Adam Morton

surprise

draft, but final. to appear in Sabine Roesser and Cain Todd, eds. *Emotion and Value*, Oxford U P, 2014 pp 136 - 144.

It is not surprising *that* unlikely things often occur. Fair coins come down heads four times in a row, healthy people drop dead, unrelated colleagues develop the same rare hereditary disease. At any rate it should not be: the emotion of surprise here would be irrational. But the individual unlikely events do provoke real surprise, which can be a pretty intellectual or a pretty visceral emotion, and the reasonableness of the reaction needs a more subtle treatment. Surely your eyebrows rise when the coin lands heads for the fourth time, even though you know such things will happen one time in sixteen. Surely you shudder in shock when the same nasty random fate befalls several people you care for. The main purpose of this piece is to explore the emotion of surprise as an emotion, and to address the question of its rationality. A secondary purpose is to discuss the value and disvalue of surprise: how we both desire and fear the unexpected.

the emotion You open your door to go out and there is someone just standing there, her hand about to knock. You leap back, your breath comes fast and your heart pounds; it takes several seconds to regain your composure. "You startled me" you say.

You find that the president of your university, a well-respected scholar and much-admired leader, has been blackmailing colleagues to fund his drug habit. You are shocked.

You go into your lab one evening and find that six of the ten mice that were showing symptoms of an acute viral infection are healthy and alert. You find this curious, and you pay a lot of attention to the details of the mice's surprising condition.

You log onto your bank account online, and find that the balance is appreciably higher than you expect. You immediately look for unexpected transfers in, and see

if regular debits have all been paid.

These are very basic emotions, all reactions to changes in the environment. Not all are unpleasant. They are all reactions to unexpected information, reactions that defend against possible new threats and that gather more data. That the link between newness and information-gathering is a very basic human attribute is suggested by the work on the reactions of infants and newborns to novelty, pioneered by Robert Fanz in the late 1950s and famously applied to ever-younger babies by Elizabeth Spelke from the 1980's (Gopnik and Melzoff 1997, Talbot 2006). Infants look more, and show other signs of increased attention, to situations that depart from established patterns or from expectations that we can hypothesise to be innate. (Perceptual phenomena such as the Ganzfeld effect suggest that variety-hunger is built into the normal function of very basic cognitive processes (Metzger 1930.) As my examples suggest, the range of situations in which a violated expectation can lead to an emotion of surprise is very wide, producing reactions from self-preservation, as when one is physically startled, to intellectual inquiry, as when an interesting result stimulates one's curiosity.

It is important to take situations in this whole range not only as unexpected happenings, but as producing the *emotion* of surprise. For in situations like those I have described, which span the range, the person enters a state in which resources are summoned to meet the challenge, some of which go beyond the normal reaction to falsification of a belief and some of which may not be perfectly adapted to the particular situation. That is of the essence of an emotion: one finds a way to extraordinary resources, but at the price of possible mis-match or over-reaction. Standing at the door, looking at the old friend who happens to have arrived just as you opened it, you react as if you faced an assassin with an axe. (I once addressed the friend by name with a friendly greeting, and then jumped back and became short of breath, a second later. The emotion was out of synch with the thought.) Looking at the unexpectedly healthy mice, you find yourself scouring your memory for ways that these might not be the same mice, or in which some powerful antiviral could have been administered by mistake, in much the way you would

have if you were trapped in a burning building searching for a way out and trying to remember anything you had heard about its construction. At some level research and self-preservation are not so different.

These are characteristic functions and effects of emotions, but surprise has familiar common-sense emotional features also. I'll mention three. It can be attributed on the basis of facial configuration and bodily posture, though as with other emotions this is an unreliable and context-sensitive thing. It can be expressed in language with a *that* clause, though what is expressed is not a belief or a desire. You are surprised that your president is a criminal; you are surprised that the mice are well. (In this respect it is what Robert Gordon (1988) called a factive emotion.) And it comes with a feel, building in part on physical sensations, which besides experiencing ourselves we attribute to others when we imagine their surprise empathetically. Imagining a person confronting someone unexpected at the door we sense the breath getting tight and the pulse racing. Imagining a person learning that an admired leader is a criminal we sense the muscular tightening of outrage and the panicky vertigo of disbelief.

What visceral and cerebral cases of surprise have in common is a combination of defensiveness and inquisitiveness. Defence against *new* or *novel* threats and inquiry into ways the situation might not be as it seems. Michael Brady (2011) has drawn our attention to epistemic aspects of apparently practical emotions, notably ways in which they inquire into their own groundedness. Using his way of thinking, surprise asks "is there anything here I have to know more about?" and plays it safe until the question is answered. The exact combination of defence and inquiry, and the detailed profile of actions that are motivated, is not something that we can settle without a lot of data. It is an important fact about our and related species, rather than a truth about the nature of thinking agents.

motivational aspects The large hadron collider may simply confirm the standard model of fundamental particles and forces. That would in a way be satisfying, but many physicists hope for something less comfortable. They hope that it produces

data that force them to change the model, so that they come up with a more powerful and somehow deeper one. Just perhaps, new data may prompt some young wizard to produce a new model that can be grasped as intuitively compelling. (Though there is no reason why nature at that level should respect the expectations of even highly evolved jungle and savanna creatures. In some domains lack of surprise would be surprising.) So we hope to be surprised: it might be good for us. (See for example Butterworth 2013, where it is remarked that we may have to “live with” the absence of surprising results, and the editorial accompanying the article where the absence of data challenging the standard model is referred to as a “nightmare”.)

We often hope to be surprised. We don't go on entirely predictable boring vacations, and we don't want our friends to be script-driven cardboard cutouts. (One aspect of this, not on the axis of this piece, is the Sartrian desire that other people be other people, real independent contrary people. Up to a point!) Of course we hope to be surprised when our expectations are low, with feeble students and hopeless offenders. But there is also a motive towards surprise for its own sake. We want our lives to contain an element of the unexpected. There are many sources of this. There is the practical unpredictability of human action, there is the depth and variety of the physical world, and there is the disparity between the combinatorial complexity of possible situations and the limits of our thinking power. It is an exciting mathematical surprise when axioms suddenly show that they entail the opposite of what was expected.

Our desire for surprise is typically human; we want varied and unpredictable intellectual and social lives. But it is not only a human phenomenon. Boredom affects many other creatures, from cats kept alone in small apartments to tigers in zoos. Most wild animals probably have all the surprise they need, with the changing requirements for staying fed without becoming food. The greater the environmental variation to which a species is adapted, one expects, the greater the need for surprise as part of that species' *telos*.

Humans are complex creatures adapted to variable environments, and thus we can expect that they will need a fair degree of surprise in order to flourish. We get bored if things are too predictable, and we also want signs that they are real, that we are struggling to make objective accomplishments, coming to terms with the actual causes of our experience, and interacting with people whose behaviour does exhibit their unfaked attitudes. Delusions, simulations, and acting, however pleasing, go against a deep human impetus. As a result, we are reassured when the details go against our expectations, in part as a sign that they are not generated by these very expectations. Thus a a wise person -- in fact a typical person -- will want that there be a good supply of surprising events in her life, even at the price that some proportion of the surprises be unwelcome.

surprisingly unsurprising Sometimes an event is unexpected but unsurprising. Examples can be found in 1960s epistemology (Goodman 1973). Suppose that coins enter your pocket in a generally random way that is neutral with respect to their composition: silvery coins and coppers are likely to get there in their proportion among coins. In fact, for the sake of the example suppose that proportion to be 1:1. You know there are four coins in your pocket. You reach in and pull out a copper. You do again, and again. Now you know that at least four of the coins that were in your pocket were copper. The probability that they were all copper has increased from 1/16 to 1/2, yet, against the orthodoxy that developments that increase the probability of a claim are evidence for it, you have not acquired evidence that all the coins were (or are now) copper. So if a fourth reach brings out a silver coin, you should not be surprised. (You may in fact be surprised, superstitiously, as you might be if for example three friends who walked under a ladder failed a subsequent exam, and then a fourth did not.)

An interesting case is that of events for which one has no good evidence, but which one has come to expect. If you find that servers at your coffee shop are always wearing blue shoes, though there is nothing else uniform about them, you may well find yourself expecting it, and subject to surprise if one has black or red shoes. Suppose now that one of them confides in you. "We do it to annoy the boss. Hard

to explain, but it drives him wild and there's nothing he can do about it. He's been nicer lately, though, so we're just vaguely considering calling it off." Now you do have evidence that it is not just a series of coincidences, though interestingly the evidence -- though evidence for the regularity -- may *lower* your subjective confidence in its probability. So now when you look down when reaching for an espresso and see that the barista's shoes are green, should you be more or less surprised?

Improbable events are often not surprising. If one in a thousand five year old light bulbs burns out in any given month, then it is less than amazing that the light in your bathroom has gone, though it is a nuisance. There is nothing that you have to check or take account of, since you always knew it would happen sooner or later. If you had been perfectly prepared you would have had the spare bulb ready and have thought out how to place the chair safely under the socket for the replacement. Contrast this with your reaction when you replace the bulb and it begins to blink in a Morse code fashion, as if trying to tell you something. *Is* it trying to tell you something; is it likely to explode; should you unscrew and replace it or wait and see what happens? Or suppose that the new bulb is a dud, and flashes then goes dark. This is surprising even if it is more probable than that your long-serving bulb should fail on this particular day. In these last two cases you have to revise your expectations of what may happen and why.

It is here that questions of rationality become delicate. Is it irrational to be surprised when your lottery ticket wins, your light bulb blows, you succumb to a disease that millions have? Surprise is certainly not unusual. The aspect that is irrational, or at any rate unhelpful is that no re-appraisal of possible causes and their possible effects is called for. (As becomes clearer below, I think that in hard cases we should withhold 'rational', 'irrational' in favour of more nuanced labels.) You may now be rich, or in the dark, or facing death, and there are emotions suited to these situations. But the probability of winning such a lottery, the causes and frequency of bulb failure, and the chance of someone with your profile succumbing to that disease remain as they were. Nothing has become more mysterious by

happening now. The likelihood of *these* things does not need to be better understood, though you may need to gather more information and think out new precautions because of what has happened. You could sensibly be alarmed but not surprised.

Seen this way, the lack of surprise in the copper coin and barista shoe examples seems right. You knew all along that there was a 1/16 probability of four coppers *a priori* and 1/2 when three have been drawn. You knew originally that you had only a guesswork expectation that the shoes would be blue, so that green shoes did not upset any fixed belief. And then once you had been given the explanation green shoes have the power to prompt questions: have they made friends with the boss or has he become too powerful to question; is there a chance that he will come storming in and hot coffee will fly? So it makes sense to say that in the enlightened situation green shoes make a smaller dent in your expectations intellectually but are a greater prompt to the emotion of surprise.

Similar considerations allow us to see how surprise at those same things might in similar circumstances be sensible, and guide the person to inquiries she should be undertaking. You may not have calculated the probabilities in advance, and have just taken four heads in a row or four coppers as "very unlikely". Then the event may make you do the calculation you could have done earlier. Or you may have never thought about the half-lives of light bulbs, so when you turn the switch and nothing happens your reaction is to something completely unanticipated. Somewhat differently, you may have ruled out the possibility of winning the lottery, or of all four coins turning out to be copper, simplifying your epistemic situation by throwing out the evidence on which your all-things-considered belief is based. Then when that belief proves false, you no longer have that evidence to make it unsurprising and so you react as if to a mystery. You have to restore the information you had suppressed.

The reaction has a kind of rationality in these cases: given your neglect of relevant considerations earlier or given your labour-saving collapse of probability to

certainty, it follows a routine that generally promotes the interests of the organism. That earlier corner-cutting may itself be an efficient reaction to limited time and processing power, or it may not be. So there are many possibilities. There are simply helpful ways of reacting, that will promote a person's well-being in most likely circumstances. There are second-order helpful reactions, that compensate for earlier deviations from procedures that would have worked out well. Among these there are those that compensate for deviations that were simply faulty: slips, omissions, glitches. And there are also reactions that compensate for deviations from ideal procedure that given the nature or situation of the person represent acceptable trade-offs between possible outcomes and costs of thinking and investigating.

Epistemologists know well that to label thinking as rational or not brings complications such as these into view. In the philosophy of emotion the complications are forced on us when we pay attention to surprise. Surprise fits here because it is the emotion that prompts further inquiry, the reaction to things that need explanation.

contrastivity Events are often surprising and unsurprising, as we have seen, and both welcome and unwelcome. This is no paradox, but merely the effect of context and, especially, contrast. It is surprising that there is a run of seven heads rather than a more evenly distributed series; it is not surprising that the coin comes down heads rather than tails on this occasion. It is welcome that your cancer is a treatable type rather than an untreatable one; it is unwelcome that you have cancer rather than a stomach ache. Sometimes the two contrasts coincide. Suppose there is a consolation prize given at the same time as the jackpot to a very small proportion of the people who have bought a thousand lottery tickets but have never won. You are one of these poor people. You learn that you have won the consolation prize. It is surprising that you have won the consolation prize rather than losing the value of your ticket yet again, and it is not surprising that you have won the consolation prize rather than the jackpot. Similarly, it is good news that you have won the consolation prize rather than losing the value of your

ticket yet again, and bad news that you have won the consolation prize rather than the jackpot (see Driver 2012).

In traditional cultures people usually described themselves as not wanting surprises (see the introduction to Giardina 1993, and a host of bad connotations for secondary meanings of *novus* and cognates in Latin dictionaries. For another ancient culture see chapter 4 of Almerding 2011.) But people then were as susceptible to boredom as we are, and had as deep a need for stimulation. The difference is in the default contrasts, I think. If little happens on a given day, and you think the alternative is plague or massacre, then of course you will value the lack of surprise. If the alternative is exciting developments and thought-provoking puzzles, then you will disvalue the lack. A person who meets every new day with wide-eyed wonder is implicitly contrasting it to conceivable more boring days (and this may sometimes be a feat of imagination). A person who remains blasé in the face of the most dramatic occurrences is implicitly contrasting them with the really interesting things that might have happened. (Imagination overpowers perception: the person does not see present marvels as marvellous, blinded by the force of what might be there instead.) It's all in the contrastive rather than: what in the usual context is the alternative one will naturally think of?

I described surprise above as the enquiry-prompting emotion that asks for explanations. Explanations are typically contrastive too (see Hitchcock 2012), which fits with the idea that in being surprised at something one is asking why it rather than some contextually determined alternative should have occurred. But there is another contrast-themed connection between surprise and explanation. Surprise sets the task for satisfactory explanation. If one is surprised that the crops have been half-successful rather than giving a full harvest then one will want an explanation of why this year's harvest is half rather than full. If one is surprised that they have been half-successful rather than failing, then one will want an explanation of why the harvest is half rather than none. The cultural contrasts built into intuitive surprise can be ignored in an explanatory project, of course, but this takes deliberate effort. The influence can go in the other direction too, as when one

learns that some events taken with a particular contrastivity have no explanation -- why the fair coin lands heads rather than tails on this particular toss -- and as a result comes not to be surprised by them.

life and death In earlier work I have argued that when rationality is slippery we can sometimes frame our questions in other terms, particularly by asking what virtues are needed by someone who thinks in one manner or another. I am not going to repeat the arguments for this point of view, but end this essay by asking of some ways of being surprised what virtues can well accompany them.

All humans are mortal, and you are human. But it comes as a surprise to many people when their death comes in sight. Why now, why this disease? But the situations of an eighty five year old with a failing heart and of a fifteen year old with leukemia are different. The first is no surprise.

For some people life will go better under the illusion of immortality. Their conversations with the spectre would oppress them; they would not make good medium-term plans. So a minimum virtue for lack of 'unreasonable' surprise is the ability to keep perspective and proportion in the face of scale-changing considerations, and perhaps a degree of immunity to framing effects. (I have known highly intelligent people who lacked these virtues, and knew it.) Given these, a person's setting themselves in the way of surprise, if forced to face the fact that they will die sooner or later (or that their children will have less than total admiration of them, or that their loved ones will see some of their flaws) will work to their advantage. What about the less mysterious, but still puzzling, surprise at the fact that some particular not very unusual death is imminent? It ought to be like surprise that an old light bulb has blown, or that this time all the coins are copper. But it can seem like surprise that the insurance number randomly assigned to you begins with your birth date, or that all of your close friends have the same middle initial.

I think the death case is in fact rather like these latter cases. They are all of kinds

that are rarely as unusual as they seem at first sight, and so one's reaction to them is likely to be based on shortcut estimates and heuristics. The reaction thus makes sense in a second-order way, as a good reaction to the fact that one's basic reaction is not ideal. Its advantages stem from the fact that one has not previously digested some relevant considerations. Would it be better if one had digested them? Perhaps, for some people, those who could make good choices and enjoy their lives in the face of these generally a priori considerations. For others not: the lives of some others will go better, for a short while, if they react as if some monstrous predator had chosen them, against all the odds, as victim.

Corresponding things can be said of good news. As you awake from the anaesthetic you may be surprised that the 70 percent chance of success has been achieved. Oh, I'm here. Had you really thought that what was only 30 percent probable was more likely to happen? Surprise and relief are hard to disentangle here: relief has a related set of functions and is most easily activated when the feared outcome was taken to be more probable, so to get to feel it -- make the right offerings and change the right priorities -- it may help to keep one's grasp on what was likely a bit fuzzy. The moral is the same: depending on who you are, different ways of thinking what to expect may better fit your intellectual and emotional constitution, and with them different occasions when surprise is a helpful emotion for you.

One important and modern virtue that emerges from the examples I have been using is the virtue of reacting appropriately to the randomness of the world. If you see that there is no deep reason for much of what happens -- how long a run of heads continues, whether you have a road accident or contract a fatal disease, whether this or that opportunity opens up for you in life -- then you may succumb to fatalistic lethargy or you may take life as a mixture of opportunities to be taken and dangers to be forestalled or endured. And you will see that whatever happens could have been better and could have been worse, so that it is both a good surprise and a bad one, and both surprising under one description and not under another. You can take it as both; you can take control of the contrastivity. Thus

the virtue in question is one of framing events with suitably contrasting ones so that you can react to them as surprising or banal, and as good news, bad news, or no news at all, in ways that steer between keeping life interesting and keeping it safe.

If events are framed in this way, a sophisticated higher-order emotion becomes possible. You can see the value of unwelcome surprises, both in the simple pragmatic terms that have shaped most of my discussion and as licensces to direct at them other evaluative emotions. You can react to the occasional item of bad news with disappointment or annoyance while simultaneously being glad, even relieved, that your life has the variety of the occasional less than optimal moment. (More than occasional, and something super-human might be needed.) Your reactions to the particular event and the general pattern it exemplifies are different. Seeing the presence of randomness in most important developments is important in this, I think, because it prevents one from thinking that particular events have to be tied to general patterns. Your annoyance at this particular frustration does not have to undermine your satisfaction that the project it is part of is proving unpredictable and challenging. So, if this is right, there is a systematic connection between a randomness-appreciating evaluative attitude -- which is most easily expressed in terms of what you find surprising or unsurprising -- and a capacity to direct opposed emotions towards intrinsically linked objects. They both depend on not reading too much into things one by one.

Adam Morton
University of British Columbia

BIBLIOGRAPHY

Almerding, Amy (2011) *Moral Exemplars in the Analects: the good person is just that*. London: Routledge

Alston, William (2005), *Beyond Justification: Dimensions of Epistemic Evaluation.* Ithaca NY: Cornell University Press

Blauuw, Martijn, ed. (2012) *Contrastivity in Philosophy.* Routledge

Brady, Michael (2011) Emotions, perceptions, and reasons. in Carla Bagnoli, ed., *Morality and the Emotions*, Oxford: Oxford University Press, 135–49

Butterworth, John (2013) Instant Expert: Higgs Boson. *New Scientist* 2933 Sept 7-13, i-vii

Driver, Julia (2012) Luck and Fortune in Moral Evaluation. in Blauuw, ed., *Contrastivism in Philosophy*, London: Routledge, pp. 154-172

Giardina, Andrea, ed. (1993) *The Romans*. Chicago: University of Chicago Press

Goodman, Nelson (1973) *Fact Fiction and Forecast*, third edition, Indianapolis, IN: Bobbs-Merrill

Gopnik, Alison and Andrew Meltzoff (1997) *Words Thoughts and Theories* Cambridge MA: MIT Press

Gordon, Robert (1988) *The Structure of the Emotions.* Cambridge: Cambridge University Press

Hitchcock, Christopher (2012) Contrastive Explanation. In Martijn Blaauw, ed. *Contrastivism in Philosophy*: Routledge, 11-34

Kemeny, John G., J. Laurie Snell, and Gerald Thompson (1957) *Introduction to Finite Mathematics*. Englewood Cliffs: Prentice Hall

Metzger, Wolfgang (1930) Optische Untersuchungen am Ganzfeld. *Psychologische Forschung* 13, 6-29

Morton, Adam (2010) Emotion, virtue, and knowledge. in Peter Goldie, ed. T*he Oxford Handbook of the Philosophy of the Emotions*. Oxford: Oxford University Press, 385-400

Morton, Adam (2012) *Bounded Thinking: intellectual virtues for limited agents.* Oxford: Oxford University Press

Morton, Adam (2013) *Emotion and Imagination*. Polity Press

Nichols, Shaun (2007) Imagination and immortality: thinking of me. *Synthese* 159, 215-233

Stocker, Michael (2004) Some considerations about intellectual desire and emotions. in Robert Solomon, ed. *Thinking about feeling.* New York: Oxford University Press

Talbot, Margaret (2006) The baby lab. *The New Yorker*, Sep. 4, 90-101