

HOW DO WE TALK ABOUT THE IMPOSSIBLE?



AND OTHER BIG QUESTIONS
AND DEBATES IN PHILOSOPHY



SCHOOL OF POLITICS,
PHILOSOPHY, LANGUAGE
AND COMMUNICATION
STUDIES

WELCOME

Philosophers are not afraid of big questions and difficult discussions. Here at the University of East Anglia's School of Politics, Philosophy and Language and Communication Studies we encourage anyone thinking about studying philosophy to think about the questions and concerns that puzzle, inspire and trouble them most. Above all, philosophy is a subject that will help you to address those questions in fruitful, rigorous and surprising ways.

In this short book we set out to give you a taste of some of the questions that inspire our own thinking, and the variety of ways that philosophy helps us to address them. From the ideas of some of the greatest thinkers of all time to the latest research, we insist that philosophy can engage with matters of the greatest concern and shape the ways we understand our lives and actions. As a philosophy student you will also learn to debate and think along with others, as you will see in the three debates showcased here. We hope these questions and debates will get you thinking and that you will want join in the discussion.

We hope you enjoy it!

WHAT QUESTIONS WILL YOU ASK?

QUESTIONS AND DEBATES

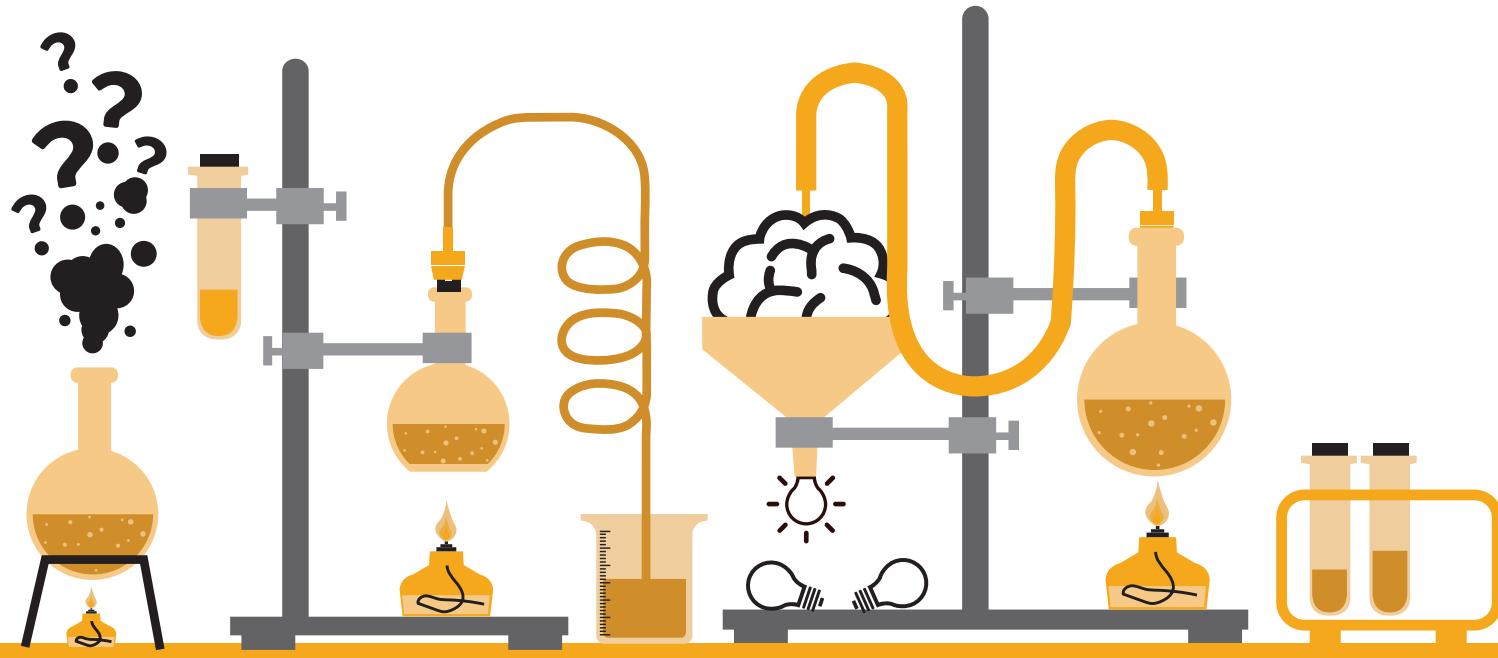
- | | |
|---|----|
| Q1. Can philosophy be practised as a science?
By Dr Eugen Fischer | 4 |
| Q2. How can a film be philosophy?
By Dr Silvia Panizza | 6 |
| DEBATE 1:
Will we ever be ruled by robots? | |
| 8 | |
| Q3. How do we talk about the impossible?
By Prof. John Collins | 10 |
| Q4. Does nature have its own value?
By Dr Tom Greaves | 12 |
| DEBATE 2:
Should we eat animals? | |
| 14 | |
| Q5. What is goodness?
By Dr Oskari Kuusela | 16 |
| Q6. Are some risks too big to take?
By Dr Rupert Read | 18 |
| DEBATE 3:
Should we be ruled by philosopher-monarchs? | |
| 20 | |
| Q7. How large is infinity?
By Dr Davide Rizza | 22 |

Q1.

CAN PHILOSOPHY BE PRACTISED AS A SCIENCE?

DR EUGEN FISCHER

Reader in Philosophy at UEA



Philosophy deals with distinctive problems, different from the problems of science. Does that mean that we cannot approach those problems scientifically? Or can we adapt experimental methods to address problems that arise from pure thought?

REASON IN A TANGLE

'To know what this text is saying, you need to read it. Indeed, you need to know that you are actually reading it, and not just having an odd dream. But this is something you can never know: If you were merely dreaming that you read this text, you would have exactly the same experience as when actually reading it. Therefore you cannot tell, and don't know, whether you are actually reading a text now. (Even if you guess correctly, you will lack justification.) So you won't ever know what this text is saying.' This is a paradox: a line of thought that takes you from uncontroversial claims to an unsettling conclusion.

ODD PROBLEMS

Science seems unable to prevent the conclusion: You might devise an empirical test to find out whether your experience is waking or dream experience – a brain scan might reveal cerebral activity that occurs only when you are awake. But what gives you the right to believe that you actually ran the test – and did not merely dream it? Nothing, it seems – and the paradox stands. Paradoxes make familiar facts appear puzzling: Of course I know what this text is saying. But how is that possible?

Psychology and neuroscience tell us ever more about what goes on when readers extract information from texts. But that misses the present problem. Science seems unable to deal with the sort of problems with which paradoxes confront us.

THROUGH EYES INTO MINDS

We can resolve such problems by exposing fallacies in the underlying reasoning. This can be fiendishly difficult; some paradoxes have resisted centuries of effort. The fallacies most difficult to spot occur in intuitive inferences we cannot help making, to conclusions we presuppose in our reasoning, without realising.

At UEA, philosophers and psychologists collaborate on experiments that bring such hidden inferences to light. One technique exploits the fact that people's pupils widen when they are surprised. In our experiments, participants hear sentences whose end is inconsistent with the conclusions we suspect people intuitively infer from previous words.

If participants really make the inferences, the endings of these sentences will surprise them, and their pupils widen. We test for automatic inferences by measuring pupil diameter.

Using eyes as windows into minds allows us to expose fallacious inferences thinkers automatically make without realising. Exposing such hidden fallacies helps us find fresh solutions to resilient paradoxes. (Can you spot what goes wrong in the one above? How does reason get into a tangle?)

WANT TO READ MORE?

See Eugen Fischer and John Collins (editors), *Experimental Philosophy, Rationalism, and Naturalism. Rethinking Philosophical Method* (Routledge, 2015). www.uea.ac.uk/study/brighton/power-of-thought

WANT TO STUDY MORE?

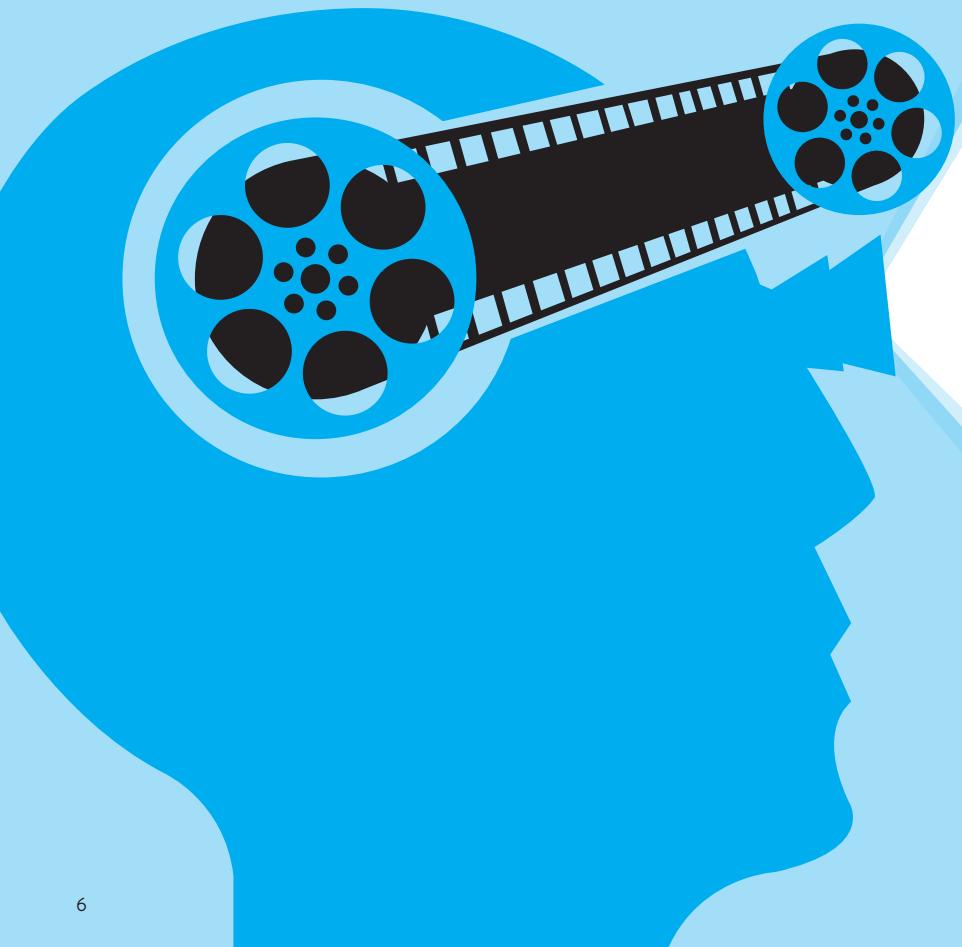
Eugen Fischer teaches 'Empiricism and Naturalism: Experience, Experiments, and Philosophy'

Q2.

HOW CAN FILM BE PHILOSOPHY?

DR SILVIA PANIZZA

Lecturer in Medical Ethics at
the Norwich Medical School



Philosophy of film is a relatively young field. As a popular art-form, film was for a long time considered not a suitable object of philosophical reflection. Recently philosophers like Stanley Cavell and Stephen Mulhall have changed this. Films are now being studied both as art-works in their own right, as well as ways to reach a wide audience while offering means to reflect more deeply about life and the world around us.

WHICH FILMS ARE PHILOSOPHICAL?

If a film enables us to 'see' things differently, in a non-trivial way, then it is probably a philosophical film. Films that can question our assumptions about particular issues can be objects as well as means of philosophical thought. One of the most famous examples is *Blade Runner* (1982), where a group of cyborgs gains consciousness: this film encourages the viewer to re-examine her ideas about what humanity is, its significance and its boundaries. More recently, *Never Let me Go* (2010) does something similar with young clones, and *Her* (2013) presents the possibility of engaging with a robot in one of the most deeply human ways, i.e. by falling in love.

PHILOSOPHY THROUGH FILM

The interesting question is not only what philosophical ideas films can present, but also how films specifically present these ideas, differently from other art-forms or written texts. Films usually tell stories, and do so through images. The story form allows us to engage more personally and emotionally, living through a problem rather than understanding it only intellectually, and observing it from someone else's perspective; stories also present ideas embedded in contexts. Images are more striking and powerful ways of presenting possibilities, and presenting them as real.

In these ways and others, films can not only contain philosophical ideas, but enact them, and make us live through those ideas with them.

WANT TO READ MORE?

Check out Rupert Read's and Jerry Goodenough's edited collection *Film as Philosophy: Essays in Cinema after Wittgenstein and Cavell* (London: Palgrave Macmillan 2005) where you will find essays by the most influential philosophers of film today.

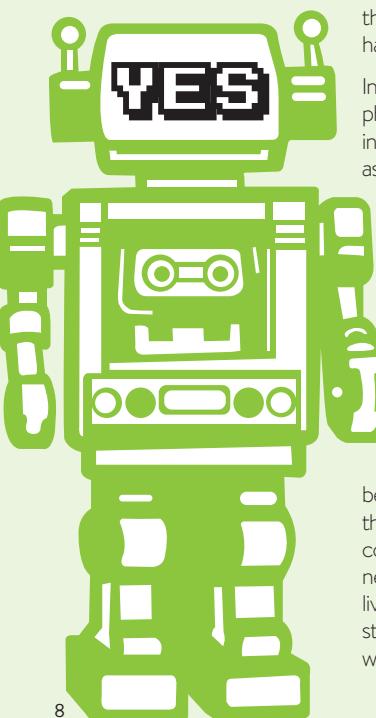
WANT TO KNOW MORE?

Take the 'Film as Philosophy' module as part of a Philosophy or Philosophy and Literature degree at UEA and discuss the many ways of thinking philosophically through films. Talk with Rupert about how films can change the way we think and live.

D1.

DEBATE 1: WILL WE EVER BE RULED BY ROBOTS?

There is increasing debate in our society about the 'rise of the robots'. Are our jobs going to be replaced by automation? Is 'artificial intelligence' going to become powerful enough to take over society itself? As films like Terminator envisage, could we even one day be ruled – dominated – by robots?



ROBOT OVERLORDS?: IT'S ENTIRELY POSSIBLE

by Dr. Gareth Jones,
Honorary Lecturer in
Philosophy at UEA

Let's immediately dispense with misleading anthropocentric notions of intelligence – what is at issue is capability, and it is unclear how not being alive, or lacking some overarching purpose that human life apparently has, will act as a limit.

In any event, whilst modern philosophers of mind do indeed regard computation as the best explanatory framework for thought, computers/brains can clearly also be embodied and process signals from the bodies and worlds which they inhabit. Why should they, then, not be capable of exhibiting and participating in the sorts of behaviour that Rupert takes to be beyond them? As for life, thought (according to the computational model, at least) need not be the product of a living thing, and for anyone to stipulate or assume otherwise would be to beg the question.

Similarly, physical issues to do with energy, pollution and material resources are unlikely to set limits on future technological progress – the last 50 years has been a tale of consistent rapid capability growth alongside consistent reductions in such resource requirements.

The interesting question is whether the future “dominance” of humans by technology will manifest itself suddenly at the point at which AI exceeds human capability in all meaningful ways (the “singularity”), or whether the shift in control from man to machine will emerge gradually. I think the former is entirely possible, but regard the latter as in any case inevitable.

The fourth industrial revolution will see the establishment of a ubiquitous intelligent network: trillions of linked and increasingly capable computers deployed throughout every type of infrastructure.

WE ALMOST CERTAINLY WONT EVER BE RULED BY ROBOTS

By Dr. Rupert Read, Reader
in Philosophy at UEA

Philosophical reflection offers two powerful reasons for thinking that the risk of humans being conquered by artificially-created beings is grossly over-stated:

Objection A: Artificial intelligence (AI) has become ‘clever’ enough to beat humans at chess. It has enormous computing-power, and this will grow larger. But computing-power is only simulated intelligence, not the thing itself. Actual intelligence requires understanding and knowledge, and these require purpose and point; they are not mere assemblages of information/data.

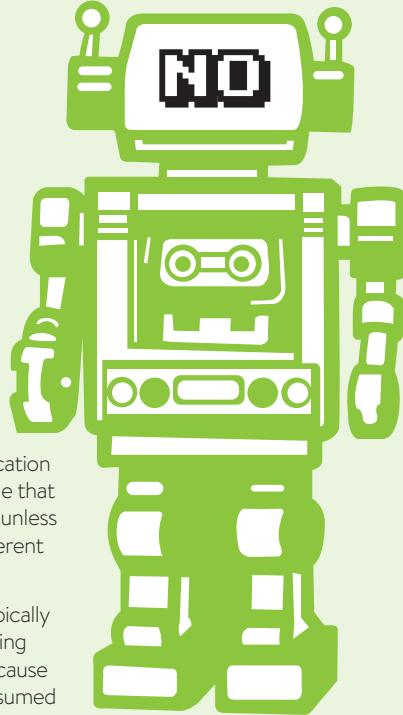
AI still lacks as much purpose or life-like character even as an amoeba. Until it has purpose, meaning, emotionality – until robots actually live and grow and suffer – they will not have any capacity whatsoever to actually think, or rule anything. The current AI paradigm has not taken even the first steps

towards this. The implication is that it is inconceivable that we will be ruled by robots unless AI takes a radically different direction.

Human beings have typically been poor at appreciating this line of thought, because they have too often assumed human life to be only mental and mentality in turn to be essentially a kind of computing. Our bodily and social existence, our reliance upon our emotions and sense of meaning in order for us to be able to actually accomplish anything at all, have too often been sidelined.

I think that artificial life, which eventually led to artificial intelligence, would need in key respects to be modelled on real life – not on computers.

Objection B: If, somehow, far vaster computing-power were to get around objection A, it would require far vaster material inputs even than it already requires. But this runs into a limit: the ecological limits of our Earth. If human beings keep trying to increase computing-



power, we will hasten our own destruction via first destroying our climate.

In other words: before we ever got near the point of being ruled by robots, we would have crashed our already highly-vulnerable ecosystems – bringing ourselves (and robots) down with them. To think that this won’t happen is to make the same mistake as the turkey makes who gets more and more confident about his long-term survival, the closer it gets to Christmas.

To think that the ‘progress’ of the last 50 years will continue indefinitely shows merely a lack of imagination and a hubristic over-confidence in our species’s abilities/powers.

Q3.

HOW DO WE TALK ABOUT THE IMPOSSIBLE?

PROFESSOR JOHN COLLINS

Professor of Philosophy at UEA

Language allows us to communicate with each other about our shared world. Yet much of what we seem to talk about cannot possibly exist. How can this be?

IMPOSSIBLE OBJECTS

Sally is packing for holiday; she says: (1) This book is really interesting, but too heavy to pack; I'll read it on-line.

That's a normal thing to say, but hang on! Is there a thing that is interesting, has weight, and can be on-line? Obviously not. What is interesting and readable on-line is the story, but what is heavy is the particular book. Nothing can be both abstract, like a story, but have weight, too. So, there are no books!

You've never been to London, either, and never will! Consider: (2) London is situated at the eastern end of the Thames Valley and tends to vote Labour.

Only people can vote, not geographical areas. So, there can be no object that has the two properties (2) claims of London. Goodbye London!

The same kind of reasoning applies to all nouns, so we appear to be left with nothing to talk about (devise your own examples for names of persons, animals, countries, etc.).

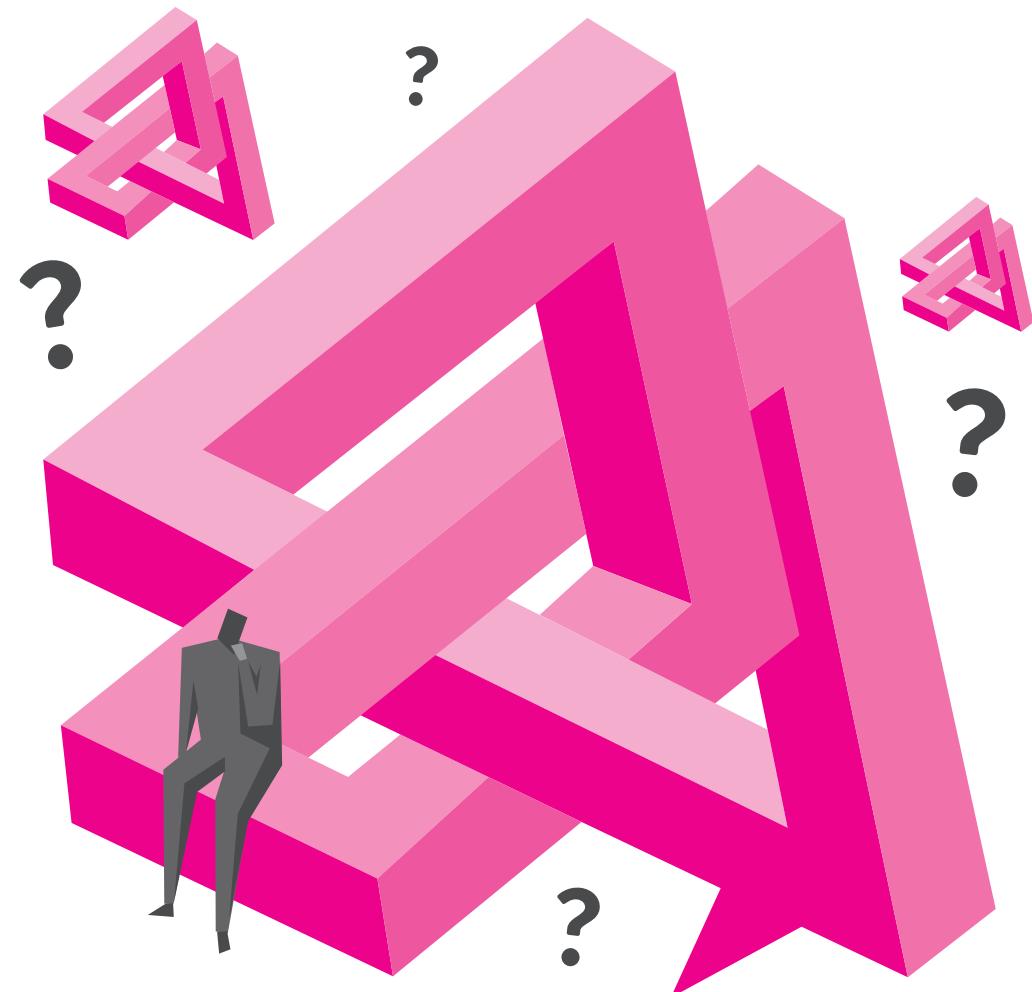
NO EASY ANSWERS

You might think there is no problem; after all, (1) and (2) are ordinary things to say, and no-one is confused. Right, but the problem is precisely why we are not confused given that we know that the world cannot contain objects that have

the properties we attribute to them. The ordinary is often more puzzling than the extraordinary.

A more sophisticated response might be that every noun is really ambiguous, exemplified by the familiar case of 'bank' (financial institution or side of a river). Genuinely ambiguous nouns, however, cannot simultaneously express their different meanings by a single occurrence.

We can't use 'bank' once in a sentence and refer to a financial institution and the side of a river. So, ambiguity is revealed by different occurrences of a noun having different meanings. In distinction, the examples of (1) and (2) precisely express different meanings by a single use of the nouns. Ambiguity, therefore, cannot be the answer.



A DIFFERENT PERSPECTIVE

One approach to the problem of our missing objects is not to doubt the world (it's OK, our library does have books in it), but to rethink how language works. Instead of thinking of words as labels for objects, think of them as offering a range of perspectives by which one may think of the world. Thus, cities can be

areas, populations, legal entities, and so on, just as books can be particular material objects and stories, not in themselves, from the perspective of aliens or physicists, but from the perspective of language-using creatures. Exploring the consequences of this kind of view is at the heart of much contemporary philosophy of language.

WANT TO READ MORE?

See John Collins's *The Unity of Linguistic Meaning* (Oxford University Press, 2011).

WANT TO KNOW MORE?

John Collins teaches the UEA module 'Language & Reality'.

Q4.

DOES NATURE HAVE ITS OWN VALUE?

DR TOM GREAVES

Senior Lecturer in
Philosophy at UEA



In the modern era value has often been thought of as essentially human in two senses.

We all know that we are living through a time of terrible ecological destruction. The human impact on the environment has become so great that many are now claiming that we have entered a new geological era: the Anthropocene, the era of human impact.

In this situation, how should we be thinking about the value of nature? Is there something about the ways we have thought about nature and value in the past that has helped to get us into the terrible situation? Might there be other ways of thinking about the value of nature that can help to undo some of the destruction?

HUMAN VALUES

In the modern era value has often been thought of as essentially human in two senses.

Firstly, there is the idea that things get their value from the process of human beings valuing them. Human beings project their wants and desires onto nature and that is the only value that nature has.

Secondly, it is often thought to follow from the idea that values are a human projection onto nature that all values must ultimately boil down to what is good for humans. After all, if value comes from the projection of human desires, then valuing anything in nature is simply part of the process of trying to fulfil our own desires.

INTRINSIC VALUES

That is why in recent years environmentalists have taken up an older tradition, claiming that things in the natural world have intrinsic value. The process of valuing is not one of projecting our desires onto nature, but of discovering the intrinsic value in nature.

But there are still problems with this vision of intrinsic value in nature. If values are simply there in things then it seems that any appreciation that humans and other creatures have of that value is incidental. The natural world might be just as valuable, and perhaps far better off, without any creatures capable of appreciating its value. Furthermore, the vision of intrinsic value can lead to a preservationist ethic that does not do justice to the dynamism of the natural world.

ECOLOGICAL VALUES

We have been developing a new way think about the value of nature. The idea is that value itself is ecological. That means that value is generated in the myriad relations between living creatures and their environments. These relations are dynamic and open to specific possibilities for change. So value is not a static property of things, nor is it narrowly confined to the projection of human desires.

A further crucial dimension to the value generated by ecological relations is introduced when there are creatures capable of an open-ended appreciation of those relations. Human beings and some other living creatures make ecological value possible through such open-ended appreciation.



WANT TO READ MORE?

See the recent article by Tom Greaves and Rupert Read: 'Where Value Resides: Making Ecological Value Possible': ueaepubs.uea.ac.uk/56910/1/Greaves_Read_Proof.pdf



WANT TO KNOW MORE?

Think about studying Environmental Philosophy as part of a UEA Philosophy degree.

D2.

DEBATE 2: SHOULD WE EAT ANIMALS?

By comparison with the general population, a greater proportion of philosophers are vegetarians or vegans than you would expect.

Why might a philosopher think that one should be avoiding eating animals? Are there some considerations that seem to make it irrational to do so, or immoral to do so?



WE SHOULD NOT EAT ANIMALS

By Prof. Gary Francione, Honorary Professor of Philosophy, UEA

I am opposed to eating animals for four reasons.

First, as a matter of conventional morality, most of us agree that it is wrong to impose suffering or death on animals unless it is necessary to do so. And there is no necessity to eat animal foods. Governmental and professional health organizations unanimously maintain that a sound plant-based diet is perfectly adequate (and may even be better) for human health. All of the suffering and death we impose on animals incidental to their use of food is unnecessary.

Second, we reject human slavery because we recognize that, if humans are property, they are excluded completely from the moral and legal community. Nonhuman animals are chattel property. There is no reason to deny to sentient nonhumans the one right that we accord to

all humans—a right not to be property. And that means we cannot eat, wear, or use them.

Third, animal agriculture is an ecological disaster. The argument that animal use may help us live more sustainably ignores the fact that animal agriculture accounts for 51% of global greenhouse gasses, and has other devastating effects on the environment.

Fourth, it takes many more pounds of plants to produce a single pound of animal protein; we could eradicate world hunger (and have fewer acres under cultivation) if we ate plants directly rather than feeding them to animals.

The idea that we can exploit animals ‘humanely’ is a fantasy. Because animals are property, we generally protect their interests only when there is a resulting economic benefit. This means that animal welfare standards will always be very low (as they have been and are now) and do little more than to ensure that animal exploitation is economically efficient.

WE SHOULD EAT SOME ANIMALS

By Prof. Catherine Rowett, Professor of Philosophy, UEA

I don’t think that we should rank human interests above animal interests. So I’m in favour of treating animals well, and I’m against putting profits above animal welfare. Factory farming that cages animals in crowded conditions, or prevents them from enjoying their natural habits, should be eliminated. Farm animals, fish and game should be reared in a healthy environment without antibiotics or imported feed. If that makes meat expensive, that’s just how it should be. Meat should cost what it actually costs for real, when someone, or our planet, is not being exploited.

But we should not become vegetarians or vegans. In my view, if we can’t feed the human population and still keep animals, then we’re unfairly taking space from animals. Animals have a right to live where they’ve always lived. We shouldn’t let the human population increase at their expense. We mustn’t privilege the human species

over other species and deny them the right to continue in their generations old symbiosis with us: that would be truly disgusting. So we must reduce the human population; reduce its excessive demand for food—much of it wasted; stop relying on maltreatment of others to feed our gluttony and lack of population control.

And besides, it makes no sense to think that humans could live better by killing off all the animals first. Animal dung is a natural fertiliser, whereas chemical fertilisers, sold for profit by global corporations, drive third-world farmers into permanent debt, and yield nutrient-deficient crops. Leather, bone, wool and so on make superior equipment, and (unlike the artificial substitutes) don’t end up polluting the land and sea. By pasturing sheep, shepherds make a living from land that’s otherwise unproductive, both here and abroad.

So in my view, you’re living ethically if your diet and clothing is made by local producers from local products, supporting a varied local economy, with all the

waste products ploughed back into the system. Somehow, in the West, affluent people seem prefer to waste their grazing land, put their fishermen out of a job, throw plastic into the sea, and ferry their food from the third world using dirty fossil fuels. That’s not commendable. It’s exploitation.

WANT TO READ MORE?

Catherine Osborne, *Dumb Beasts and Dead Philosophers: Humanity and the Humane in Ancient Philosophy and Literature*. Oxford University Press, 2009

WANT TO KNOW MORE?

Look at Gary Francione Philosophy Bites podcast: philosophybites.com/2012/10/gary-l-francione-on-animal-abolitionism.html

Q5.

WHAT IS GOODNESS?

OSKARI KUUSELA

Senior Lecturer in
Philosophy at UEA

Our daily lives are centred around the distinction between good and bad. If this distinction did not matter, one might just as well step under a bus instead of avoiding it. In all kinds of ways we care about, and are occupied with, how our lives go, and those of others, including animals and nature. So what is goodness, or badness, or evil?

THE UNITY OF GOODNESS

One way to pose this question is to ask, what binds into one unity a particular act of forgiveness, defending the weak against an attacker, or honesty of character, assuming they are all good? (Examples of different kinds can easily be multiplied.) What does the unity of good consist in, given it can be attributed to actions, agents, characteristics, and states of affairs? The history of philosophy knows many attempts to answer this question, for instance, by explaining how all these cases relate to an abstract notion of good, or how they all contribute to some ultimate good. Characteristic of modern theories is to articulate a principle in terms of which the unity of good is systematically explained. Thus, Kantians explain goodness with reference to an underlying moral

law derived from nothing but the notion of reason, and Utilitarians in terms of the maximisation of utility (for example, happiness or interest satisfaction). Socrates, Aristotle and other Ancients speak of reason-led self-development as the key to understanding goodness and being able to act accordingly. For a very long time these theories have stood against each other each claiming to hold the key to the sole right answer. Each contains deep insights, while also appearing problematic under the burden of having to explain all forms of (moral) goodness.



UNITY WITHOUT UNIFORMITY

This raises the question of whether the unity of goodness might be something more complex than any of the theories can explain on their own, and leads to methodological questions about the role of philosophical theories. An argument can be presented that goodness would be better explained, if the different theories (their specific theoretical assertions) were comprehended, not as truth claims that exclude one another as incompatible, but as instruments of clarification used to model a more complex reality. Each model helps us to understand the complex reality of goodness because it corresponds to some aspects of that reality and differs from other aspects of it.

WANT TO READ MORE?

Check out Oskari's books *Key Terms in Ethics* and *The Unity of Good* (forthcoming).

WANT TO KNOW MORE?

Study Moral Philosophy at UEA.

Q6.

ARE SOME RISKS TOO BIG TO TAKE?

RUPERT READ

Reader in Philosophy
at UEA

Some people are risk-averse. Others positively enjoy taking risks. Does this just come down to a matter of personal preference?

EXISTENTIAL RISK

What if you put your very life at risk? Provided that it is only your own life that you are putting at risk, maybe that's OK too. Although it is important to remember that no human being is an island; if you put your own life at risk, you are probably putting the happiness and health of others, beginning with your family and friends, at risk, too: because they will suffer, if you perish.

But what if you also put their lives at risk, at the same time? Or what if you put the lives of others who have no chance of avoiding the risk at risk too? Such as your companion animals, or innocent bystanders – or future generations?

It is unwise to cross a road without looking and listening, or blindfolded. Maybe you'll be fine; but it isn't very smart. But it is more than merely unwise to cross a road blindfolded while dragging your children and grandchildren along behind you. It is plain wrong. But that is in effect what you are doing, if you put the future itself at risk. By, for instance, embracing some very risky technology.

This is how philosophical reasoning suggests that some risks are too big to take, no matter how non-risk-averse you are as an individual.

THE PRECAUTIONARY PRINCIPLE AGAINST THE RISK SOCIETY

This form of reasoning is part of what's called 'the Precautionary Principle'. This Principle is a philosophical and legal tool in environmental risk management. As I interpret it, it claims that, when there is the potential for irreparable damage, uncertainty in the evidence should not be used as a reason against taking preventative (e.g. regulatory) action against new technologies/threats. This differs from the current dominant way of assessing risk, which requires that evidence of harm be proved before regulatory action is taken on potentially dangerous threats.

The past century has been characterised by uncertainty being used as an excuse to justify inaction on serious environmental threats. Most prominently, uncertainty in the evidence was a frequent 'justification' of inaction in the campaigns against regulation on cigarette smoking, ozone depletion, and manmade climate change. More recently, the lack of evidence of harm is often used as a 'justification' for the widespread use of genetically modified organisms.

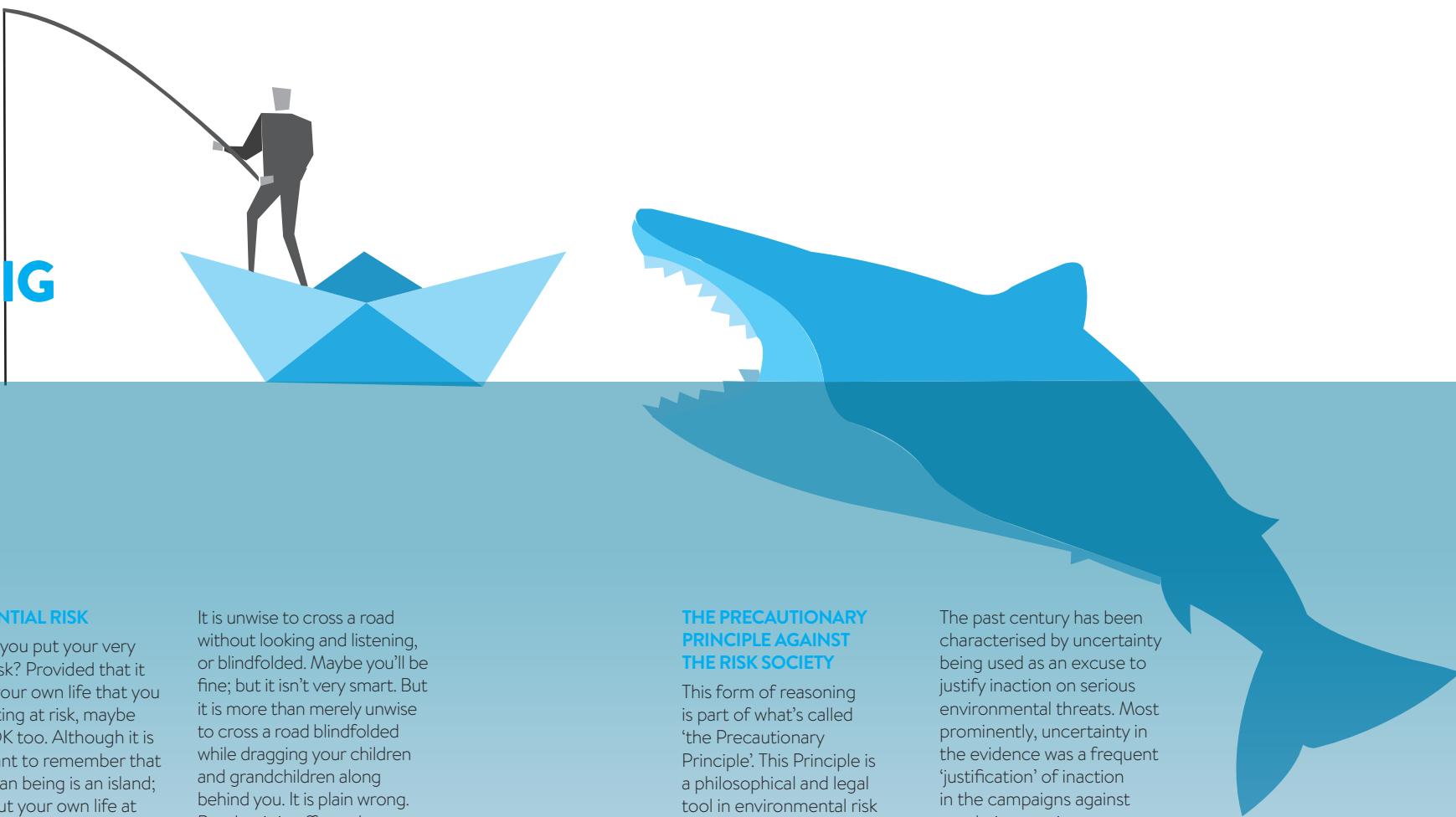
The philosophy of the Precautionary Principle undermines these 'justifications'.

WANT TO READ MORE?

Try www.theecologist.org/essays/2987436/the-precautionary_principle_the_basis_of_a_postgmo_ethical.html

WANT TO KNOW MORE?

UEA Philosophy teachers have a special interest in this area. You can access that interest in modules such as Philosophy of the Environment.



D3.

DEBATE 3: SHOULD WE BE RULED BY 'PHILOSOPHER- MONarchs'?

Famously, in his most famous work *The Republic*, the great thinker Plato offered an imaginary political system in which the task of ruling was to be assigned to people with a special aptitude for philosophy. Is this a good system? Ought we to have something like that? If we can't have that, ought we to try to approximate to it? Catherine Rowett recommends that we should, but Janosch Prinz thinks otherwise.

YES PLEASE!

By Prof. Catherine Rowett, UEA

A political system ruled by 'philosopher kings' was devised by Plato as an ideal, to avoid the risk of corrupt or stupid rulers. You might think democracy a safer bet, but Plato saw that democracy easily slips into tyranny: voters can be seduced by the rich and powerful on whom they depend; a rising dictator makes things seem attractive on the surface, and persuades the people to vote away their own autonomy.

By contrast, Plato's ideal community never resigns its autonomy to anyone: it works like your own body, with the different members consenting to assign relevant

responsibilities to those best equipped for them.

Just as in any important decision (e.g. choosing a university), you'd take advice from knowledgeable people, and think it through, not plumping for whatever appeals to your most childish desires, so when our politicians make decisions on our behalf, (e.g. whether to charge university fees), we'd want them to think things through with wise advice, not listen to their greediest paymasters.

So our question shouldn't be whether the people in charge should be wise, free of self-interest, with no financial gains from any decisions they take on our behalf, but rather how to make that happen.



NO THANKS!

By Dr. Janosch Prinz,
Leverhulme Post-Doctoral
Fellow in Philosophy, UEA

We should not desire rule by philosopher-kings – at least not now, not around here. The appeal of philosopher kings is that they would make decisions not based on the interests of parties or institutions, but on truth and right.

But their decisions would not be 'our' decisions. Politics is a historically formed range of activities: over the past

few hundred years politics, at its best, has been about finding compromise between conflicting groups: not truth or rightness, but resolving conflict has been its aspiration.

Realistically, we cannot expect impartiality in politics, but we can demand accountability; but for that to work, not just some 'philosopher kings', but all the citizens need to be invited to understand the issues and all must have a voice. Rather than hope for philosopher-kings, our best bet is to engage critically with our politics, so as to find a voice, and make sense of the frustration widely felt with current politics.

Many branches of philosophy can helpfully contribute to this: we can examine past and present ideas, learn about language, and understand the workings of our own minds and of society. After that we shall be well-placed to propose alternative models of politics.

WANT TO READ MORE?

Catherine Rowett 'Why the Philosopher Kings will believe the Noble Lie' *Oxford Studies in Ancient Philosophy* 50, Spring 2016, 67-100.

WANT TO KNOW MORE?

Come and study subjects such as Ancient Philosophy and Political Philosophy at UEA.

Q7.

HOW LARGE IS INFINITY?

DAVIDE RIZZA

Lecturer in Philosophy at UEA

Consider all positive, whole numbers 1, 2, 3, ... and all positive even numbers 2, 4, 6, ... How many even numbers are there? Are they fewer than the positive numbers?

FIRST ATTEMPT: EQUALITY OR INDISTINGUISHABILITY?

The sequence 1, 2, 3, ... has a first element, a second element, a third element, and so on, but no last element. We could call the first element a_1 , the second element a_2 , and so on. Using these new names, the sequence could be written as: a_1, a_2, a_3, \dots .

But now note that the sequence 2, 4, 6, ... has a first, second, third element, too, and no last element. We can assign these elements the names a_1, a_2, a_3, \dots , just as we did before. Then both the sequence 1, 2, 3, ... and the sequence 2, 4, 6, ... are described by: a_1, a_2, a_3, \dots .

If this description applies in both cases, then our two sequences are in some respect the same. We might think of them as being the same with respect to size: they would then have the same infinite size (this way of thinking plays an important role in modern mathematics). However, we might also think of them as indistinguishable relative to size, on account of the fact that we cannot carry out a 'full' comparison.

SECOND ATTEMPT: GRAINS AND HEAPS

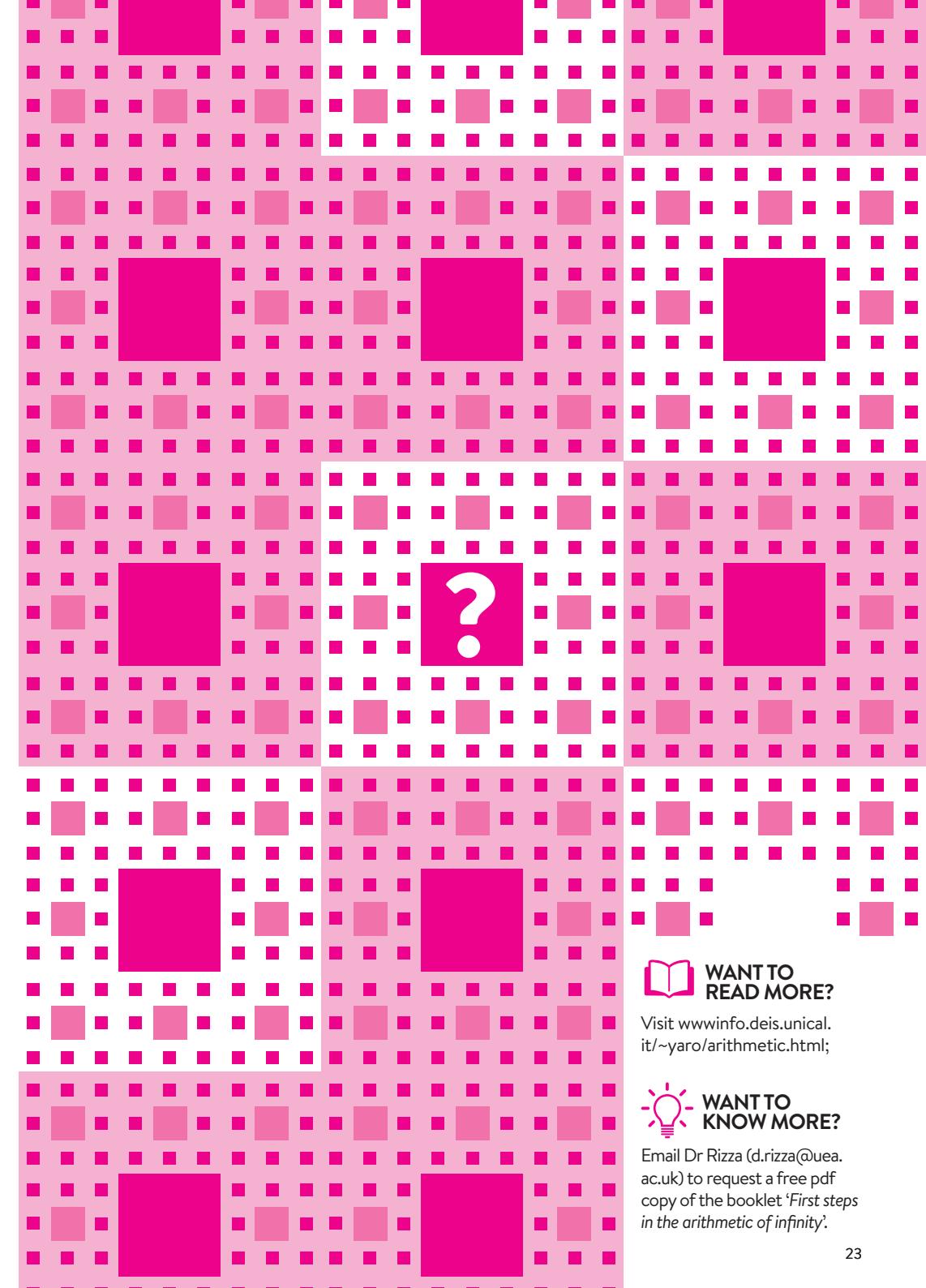
Think of the numbers 1, 2, 3, ..., as tiny grains forming a heap. If we try to evaluate the size of the heap using the grain as our unit of measure, there is no hope of success: we cannot count all grains.

If, however, we move to a different unit of measure – the heap, instead of the grain – we may well succeed. Thus, let the symbol ① (called 'gross-one') stand for the unit of measure of the infinitely

large 'heap' 1, 2, 3, Then the infinite collection 0, 1, 2, 3, ... has ①+1 elements (one heap plus one grain) and is therefore larger than 1, 2, 3, ... (i.e., larger than one heap), whereas the infinite collection 2, 3, 4, ... has ①-1 numbers and is smaller than 1, 2, 3,

When we delete one in every two numbers from the sequence 1, 2, 3, ... we obtain 2, 4, 6, ..., namely a halved heap, which will contain ①/2 numbers. Thus, there are fewer even numbers than positive, whole numbers, but we can only express this fact in a new numerical notation based on ①.

With this new notation, recently introduced by the mathematician Yaroslav Sergeyev, it is possible to distinguish numerically sizes of infinity and to develop new mathematical ideas and models.



WANT TO READ MORE?

Visit wwwinfo.deis.unical.it/~yaro/arithmetic.html;

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Email Dr Rizza (d.rizza@uea.ac.uk) to request a free pdf copy of the booklet 'First steps in the arithmetic of infinity'.

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