

# Mhairi's Dilemma: A study of decision analysis at work

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with comments by Jack Dowie and Rex V. Brown

## Abstract

A case study review of a formal decision analysis involving a 10 year old girl. She had just faced the death of a close adult friend, and had become filled with uncertainty and emotion while facing the decision as to whether or not to attend his funeral. The study demonstrates that formal analysis can provide the sensitivity and caring basis for such decision making, thus counteracting some of the criticisms of decision analysis.

Keywords: decision analysis, children, emotion.

## 1 Introduction — Roger Mullin

For over 20 years of teaching decision making, I have been struck by how resistant many professionals are to analytical approaches. A common complaint, whether from medical practitioners, social workers, police officers, business executives or other well educated groups, is that it is too difficult for their clients or even colleagues to understand and far too difficult to involve them in the process.

Such professionals have regularly claimed that the most important thing is to have a comfortable, sensitive process, without any formal, structured analysis. How that can lead to effective decision making, I have never understood, but I did recognise a legitimate challenge to convince them that a formal analysis was not incompatible with being sensitive, caring and effective. It took a ten year old daughter and a tragic death, to give me the means to address the challenge.

What follows happened 15 years ago. The story involves my youngest daughter, Mhairi, my wife Barbara and myself. Although in many respects the analysis within this story is simple, it nonetheless has helped me demonstrate the value of decision analysis to sceptical professionals. I have been encouraged most recently by a group of social workers in Scotland to record this tale.

The following has been written by Mhairi, Barbara and myself, looking back on the event and doing our best to faithfully record what transpired. The story begins with

Mhairi . . .

## 2 Mhairi's tale

From as early as I can remember, Father Pat was my local parish priest. He was a wonderful man; he was gentle, caring, and approachable. Over many years he had created a warm and lively parish. He involved us in the daily running of the parish as much as he could, and was keen for us to participate fully during Mass. One of my most poignant memories was when he invited children up onto the altar during Communion. Whoever got there first held his hand and helped form a circle in preparation for singing the Our Father. I made it my goal every week to get there first. Most of the time I was successful!

Up until I was 10, Father Pat had watched me mature as a person and develop my faith. I remember so clearly the conversation we had during my first Confession, and the Mass he held for my first Holy Communion. Before both I was nervous, but somehow Father Pat's presence calmed me down, and his jokes made me giggle. I also remember the time he asked me to announce to the congregation that he was hosting a "sausage sizzle" in the parish house garden, and my embarrassment when I got tongue-tied!

Father Pat was so special to me.

When the news came of his sudden death, I was swamped with so many emotions. I was completing a homework task when my dad broke the news. I threw my pencil and rubber away as I collapsed on the floor in floods of tears, inconsolable. I had never experienced a death before; I was confused as to why he had been taken away from us, scared of what it meant both for him and for me, upset at the prospect of never seeing him again.

The days following his death were just as hard. I attended the Mass held shortly after his death along with my mum and sisters. I sobbed as I looked at the altar; Fa-

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ther Pat was nowhere to be seen. It was during this Mass that details regarding his funeral were given; I knew I had a big decision to make.

Never having attended a funeral before, the thought of doing so absolutely petrified me. I was incredibly worried about what it would entail. But I wanted to say goodbye and I wanted him to know I had been there for him.

My mum sat me down after Mass and explained sensitively the proceedings of a funeral. I asked question after question: What will happen? Who will be there? Where will Father Pat be? Will I see him? What will happen to him? The answers to which, unfortunately, sparked even more worry and anxiety. How would I cope seeing his coffin knowing he was inside? How would I cope through a Mass dedicated to his memory *and* during his burial? What if I had to escape? My mother held me as we tried to work through this dilemma. She was sensitive, empathetic, and able to get me thinking and talking, but it didn't help. My head was full of thoughts, images and feelings that I was unable to make sense of or organise properly. Every option we considered brought with it some degree of anxiety. I was grieving, anxious and terribly confused; nothing seemed to be helping.

Dad returned home that night to find both my mum and I in tears. Mum explained the turmoil I was in and that we couldn't work out what to do as I sat getting more and more upset.

It was then that Dad asked Mum to get him some paper and a pencil, as he sat me on his knee. Mum can take over the tale now. . . .

### 3 Barbara's reflections

I was incredulous at this point because I knew exactly what was coming. My husband seriously believed a decision tree based analysis would solve Mhairi's dilemma! Decision Analysis was something I was struggling to understand as part of my Open University studies and here he was, suggesting that a ten-year-old child, in a highly emotional condition, could cope with it.

I was also grieving for Father Pat, and had to admit my attempt to counsel Mhairi in more conventional ways was patently leading nowhere. We were going round in circles, both of us becoming more and more distressed at the impasse. Therefore, despite my incredulity, and feeling that Roger was a touch mad to try this, I sat down and listened to his attempt to help the situation. At this stage I would have settled for being able to help calm Mhairi's emotions. Roger can now lead us through what transpired.

### 4 Roger's review

Having reflected on my experience, I realise how vital it was to have Mhairi involved throughout, discussing matters and guiding me in the light of her feelings. I therefore think it best to capture the spirit of our discussion in the form of a dialogue between myself, and 10 year old Mhairi. This is not a transcript of what happened, but a recreation, as best both myself and Mhairi can recall, of the type of discussion we had. I can say however, that the final analysis is exactly what resulted.

**Dad (Roger).** This is very difficult Mhairi isn't it? (She nods, still weeping). You are all mixed up inside and don't know what is the best thing to do? (She nods and hugs me) Dad has an idea that might help, would you like to hear it?

**Mhairi** (still weeping).

Yes, I don't know what to do, I want to go, but I'm afraid, maybe I shouldn't go, but wouldn't that be bad? What should I do Daddy?

**Dad.** Well, since everything is all mixed up inside, would you like me to draw a picture of the decision, so that we can see where everything is?

**Mhairi** (still sobbing).

OK, but I don't think its going to help me.

**Dad.** Let me try. Have a look at this box I am drawing. Inside it I am going to write "Mhairi's difficult decision". See? (Mhairi nods) Now, growing out of the box I am going to draw a line for each choice you have.

**Mhairi.** What do you mean Daddy? (Mhairi stops sobbing about now)

**Dad.** Well, do you agree that one thing you might do is go to Father Pat's funeral?

**Mhairi.** Yes, but I don't know if I should go, that's what the problem is, and. . .

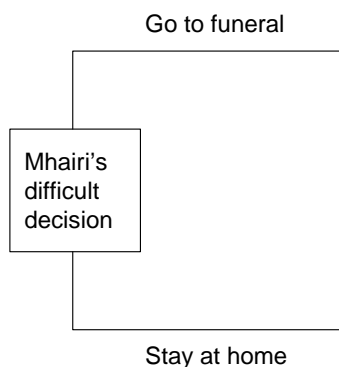
**Dad.** Wait just a moment. You have just said something very important. You don't know if you should go. So if you don't go, what would you be doing instead?

**Mhairi.** Staying at home, but that would mean not getting to say goodbye (signs of beginning to weep again) and I'd get upset again. . .

**Dad.** OK let's take it one step at a time. I think I need two lines coming out of your box. One saying "Go to funeral", the other saying "Stay at home". The problem is, I think, it's very difficult for you to know which you should choose. Is that right?

**Mhairi.** Yes, I just don't know Daddy, what do you think I should do?

**Dad.** I think you should choose what is best, and that's what we are going to try and work out. So do you understand my drawing so far? (Mhairi looks at the drawing below.)



**Mhairi.** Yes, but which one do I choose?

**Dad.** Well, I don't know yet, but we soon will if you help me. Ok? This is called a decision tree, although it's a pretty funny looking tree! Will you help work out what is best for you to choose to do?

**Mhairi.** If I can, but what do I do now?

**[Mum (Barbara) comments:** By about this stage, Mhairi had completely stopped crying, and seemed more and more involved with her Dad. It seemed to me that drawing out the decision and being able to picture it was having a calming effect... perhaps because Mhairi was beginning to understand the decision better?]

**Dad.** Well let me suggest something and you can tell me if you agree or not. If you were to go to the funeral, and if everything went really well, what would happen do you think? What would be good about that for you?

**Mhairi.** Do you mean if I get to say goodbye and I'm not too upset and frightened?

**Dad.** Exactly. You are good at this. So if you go and if everything went well, you would get to say goodbye and wouldn't get too upset or frightened?

**Mhairi.** Yes, but it might not, that's what worries me. What if I get upset too much and make a fool of myself in front of everyone, and have to leave, and don't say goodbye, and...

**Dad.** Wait a wee minute. I think I understand. Let me draw more of the tree, and you tell me if I am getting this right.

If you go to the funeral the problem is two things might happen. If all goes well, you will get to say goodbye and not be too upset. A wee cry is OK, but it would be good not to be too upset. I've put that in the box at the end of this line, see? [See tree below.]

However, things might not go well, and you could be very upset and you think you might make a fool of yourself and not get to say goodbye properly, is that right?

So I am going to draw that in, and then we can look at it. How does this seem? I know it's not finished because we'll have to work out what to put on your stay at home branch, but what do you think so far?

**Mhairi.** That's right Daddy but how do I get the good one? And what's the big circle for?

**Dad.** The big circle is to put some numbers in later.

I can already see from the tree part of your problem and why it's so difficult. You can choose to go to the funeral, but all you know at the moment is that there is a chance it will end up pretty good, but there is also a chance it will end up bad. That's why this is difficult for you.

**Mhairi.** Yes, so what if I stay at home?

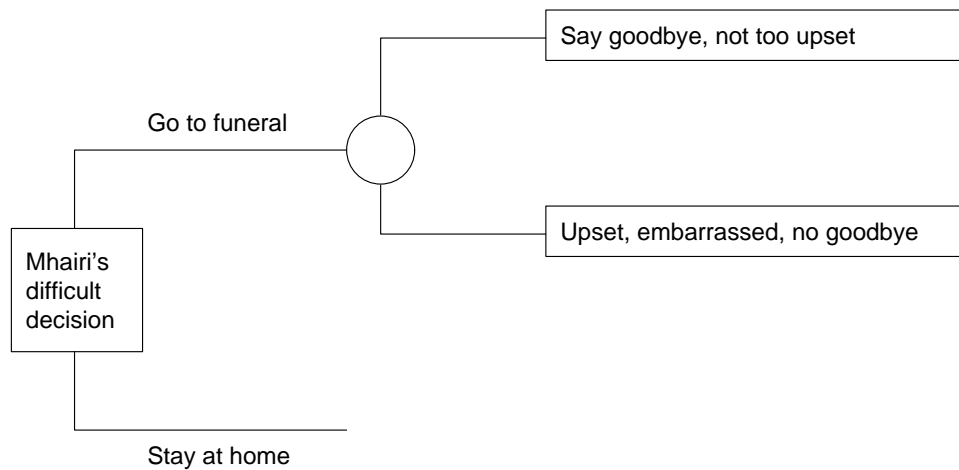
**Dad.** Well, what if you stay at home?

**Mhairi.** I'd hate it not getting to say goodbye to Father Pat, and I might be even more upset, but what if I didn't go Daddy?

**Dad.** Well, I think you have just told me what might be bad if you stayed at home. You might be very upset because you didn't get to say goodbye.

**Mhairi.** Yes.

**Dad.** So why might it be the right thing to do? You must think there is a chance of something better?



**Mhairi.** Like what? I don't know.

**Dad.** Well, although you might regret not saying goodbye, there might be a lot of relief that you didn't have to go through the funeral: That you remember Father Pat in the good times when he was with you, more than regretting missing the funeral.

**Mhairi.** Well, yes, I suppose so, but I don't think that's going to happen. I think I'll just be upset.

**Dad.** But you can't be certain can you? (Mhairi looking a little confused). Why do you think it might be better than going to the funeral?

**Mhairi.** I suppose because I might not feel as bad as being at the funeral. I suppose I might feel better.

**Dad.** OK. I see you think it is unlikely, but there is perhaps a small chance that you won't be hugely upset and are relieved at not having to go to the funeral. Is that fair to say?

**Mhairi.** OK...and does that go on my tree there? (Mhairi has cottoned on to the design of the tree which in its completed form thus far can be seen on the next page).

**Dad.** Can you see why I now understand why your decision is difficult? If you go to the funeral, you might be OK, but on the other hand there is a chance you won't be. If you stay at home, there is a chance you will be very upset, but just a chance you won't be too bad. So the difficulty is, whatever you choose, there is a chance that it won't work out very well. Can you see that?

**Mhairi.** Yes, but what do I do?

**Dad.** Well you started doing what is needed a little earlier. We need to think about the chances of these things happening. I think it's fair to say from what you have told me, that if you choose to stay at home, the most likely thing to happen is that you'll become very upset at not saying goodbye, and only a small chance that you won't feel too bad. Is that right?

**Mhairi.** Yes Daddy. I just think there's not much chance I'll feel OK.

**Dad.** Well, I am going to put some numbers on the tree now. These numbers are ways of telling us how likely you think it is that each of the possibilities, like getting to say goodbye and not being too upset, are.

[Mum's thought at the time: He's got to be kidding! Mhairi hasn't done percentages yet at school. He seriously thinks she's going to be able to give him probabilities. This will be good!]

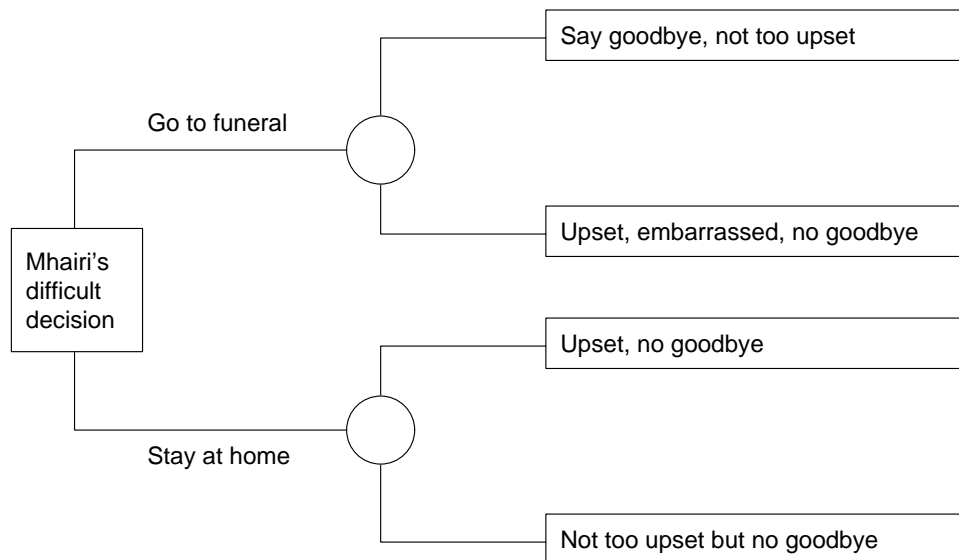
**Dad.** Now, the bigger the number, the more likely you think something is likely to happen. Take the possible decision to stay at home.

If you stay at home, you will feel something, do you agree?

**Mhairi.** Of course, that's my worry, I..

**Dad.** Hold on. I can only do this a bit at a time. We have already agreed there are two main things that could happen. Show me again what they are.

**Mhairi.** These. (Pointing at the correct descriptions — the correct outcomes – on the tree).



**Dad.** Excellent. You're terrific at this. We call these the possible outcomes. Outcomes simply mean things that happen.

Now, this involves a special kind of sum. You like sums don't you? (Mhairi nods). When we put numbers here and here, next to each outcome (Dad pointing to the branches connected to the outcomes), we need a way of making clear that one of them is definitely going to happen. We need a number that represents the certainty that something is going to happen. We could use any number, but it is easy to use a nice round number, like 100. So, 100 is the same as saying one of these is certain to happen. [This was my stumbling attempt to introduce percentage chances to a child who had never heard of percentages let alone probabilities. I ran over it a couple of times, and Mhairi seemed to understand].

But this is where the sum comes in. We need to use two numbers that add to 100. One of the numbers is the chance of getting the better of the two outcomes, not being too upset, and the other being really upset at not getting to say goodbye. Earlier you said the worst of the outcomes, this one (Dad pointing to the tree), was the most likely to happen. So we give that a bigger number than the other outcome, this one. OK?

**Mhairi.** OK, but how big do we make it?

**Dad.** Well if each of the outcomes was as likely to happen as the other we would give them both 50 so that they are the same, and so that they add to the magic number 100.

**Mhairi.** But they are not the same, the bad outcome is more likely to happen, I just know it!

**Dad.** So we'll give it a bigger number than 50. How big do you think we should make it? If we make it, say, 80 it means the other one will only be 20. If we make it 90, the other one becomes only 10, and the larger the number the more likely it is to happen. We call these numbers percentages. But you don't need to remember that just now. As long as you understand what we are doing.

**Mhairi.** I have heard my teacher talk about them, but I don't remember very much about it. But Daddy I don't like 80 or 90, I think it's more like 95, and 5 for the other one. Can I do that?

**Dad.** Yes of course, it's what you believe that counts. So you are saying to me, that you think it is very likely that the bad outcome will result, and only a small chance that you'll not be too upset.

**Mhairi.** Yes Daddy, that's what frightens me, maybe I should just go...

**Dad.** Well let's see. Don't you think we should complete our tree and see what it suggests to us?

**Mhairi.** OK Dad. Is this what you teach people?

**Dad.** Sometimes. It's also what your Mum is studying at the moment, but I don't think she is convinced. You know our friend Jack Dowie (Mhairi nods), well Jack teaches this too, and it's Jack who wrote your Mum's course! So you are really doing university stuff!

**Mhairi.** And it's quite easy.

[Mum's eyes roll as Mum and Dad exchange meaningful smiles!].

**Dad.** Now, what about the other pair of outcomes we need to think about. You have told me that if you go to the funeral two things could result. First, although it will be a sad occasion, you might be OK and get to say goodbye. However, you also said, you might be very upset, and are afraid it might lead to you having to leave in front of everyone, get embarrassed, and still not get to say goodbye as you would like. Now, do you think one of these outcomes is more likely to occur than another?

**Mhairi.** I don't know, can you help me? What do you think?

**Dad.** Well, it's really what you think that counts. You have never had anyone close to you die before, and therefore you have never been at a funeral. So we don't have anything to help us predict what is likely to happen. And in these circumstances, since it's your decision, it's your beliefs about it that matter. Let me ask it this way. Do you think one is more likely to occur than the other outcome, or would you say you are completely uncertain?

**Mhairi.** Oh, I'm definitely completely unsure. One second I think this will happen, but then I change and think the other will happen. I just don't know. Sorry Daddy.

**Dad.** Don't apologise, you have been very helpful. I think I can help you after all. You see one of the good things about this, is that complete uncertainty makes it very easy to know precisely what chances, what percentage numbers, we should provide.

**Mhairi.** How can me not knowing help? I don't understand.

**Dad.** Well let me try to explain. You are completely uncertain, OK? So another way of saying it, is that it is just as likely one outcome will occur as the other. You can't choose one being more likely than the other, can you?

**Mhairi.** No, I'm a bit confused. So what numbers do you use for that?

**Dad.** Since there are two possible outcomes if you were to choose to go to the funeral, and since you are completely uncertain, we give each outcome the same number as the other in terms of chances. But they still have to add to 100 remember. So you tell me, what two numbers, that are the same, add to 100.

**Mhairi.** Fifty and fifty.

**Dad.** Correct. So I now write those numbers on to our tree. See? (referring to tree at start of next page).

**Mhairi.** So does that tell me what to do?

**Dad.** No, not yet. It would be silly to make a decision just on the basis of chances. We also need to find out what value you will put on each outcome.

**Mhairi.** Is this more percentages that have to add up to 100?

**Dad.** No. The numbers we are going to use don't need to add up to anything, but we have to decide on some kind of scale to measure how good or bad each outcome is.

**Mhairi.** What do you mean by a scale Daddy?

**Dad.** Like money. (He pulls money from his pocket). If we had a lot of pennies we could buy a lot of sweets couldn't we?

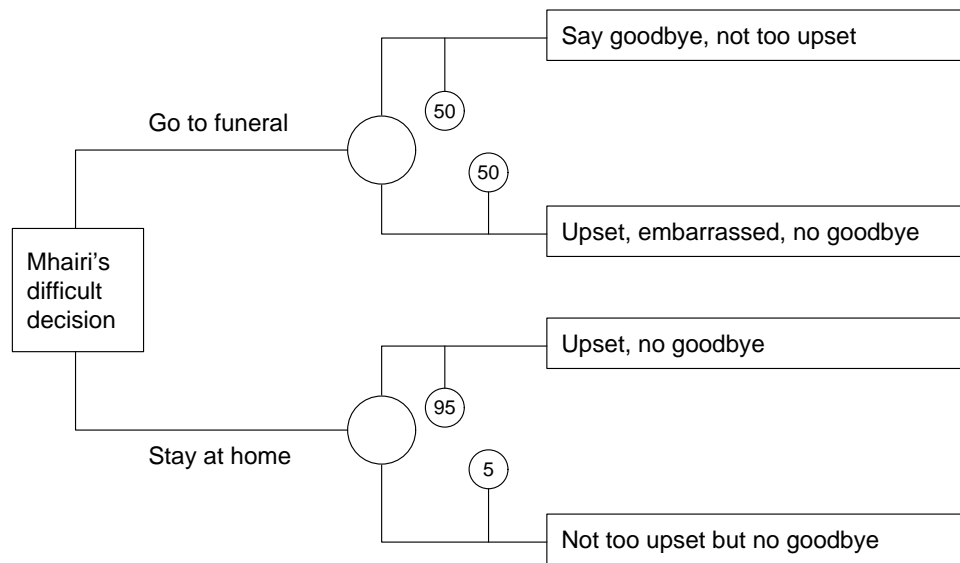
**Mhairi.** Yes, and that would be a good outcome Daddy!

**Dad.** Yes, you are good at this! Now, let's imagine my pennies here are worth a lot more than just a penny, and that you have to decide how much you would pay for each of the outcomes on your tree?

**Mhairi.** Do I only need to buy one?

**Dad.** No, we need to put a value on them all: How much do you think they are worth? I'm not explaining this very well. Let me ask you another way first of all. Which of your four outcomes is the very worst as far as you are concerned?

**Mhairi.** Well there are two bad outcomes, and I don't much like either of them.



**Dad.** Well let's say you could choose only between the two bad outcomes. Would one be any better than the other?

**Mhairi.** Definitely. I'd hate to go to the funeral, get all upset and make a fool of myself and still not get to say goodbye. At least if I'm very upset at home, I will only be upset with you Daddy. Sorry.

**Dad.** Don't be sorry. So this is the very worst outcome: going to the funeral but having to leave very upset before saying goodbye. So you wouldn't want to waste any money buying it would you?

**Mhairi.** No

**Dad.** So I can put a value of 0 on it. See I am putting it in brackets here. (See tree on next page for this and subsequent outcome values).

**Mhairi.** Yes, I wouldn't pay a penny for that.

**Dad.** Now, let's think about the good outcomes. There are also two of them, aren't there?

**Mhairi.** Yes, but there is only one I want. I want to be able to say goodbye.

**Dad.** I understand. You are saying this is the best outcome by a long way. So if you had, say 100 pennies, you would happily spend the lot to get that outcome?

**Mhairi.** Definitely Daddy. But if it was that easy I wouldn't have this problem. But you and Mum often tell me you can't buy happiness!

**Dad.** That's right. We are only using my pennies to help us think through how happy... no,

happy is the wrong word... how content you would be with each of these outcomes... how desirable each is. Is that OK?

**Mhairi.** Yes Daddy, I knew you weren't saying I could buy outcomes.

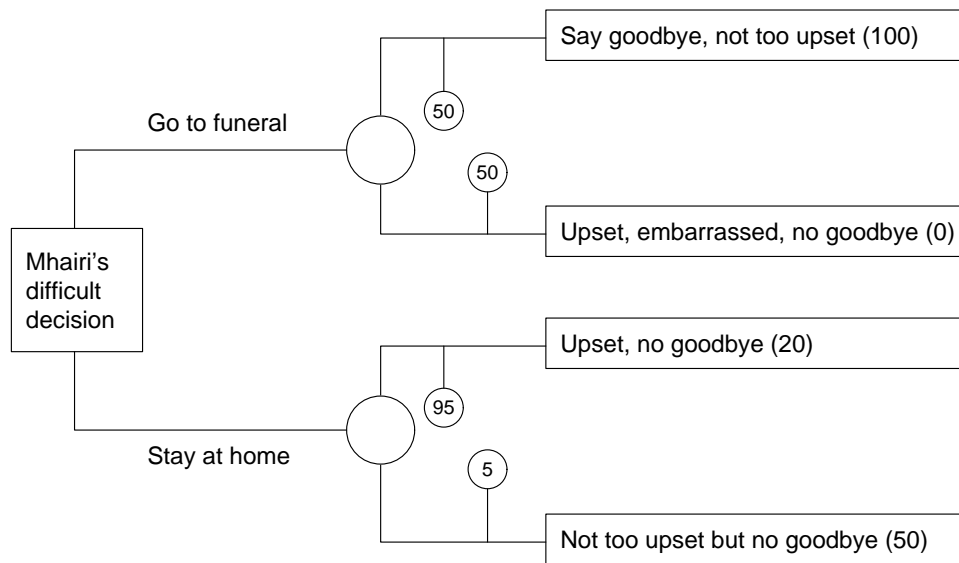
**Dad.** So, to get back to the tree, I have put 100 in the outcome which says you get to say goodbye at the funeral and don't get too upset. (Mhairi seems content). Now we need to think on what value you put on the other outcomes. Let's start by thinking about the bad outcome of getting upset, but at home, and not saying goodbye.

**Mhairi.** OK, the only reason it's a bit better than the other one, is because I won't be making a fool of myself. Is that right?

**Dad.** Seems right to me. Now what value would you put on it, if you have already put 100 on this, your best outcome, and 0 on this your worst?

**Mhairi.** Well it's still bad, I don't want it... can I put a small number on it, like 20?

**Dad.** Yes that makes sense. In effect you are saying you would pay 20 just to make sure you don't make a fool of yourself in public. Are you happy with that?



**Mhairi.** I think so Daddy. And that leaves just this one (pointing to the remaining outcome). I'm not sure about it, can you help me?

**Dad.** Well, do you agree it must be higher than 20, because being very upset, to which you gave 20, is worse than not being too upset? (Mhairi agrees). But it's not as good as the best outcome, so it must be less than 100?

**Mhairi.** Yes Daddy, and I think it's a lot worse than the best outcome.

**Dad.** That's helpful. Would you say it's nearer to the outcome you valued at 20 than it is to the one at 100?

**Mhairi.** Definitely.

**Dad.** Well that means it must be a lower number than 60, because 60 is halfway between 20 and 100.

**Mhairi.** That's quite clever Daddy. I see that. And I think I'll give it 50, because, it's still going to be quite a bit better than being really upset.

**Dad.** Fifty it shall be then. Look, now I can work out, on the basis of everything you have told me, what your decision tree suggests.

**Mhairi.** How can you do that Daddy?

**Dad.** I can do a special kind of sum, but I don't think I'm clever enough to explain it easily.

**Mhairi.** It's OK Daddy. I trust you. You're good at sums.

**Dad.** Let me try to explain it this way. I'll point to the numbers I'm using as we go along. Your tree tells me that if you choose to go to the funeral, you have a 50 percent chance of getting an outcome valued by you at 100.

Now 50% of something is the same as a half, so tell me what half of 100 is.

**Mhairi.** Fifty. Can I do the other ones too?

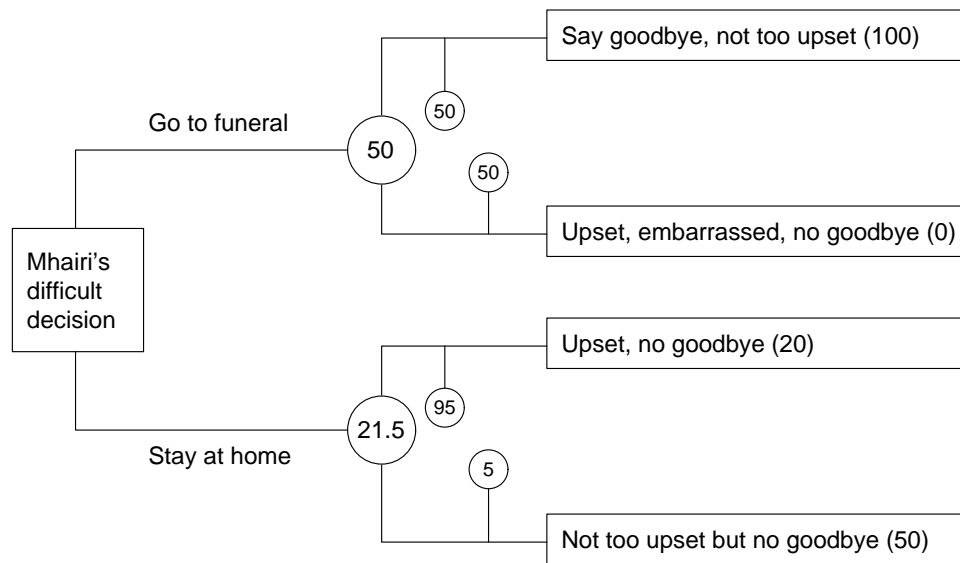
**Dad.** Of course, it's your tree. Now here is a tricky one. If you choose to go to the funeral you also have a 50% chance of getting this outcome which you valued at 0. Do you know what half of nothing is?

**Mhairi.** You can't do that...it's just nothing.

**Dad.** That's right, half of nothing is nothing. These answers have a very special name. Utility. It's just a name for a combination of chances and the value you placed on the outcome. Now let me try to explain to you what we should do with these two utility numbers, the answers to our sums — 50 and 0. If you go to the funeral, you might end up with the 50, but you might also end up with the 0. Also is like an add sign (Mhairi is puzzled!). Put it this way, if you have 10 pence in your purse, and you ALSO have 5 pence, how much do you have?

**Mhairi.** Fifteen pence.





**Dad.** Excellent. Now let's do the other branch. Here you have a 5% chance of something you value at 50. That's the same as 1/20 times 50. (A bit of arithmetical explanation comes in here)...So that means 5% of 50 is 2 1/2, or as I write it, 2.5. And here you have a 95% chance of an outcome valued at 20 (and again after a bit of arithmetic)...that's correct 19. That means we have two utilities for this branch, 2.5 and 19. What do we do then?

**Mhairi.** We add them to get 21.5.

**Dad.** And now you see what we needed the big circles for, to put the answers in! Now it is very clear to me what this tells me. It says the branch with the biggest total of utilities is go to the funeral with 50. Fifty is a lot bigger than 21.5, which suggests that in fact the decision is not even very close, even if it is very difficult. [See completed tree above.]

**Mhairi.** I think I see, but could you explain a bit more?

**Dad.** Yes. What we have done is take account of everything we have talked about. We have taken account of the chances and taken account of the outcomes. In fact we have taken each into a *count*! We have then combined them to see which branch gives us the bigger number, or to put it in my special language the biggest overall utility.

**Mhairi.** So I should go to the funeral?

**Dad.** Yes, according to this analysis. But I can also see now why the decision was so very difficult for you. Because your choice of going to the funeral means you have

a chance of getting the best of all outcomes, but also a chance of getting the worst of all outcomes. That's why it was so difficult for you. However, it is still the best choice, because to stay at home would give a very large chance, a 95% chance, of getting a poor outcome, and very little, only a 5% chance of getting an OK kind of outcome, but still not a very good one. You were brilliant.

**Mhairi.** But how do I make sure it's the good outcome I get?

**Dad.** Well, we can't be certain, but knowing what we know now, we can plan how to implement your decision sensibly, or at least you and your Mum can.....

## 5 Barbara

Knowing this, it was clear to me that we should make our arrangements to make matters as easy as possible, in case Mhairi became too distressed to remain at the funeral. We went a little earlier so that she could become familiar with the church and where the coffin would be placed prior to the beginning of the Requiem Mass.

I also arranged for a very close family friend to be seated with us so that Mhairi felt supported by people she knew and trusted.

In the event, she managed extremely well throughout the service and didn't have to leave the church early.

## 6 Roger's reflections

This may not have been a very complex decision, but it was an extremely difficult one for Mhairi. Remember too, she was far less familiar with theories, models, statistical measures and calculations than adults will be, let alone professionals. Yet she not only coped, she understood her decision by participating in a decision analysis and found comfort in seeing things laid out logically.

Therefore, to me, not taking such a structured approach would have been cruel in such circumstances. Being able to use decision analysis is part and parcel of being a caring and sensitive human being. And if Mhairi could participate effectively when only 10 years old, it is surely reasonable to expect most adults will be able to do it too, with the help of skilled professionals.

Only three weeks after the death of Father Pat, Mhairi's much loved Granny, suddenly died. Along with her Mum and sisters Kirstine and Rosslyn, Mhairi attended my mother's funeral and gave me much comfort. There was no longer a need for any decision analysis: Mhairi knew her mind.

## Postscript from Jack Dowie

Roger and I spent many stimulating hours introducing decision analysis to the hundreds of 24–84 year olds from all walks of life who enrolled for my OU course on Professional Judgment and Decision Making. Some took to it immediately. Some rejected it immediately and dropped out early on. The majority — of whom the greatest number were women in the “caring professions,” such as nursing and social work — wrestled long and hard with their intuitive resistance to what they characterised initially as “cold calculation” in relation to human beings. By the end of the 9 month course they typically said, in one way or another, “I wouldn't have taken the course if you had been more honest about what was in it, but I can now see that would have meant missing something that has changed my life/behaviour/attitudes/practice in very important ways. Everyone should do it.”

One of the most frequently asked questions was always “But where do the emotions fit in?” My answer — they need to be processed, transformed into the value judgments about outcomes that the analysis requires - was always academically satisfactory to me, but I had the sense that it never really got through. That is why I am so delighted that Roger, Barbara and Mhairi have written up their experience of making a decision in which emotions played such a significant part and showed how a little analysis helped greatly in dealing with the dilemma posed by the emotional conflicts.<sup>1</sup>

<sup>1</sup>For a somewhat different analysis of the same case, see

## 7 Comment from Rex Brown

As a decision analyst by profession, I welcome this delightful contribution to the oft-neglected prescriptive side of judgment and decision making. It certainly shows how decision analysis, or more precisely applied decision theory (ADT), can be accessible, appealing and useful to lay deciders (of any age).

It also contributes to the art of decision aiding itself. The well-known engineering design principle, “build-test-build-test”, would work well here. The aider applies existing methods to a task, then evaluates where and how they might have been improved, then updates the methods accordingly, then applies them to the next task, and so on. Roger Mullin has taken a first step here, and I will try my hand at a second. Luckily, I happen to have a case of my own with remarkable similarities to Mhairi's<sup>2</sup>; which helps me make generalizable comments.

## A Matching Case

Ten years ago, when my daughter Karen was expecting twins, I agreed to try to help her make a difficult decision. Her female baby, in the lead, was doing well, but her brother was in a “breech” position, which might need a C-section delivery. Karen had to decide whether to have both babies by C-section or to have the sister delivered naturally and to have a C-section for her brother only if he could not be “turned”. That would be the worst outcome.

We analyzed the choice with a simple ADT model, almost exactly like Mhairi's: two options, three possible outcomes (four for Mhairi) and a single measure of utility. To derive the preferred option with the greatest probability-weighted utility, Karen provided a probability that the brother could be turned, and a relative utility for the three delivery possibilities. The result favored “natural first”, which she did and it turned out fine.

Karen's major differences from Mhairi were that she knew percentages and averages, and that her reasoning was not shown with a decision tree, but with equivalent graphics. Her input elicitation followed the same sequence, though without the emotional texture.

## Characterizing the cases

The similarity between these two cases provided, in effect, an opportunistic sample of two, from a target population of potential applications of this ADT variant to untrained deciders. The treatments were essentially the

[http://www.cafeannalisa.org.uk/STARTERS/Relationships/Mhairi's\\_Funeral\\_Dilemma/](http://www.cafeannalisa.org.uk/STARTERS/Relationships/Mhairi's_Funeral_Dilemma/)

<sup>2</sup>This case can be found the Prolog to Brown (2005), where it is used to preview the book's essence.

same; the subjects differed in maturity; responses were good outcomes.

Three questions were addressed for each case:

1. What, if any, decision improvement resulted from the aid? Both deciders acted on the ADT, felt good about it, and things turned out fine. Some of that may have been luck, but Mhairi certainly got peace of mind.
2. Could the aid have been improved? Probably, in that it did not take account of all they knew or could readily learn (see next section).
3. What improvements can be made? Here are some hypotheses about how Mhairi's—and Karen's—decisions might have been better aided. (They are based partly on what I have learned over the past ten years).

### Decision aid improvements

*Multiple evaluations.* Both deciders relied on a single coherence-based ADT analysis. In all my experience, I can't think of any responsible deciders commit themselves to critical action based on just one approach, other than intuition. The girls' ADT analysis could have been complemented (or replaced) by other forms of aid. For example, they could have tapped into more of what is now in their heads by other means (such as reviewing analogous past choices); or referred to outside resources (such as the advice of wise friends).

*Multiple criteria.* They used a single measure of utility to evaluate outcomes (near term contentment for Mhairi). Instead, they could have split out component criteria (such as upset during the funeral and immediate after-effects, like guilt and closure). They could also have added criteria (such as how well Mhairi would handle similar future situations).

*Empirical utility.* They evaluated outcomes by introspection alone. Research suggests this is generally a poor predictor of future happiness (Gilbert, 2006). Would they have been better off basing the evaluation on how satisfied *others* have been in comparable situations?

*Partial analysis.* Often it is not feasible to measure utility without fatal bias, especially in emotional circumstances. They could have given up entirely on predicting happiness explicitly, and focused instead on predicting only the outcomes. This common decision aiding practice.

*Equivalent substitution.* They analyzed outcomes as if there were only two per option. Would specifying more possibilities (such as several funeral scenarios for Mhairi) have captured the future more realistically?

I don't know how well these hypotheses will stand up, but I am generally satisfied to act on them for now. If my grand-daughter Lucy (now also ten) asks me to help her with a tricky choice like Mhairi's, we might well work through the same kind of classic ADT model. However, I would certainly not have her base her choice *solely* on that model.

### Research implications

Not having been involved in Mhairi's case, I am not as qualified as Roger to interpret it. It might be useful to get his evaluation, with the perspective of 15 years. However, it might be more useful to get decision aiders' evaluations of current cases (perhaps with adult deciders). I would expect such exercises to stimulate productive research oriented toward useful decision aid (not necessarily decision-theory based, see Brown, 2006); in particular, behavioral research on how people use decision aid (and not only on how they make unaided decisions).

### References

- Brown, R. V. (2005). *Rational choice and judgment: Decision analysis for the decider*. New York: Wiley.
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- Gilbert D. (2006). *Stumbling on Happiness*. New York: Knopf.