Depending on what assumption you make for the meaning of 'otherwise', you will get a different last row in your decision table.

Note that the effect or output is the same (34%) for both Rules 3 and 4. This means that our third cause (whether or not a child is also traveling) actually has no influence on the output. These columns could therefore be combined with 'don't care' as the entry for the third cause. This 'rationalizing' of the table means we will have fewer columns and therefore fewer test cases. The reduction in test cases is based on the assumption we are making about the factor having no effect on the outcome, so a more thorough approach would be to include each column in the table.

Here is a rationalized table, where we have shown our assumptions about the first two outcomes and we have also combined Rules 6 and 8 above, since having a family rail card has no effect if you are not traveling with a child.

| **Causes (inputs)** | **R1** | **R2** | **R3** | **R5** | **R6** | **R7** |
|---|---|---|---|---|---|---|
| over 60s rail card? | Y | Y | Y | N | N | N |
| family rail card? | Y | Y | N | Y | – | N |
| child also traveling? | Y | N | – | Y | N | Y |
| **Effects (outputs)** | | | | | | |
| Discount (%) | 50% | 34% | 34% | 50% | 0% | 10% |