
DOUGLAS WALTON AND THE COVID-19 CRISIS

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Abstract

As we reflect on the work of Douglas Walton, I want to encourage readers of this journal to look beyond the usual applications of logic and consider the domains of medicine and health. It is testimony to the intellectual breadth of Walton's ideas in argumentation theory and fallacies that his work should find a home in medical and health disciplines, particularly epidemiology and public health. In this paper, I examine three areas of Walton's theoretical approach to argument and fallacies that I have found most beneficial to my work on reasoning in public health. First, Walton's collaboration with John Woods resulted in a new, rigorous program of fallacy research. Integral to this new approach to the fallacies was the characterization of non-fallacious variants of most of the major informal fallacies. Second, Walton advocated for a third category of presumptive argument to sit alongside deduction and induction, with plausibility as the standard of rational evaluation. Many so-called informal fallacies, he contended, are rationally warranted presumptive arguments in the practically oriented contexts in which they are advanced. Third, Walton argued that presumptive arguments like the argument from expert opinion can be scrutinized using critical questions during systematic reasoning. They may also bypass critical questions and facilitate a quick leap to a conclusion based on one or two explicit premises during heuristic reasoning. Each of these three areas in Walton's work is discussed in the context of medicine and health, with illustration provided by the current Covid-19 pandemic.

1 Introduction

Douglas Walton passed away suddenly on 3rd January 2020. The day before he died, a colleague in my academic department in Hong Kong emailed me to say a novel virus had emerged in Wuhan, China. No doubt guided by her experience of the SARS outbreak in 2003, an episode that left an indelible impression on the memory of all

citizens of Hong Kong, my colleague warned me to pay attention to hand hygiene, especially before eating and when returning indoors. I immediately thanked her for getting in touch and went online to see if I could read anything further about this new virus. The *South China Morning Post* carried the story. It reported that health officials were linking early cases of a viral pneumonia to a seafood or ‘wet’ market in Wuhan, a central Chinese city some four hours by high-speed rail from Hong Kong. The market had been closed and the World Health Organization had been informed of the outbreak. I phoned my parents in the UK about the outbreak as I knew this story would be of interest to my mother. As I spoke to her, I felt hopeful that the health authorities in China would be able to bring the outbreak under control quite swiftly and before there would be significant loss of life and transmission of the virus outside of Wuhan. My assessment could not have been more wrong [18].

Douglas Walton did not live long enough to witness the horror of what was to become the Covid-19 pandemic. Some might say, fortunately so. But the purely coincidental timing of his death with the start of this global health emergency has forced me to think about what his applied approach to logic would make of some of the responses to this viral pandemic. Individuals, communities and governments have reacted in ways that seem to characterize human responses to crises — goodwill and determination are expressed by all parties, but actions are invariably confused and delayed, often with devastating consequences. Douglas Walton never set out in his work to address public health responses to global pandemics. Artificial intelligence and legal reasoning were much more likely to excite him. But Doug was very much concerned with the many practical applications of argumentation. As Covid-19 moves with frightening speed around the world, leaving a trail of death and hardship in its wake, it is undoubtedly the case that there is no more pressing application of logic and argumentation right now than to the domain of public health. If Doug were alive today and were witnessing the human loss and substantial economic damage caused by this viral pandemic, I am sure he would be loath to disagree. It is because of the depth and scope of his work that I have been able to apply his ideas to problems in medicine and health. It is in recognition of his substantial contribution to argumentation theory and beyond that I write a paper for this special issue of the *Journal of Applied Logics*.

There are three areas of Walton’s work that I want to explore in this paper. They concern ideas that have been influential in my own research on reasoning in medicine and health. The first area is Walton’s early work with John Woods on the fallacies. The recognition that the fallacies are not only an area of inquiry worthy of serious study but also that non-fallacious variants of these arguments are part of our daily discourse was a springboard for my thinking about the UK’s public health response to the emergence of bovine spongiform encephalopathy (BSE) in British

cattle. The second area is Walton's views on the standard of reasoning and argument that is best suited to deliberations in the practical sphere. For Walton, that standard is plausible argument. Plausible reasoning makes it possible to address a wide range of thinking in medicine and health that does not conform to deduction and induction but that is no less worthy in consequence. The third area is Walton's later work on the fallacies as heuristics. If we take plausible reasoning and its practical contexts seriously, we must engage with the demands that these contexts place on reasoners. They include the need to conduct reasoning based on the best available evidence, according to time constraints, and with maximally effective use of a reasoner's cognitive resources. These are the hallmarks of heuristics, as Walton rightly acknowledged. I will conclude by arguing that the view of fallacies as heuristics in reasoning finds one of its most important applications in medicine and health.

2 Rethinking the fallacies

Writing in 1970, Charles Hamblin is rightly credited with launching the modern study of the fallacies [21]. Hamblin's frustration with the 'standard treatment' of the fallacies, which he described as 'debased, worn-out and dogmatic a treatment as could be imagined' (p. 12), ushered in a new, systematic approach to the study of fallacies. However, in an important respect Hamblin's treatment of the fallacies was also tradition-bound (one of the criticisms he levelled at the standard treatment). For even as he criticised the approach to fallacies in introductory logic textbooks, he still subscribed to the view that these arguments were errors of reasoning that should be prohibited. Indeed, his formal dialectic was designed to do just that, with fallacies such as *petitio principii* (begging the question) effectively outlawed by means of dialectical rules [17]. Hamblin saw the need for a more systematic approach to the study of fallacies without also seeing the need to overturn the long-held view that arguments like *petitio principii* are inherently fallacious. In failing to challenge this assumption of generations of logicians and philosophers before him, Hamblin's approach, although bold, did not go far enough. It took early work by Douglas Walton and John Woods to force a re-examination of the logical merits of the fallacies and put the analysis of these arguments on a truly promising path.

And so there began a transformative episode in the history of the fallacies. Like Hamblin, Woods and Walton were unambiguous about the inadequacies of the standard treatment, describing it as an 'embarrassment' that was 'bereft of theory' and laden with 'hackneyed examples' [50, p. 133]. They advocated a broadening of the scope of philosophical logic to accommodate the dialectical and epistemic frame-

works needed to capture the logical weaknesses in informal fallacies [51]. However, alongside these frameworks, a more benign view of the fallacies was beginning to take shape for these theorists. Dialogical and other frameworks struggled to prohibit the types of dialectical sequences that give rise to many of the most common fallacies. If these frameworks could not prohibit circles in argument, for example, then maybe the logical conclusion to draw is that such circles are not so fallacious after all. This is how Walton captured the direction that his thinking was taking in relation to *petitio principii*, a direction that put him at odds with the traditional view of this argument as a logical fallacy [34]:

“[I]n the Hintikka games, like the Hamblin and Rescher games of dialogue, it remains unclear whether arguing in a circle is wrong (vicious, fallacious). Or if it is a wrong type of move or strategy in argument, it remains unclear why, or exactly when, if ever, it is wrong. The most reasonable conclusion generally seems to be that circular argumentation may be quite permissible in dialogue, for it appears to violate no general rule of reasonable dialogue, nor would it seem to frustrate the objectives or strategies of good dialogue” (pp. 267-268).

Woods and Walton would go on to characterize non-fallacious variants of most of the major informal fallacies, including circular or question-begging argument, the argument from ignorance, slippery slope, *ad baculum*, appeal to popular opinion, and *ad verecundiam* [34, 35, 36, 37, 38, 39, 40, 41, 42, 45, 46, 47, 48, 49]. Fallacy theorists identified reasonable forms of these arguments in fields like law, economics, palaeontology, and ethics, not to mention more mundane contexts of everyday reasoning. I could see the explanatory potential of this new approach to fallacies for understanding reasoning in epidemiology and public health and proceeded to analyse a range of informal fallacies in these contexts. This included the argument from ignorance [2, 6, 7, 10, 15], analogical argument [7, 3, 5, 11, 12], appeal to authority [10, 13, 14], circular argument [12, 9, 16], *ad baculum* or fear appeal [8], slippery slope argument [17], and *post hoc ergo propter hoc* [17], as well as two fallacies not included in the standard list [4]. The contexts of these analyses were the BSE crisis in the UK, the emergence of HIV/AIDS, and issues as wide-ranging as the prescription opioid epidemic, human genetic engineering, and microbial resistance.

To illustrate how informal fallacies may be used non-fallaciously in health contexts, we can do no better than turn to the current Covid-19 situation. In textbox (A) below, Dr van Kerkhove, an infectious disease epidemiologist at the World Health Organization, is describing the current state of development of serological tests for the detection of Covid-19 antibodies. She uses a *no evidence* statement. Clearly, her aim is to try and warn countries that are looking to these tests as a

means of establishing immunity that currently available serological tests cannot be used for this purpose. Dr van Kerkhove’s *no evidence* statement functions as the premise in an argument from ignorance:

Textbox (A)

Source	Dr Maria van Kerkhove, infectious disease epidemiologist, World Health Organization, 18 April 2020
“There are a lot of countries that are suggesting using rapid diagnostic serological tests to be able to capture what they think will be a measure of immunity. Right now, we have no evidence that the use of a serological test can show that an individual has immunity or is protected from reinfection.”	

Argument from ignorance

There is *no evidence* that current serological tests can establish an individual’s immunity.

Current serological tests *cannot* establish an individual’s immunity.

Is this argument from ignorance rationally warranted? The answer to this question depends on the satisfaction of two conditions: a closed-world assumption and an exhaustive search criterion. For the closed-world assumption to be satisfied [27], Dr van Kerkhove and her colleagues at WHO would need to know what serological tests are currently available, if these tests can accurately measure antibodies present in blood serum, and if these antibodies can confer immunity on an individual. These three areas constitute the knowledge base on Covid-19 that must be present for the closed-world assumption to hold in this case.

The World Health Organization almost certainly had this knowledge of serological tests at its disposal. With its expertise in diagnostics, WHO would be aware of the serological tests that are available for Covid-19 antibody testing. Dr van Kerkhove and her colleagues also knew that these tests can accurately measure the presence of Covid-19 antibodies in blood serum. She remarked: “These antibody tests will be able to measure that level of seroprevalence — that level of antibodies — but that does not mean that somebody with antibodies, means that they are immune.” But as the remainder of Dr van Kerkhove’s statement indicates, the presence of antibodies does not necessarily establish that an individual has immunity to Covid-19.¹ In fact, this is not a question that a serological test alone can even

¹Dr van Kerkhove of the World Health Organization was not alone in urging caution about antibody tests and what they can tell us about a person’s immunity to Covid-19 (re)infection. On 14 April 2020, journalist Jennifer Smith in the Mail Online reported Carlos del Rio, Executive Associate Dean of the Emory School of Medicine in Georgia, as saying: “Just because you have antibodies

address. It requires knowledge of the antibody status of large numbers of people as well as epidemiological and clinical evidence of Covid-19 (re)infection rates in people with and without antibodies. To the extent that the presence of antibodies alone cannot address the issue of immunity, it is *a fortiori* the case that serological tests cannot establish an individual's immunity.

Based on these considerations, the closed-world assumption is fulfilled for the above argument from ignorance. The knowledge that is needed to assess serological tests is in the Covid-19 knowledge base. But we are not done. For there is a second condition that must be fulfilled, and that is an exhaustive search of the Covid-19 knowledge base. It is important to emphasize that this condition relates only to the knowledge base at a certain point in time, namely, when Dr van Kerkhove produced her statements about serological testing. Clearly, as more research is conducted into Covid-19, we can expect the knowledge base on this virus to expand considerably. But this expanded knowledge base can play no part in the rational evaluation of Dr van Kerkhove's ignorance argument. Are there grounds for claiming that Dr van Kerkhove and her colleagues had exhaustively searched the Covid-19 knowledge base that existed on 18 April 2020? Once again, we can answer this question in the affirmative. As an infectious disease epidemiologist for WHO, Dr van Kerkhove could be expected to have studied in some detail research findings about Covid-19 that would have amassed by 18 April 2020. This includes what was known about Covid-19 serological tests by this stage. With this second condition also fulfilled, we can reasonably assert that Dr van Kerkhove used a non-fallacious argument from ignorance when discussing Covid-19 serological testing.

The type of argument analysis that has allowed us to conclude that Dr van Kerkhove used a non-fallacious argument from ignorance might appear unremarkable to present-day fallacy theorists. But it would have been a marked departure from the analysis undertaken in the standard treatment of the fallacies and conducted by certain contemporaries of Woods and Walton. (Robinson, for example, steadfastly rejected arguments based on ignorance [28].) It was only possible because theorists like Walton saw the potential of analysing arguments in the actual contexts in which they were used. This forced a re-examination of the *standards* used to evaluate argument, with a new focus on presumptive and plausible models of argument. It is to this second aspect of Walton's work that I now turn.

doesn't mean you have immunity" [29]. Kelly Wroblewski, the Director of Infectious Diseases at the Association of Public Health Laboratories, also remarked of antibody tests: "Everybody is being optimistic you have some sort of sustained immunity for at least the ensuing months to a year. But it is still somewhat an assumption." [29]

3 A new type of argument

To make progress in understanding the fallacies, Walton recognized that how we evaluate reasoning and argument had to undergo a profound change. Deductive reasoning with its certain and known propositions (premises) providing deductive warrant for a claim (conclusion) seemed strangely at odds with the real-life contexts in which we all engage in reasoning. In these contexts, arguers are constrained by the evidence that *is* available to them and not by evidence that *might* be available to them in an ideal world. Arguers are also constrained by temporal considerations that preclude extended deliberation of an issue and that draw a process of reasoning to a close often before claims can be exhaustively debated and tested. We are much more likely to accept claims on a tentative basis and reject them should contrary evidence emerge rather than suspend judgement until such times as we have deductively certain or inductively probable claims within our grasp. Against a deductive or inductive standard of argument, many perfectly reasonable arguments, including so-called fallacies like the argument from ignorance, can appear flawed and not worthy of acceptance. But rather than dismiss these presumptive and plausible arguments, Walton urged us to take issue with the narrow conception of rationality that leads us to view them as inadequate [43]:

“We are so accustomed to the basing of our notion of rationality on knowledge and belief, we tend to automatically dismiss plausibility as “subjective”, and therefore of no worth as evidence of the kind required to rationally support a conclusion. The modern conventional wisdom is used to thinking of rationality as change of belief or knowledge guided by deductive reasoning and inductive probability. This modern way of thinking finds the notion of plausibility alien or even unintelligible, as an aspect of rational thinking” (p. 151).

Presumptive and plausible arguments are closely connected with actions and decisions in the practical sphere. Practically situated reasoners must often make decisions in advance of investigations during which evidence is gathered. In a public health context, the need for action and decisions can be particularly pressing. Decisions to impose, extend or lift lockdowns to prevent Covid-19 transmission, for example, are currently taxing the best public health authorities in the world. Governments and scientists charged with making these decisions must do so tentatively in the absence of complete evidence, whilst being aware that any delay could have disastrous health and economic consequences. Decision-making in the practical sphere cannot await claims arrived at by deductive and inductive reasoning. Presumptive reasoning can warrant actions and give decision-makers some foothold on

an issue or problem, with the promise that if things proceed well, claims can grow in epistemic stature.

To get a sense of the epistemic terrain occupied by presumptive argument, we return to the Covid-19 pandemic. In response to growing public concerns that ibuprofen may be exacerbating Covid-19 infection, the Department of Health and Social Care in the UK reported the conclusion of an expert working group, the Commission on Human Medicines (CHM), on the matter. This expert body concluded that, at the present time, there was insufficient evidence that ibuprofen and other non-steroidal anti-inflammatory drugs posed risks in terms of Covid-19 infection. The argument put forward by the Department of Health and Social Care took the form of an argument from authority:

Textbox (B)

Source	Department of Health and Social Care, UK, 14 April 2020
“The Commission on Human Medicines (CHM) Expert Working Group on coronavirus (COVID-19) has concluded that there is currently insufficient evidence to establish a link between use of ibuprofen, or other non-steroidal anti-inflammatory drugs (NSAIDs), and susceptibility to contracting COVID-19 or the worsening of its symptoms.”	

Argument from authority

The CHM has expertise in human medicines and their health effects.

The CHM asserts that there is currently insufficient evidence to associate ibuprofen with worsening of Covid-19 symptoms.

Therefore, it is true that ibuprofen cannot currently be associated with worsening of Covid-19 symptoms.

The argument from authority is another of the so-called informal fallacies. But if, like Walton advises, we look beyond a notion of rationality founded on deduction and induction, we can begin to see its rational merits. The conclusion of this presumptive argument is a tentative claim based on two premises. Walton captures the premises and conclusion of the argument from expert opinion in the argumentation scheme in Figure 1 [41]. Implicit in the first premise is the assumption that the Commission on Human Medicines also has expertise in the Covid-19 health effects of ibuprofen. Although ibuprofen is a well-known drug that has been used for many years to treat inflammation and pain, not even an expert body like the Commission on Human Medicines could reasonably claim to *know* its effects on a recently emergent virus like Covid-19. But while *knowledge* of these effects was not possible in the early months of the Covid-19 pandemic, it is not true to say that members of the Commission on

Human Medicines could make no claim whatsoever about the Covid-19 health effects of ibuprofen. However, such claims as they did make had to be advanced tentatively and in the knowledge that they might need to be revised as new evidence emerged about the virus. This tentative commitment towards the Commission’s conclusion was further signalled through its use of the word ‘currently’. By means of this wording, the Commission is explicitly indicating that its present assessment of the Covid-19 health risks of ibuprofen may be shown to be incorrect and may need to be revised at a later point in time.

Major Premise:	Source E is an expert in subject domain S containing proposition A
Minor Premise:	E asserts that proposition A (in domain S) is true (false).
Conclusion:	A may plausibly be taken to be true (false)

Figure 1: Argumentation scheme for argument from expert opinion [41, p. 210].

For Walton, the argument from authority or expert opinion can shift the weight of presumption in a dialogue in favour of accepting the proposition or claim advanced by an expert, be that an individual or, as in this case, a body like the Commission on Human Medicines. But that presumption only holds for as long as the individual or body with expertise can respond satisfactorily to critical questions [36]. These questions are designed to interrogate an authority’s expertise along several parameters such as an expert’s competence and personal integrity. They also challenge us to consider if the expert’s area of expertise is relevant to the question-at-issue, in this case the Covid-19 health effects of ibuprofen. If the expert can adequately respond to these questions, then there remains a presumption in favour of the truth of the proposition or claim advanced by the expert. If a critical question cannot be satisfactorily addressed, then the presumption in favour of the expert’s claim must be retracted. For example, if it were to be discovered that several members of the Commission on Human Medicines were in receipt of undeclared payments from the UK’s largest pharmaceutical manufacturer of ibuprofen, then it is difficult to imagine how the Commission could address a critical question about its personal integrity and independence. In that case, we would expect the presumption in favour of the safety of using ibuprofen during Covid-19 infection to lapse and to return to the side of those who would question its safety.

Quite apart from its typical characterization as a fallacy, the argument from authority may be a rationally warranted presumptive argument in certain contexts of use. But the argument from authority or expert opinion is not unique in this regard. For every informal fallacy may be a rationally warranted presumptive argument

when assessed in the practical contexts in which they are advanced. These contexts are characterised by a practical imperative to come to judgement on an issue — also to take actions and to make decisions — often in the absence of knowledge and before extensive evidence has been obtained. Early in the Covid-19 pandemic, the Department of Health and Social Care in the UK also sought to address safety concerns of people who take certain high blood pressure medications. Two groups of these drugs — angiotensin converting enzyme inhibitors and angiotensin receptor blockers — were raising safety concerns as it was thought that they may exacerbate Covid-19 infection. The Department of Health and Social Care issued guidance on the matter on 27 March 2020. Its guidance took the form of an argument from ignorance:

Textbox (C)

Source	Department of Health and Social Care, UK, 27 March 2020
“If you are taking angiotensin converting enzyme inhibitors (ACE inhibitors or ACE-i) or angiotensin receptor blockers (ARBs) to treat high blood pressure, it is vitally important you continue your usual treatment.	
Whilst some media reports and publications have suggested that treatment with ACE-I or ARBs might worsen COVID-19 infection, there is no evidence from clinical or epidemiological studies to support this.	
We recognise the concern the COVID-19 outbreak is causing, and we are working closely with the Commission on Human Medicines and other regulatory bodies to ensure we can respond with further advice on this issue, <u>should any new data emerge.</u>	
It is vital that anyone currently taking these medicines to treat their medical condition, continues to do so.” (Bold and underlining added)	

Argument from ignorance

There is *no evidence* that ACE-I and ARBs worsen Covid-19 infection.

Therefore, ACE-I and ARBs do not worsen Covid-19 infection.

Like the argument from authority before it, this argument from ignorance is a rationally warranted presumptive argument. Its conclusion, that certain groups of blood pressure medications do not worsen Covid-19 infection, is a tentative claim based on the minimal evidence base on Covid-19 that existed in March 2020. But a tentative claim can still be rationally warranted and have some traction within

our deliberations. It is not the final statement on a matter but the first statement that can be revised as new evidence emerges. That the Department of Health and Social Care intended their conclusion about these medications to be just that — a tentative claim based on limited evidence that may later need to be revised — is suggested by their remarks that they would amend their advice *should any new data emerge*. Early clinical and epidemiological studies, combined with advice from expert advisory groups like the Commission on Human Medicines, succeeded in shifting the presumption in argument in favour of the claim that certain blood pressure medications do *not* worsen Covid-19 infection. But if a critical question can expose a weakness in these studies or the expert advice received, then this claim must be withdrawn and the presumption in favour of the safety of these drugs no longer holds. Imagine, for example, it was discovered that clinical and epidemiological studies only examined people on these medications who recovered from Covid-19 infection. Then the presumption in support of the safety of these drugs would have to be retracted to reflect the new evidential situation at hand.

4 Walton on heuristics

With Walton’s emphasis on practical reasoning and plausible standards, it was not entirely surprising that he should turn his attention to heuristics [44]. Heuristics already had a long-established presence in the cognitive scientific literature by the time Walton began to discuss them in argumentation theory. In the now classic investigations of Tversky and Kahneman [32], it was found that people use heuristics to simplify probabilistic information: ‘Many decisions are based on beliefs concerning the likelihood of uncertain events [...] people rely on a limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations’ [32, p. 1124]. Although these heuristics can lead subjects to the correct answer, they may also be a source of error or bias in how people assess probabilities. One such error is known as the gambler’s fallacy, the belief that random processes self-correct: ‘if [a random] sequence has strayed from the population proportion, a corrective bias in the other direction is expected. This has been called the gambler’s fallacy’ [33, p. 193]. More recently, theorists have challenged the idea that heuristics are associated with error. It has been shown that simple heuristics can perform comparably to, and in some cases better than, more complex decision mechanisms [19, 20]. As Todd and Gigerenzer remark [31]:

‘[W]e show how simple building blocks that control information search, stop search, and make decisions can be put together to form classes of heuristics, including: ignorance-based and one-reason decision making

for choice, elimination models for categorization, and satisficing heuristics for sequential search. These simple heuristics perform comparably to more complex algorithms, particularly when generalizing to new data'. [31, p. 727]

This finding challenges a widely held assumption in cognitive science and elsewhere that performance in decision-making and problem-solving is in direct proportion to the amount of information that is available to cognitive agents — conversely, that when cognitive agents make errors in these domains, this is invariably a consequence of them having insufficient knowledge, information or data at their disposal. That reduced information can lead to enhanced cognitive performance is an important insight into the nature of our rational procedures that was not lost on Walton. It finds expression in Walton's notion of a parascheme in argumentation theory.

According to Walton [44], most of the informal fallacies are associated with an argumentation scheme and a corresponding parascheme. The argumentation scheme is part of a newer (in evolutionary terms) cognitive system which operates in a controlled, conscious and slow manner. This scheme asks critical questions of arguments, questions which are likely to expose logical weaknesses, if such weaknesses exist. The parascheme is a shorter version of the argumentation scheme. It is part of an older cognitive system which uses fast and frugal heuristics to achieve solutions to problems. Some of these heuristics involve jumping to conclusions, a cognitive strategy that can work well enough on some occasions but results in errors on other occasions. Walton demonstrates this view of the fallacies as heuristics in relation to the argument from expert opinion. The parascheme of this argument omits assumptions, exceptions and one ordinary premise that are integral to the corresponding argumentation scheme. By neglecting these aspects, which confer a slow, deliberative character on reasoning, an arguer can employ a fast heuristic to the effect 'if it's an expert opinion, defer to it' [44, p. 170]. This heuristic is depicted in Figure 2.

I have argued that informal fallacies play a role in both systematic and heuristic reasoning in medicine and health [17]. Public inquiries are a type of systematic reasoning par excellence. These inquiries often take many months or even years to complete. The UK's public inquiry into the BSE crisis took three years to complete [1]. They can gather evidence from several hundred witnesses, some of whom submit written statements, while others are directly questioned by the inquiry team. Large volumes of documents are scrutinized at length to obtain answers to questions. The aim is to arrive at the truth of the matter with no stone unturned in the search for truth. Public inquiries of this type are quite common in medicine and health. They are often used to investigate governments' handling of health issues where considerable harm has occurred to patients and their families (e.g. the blood

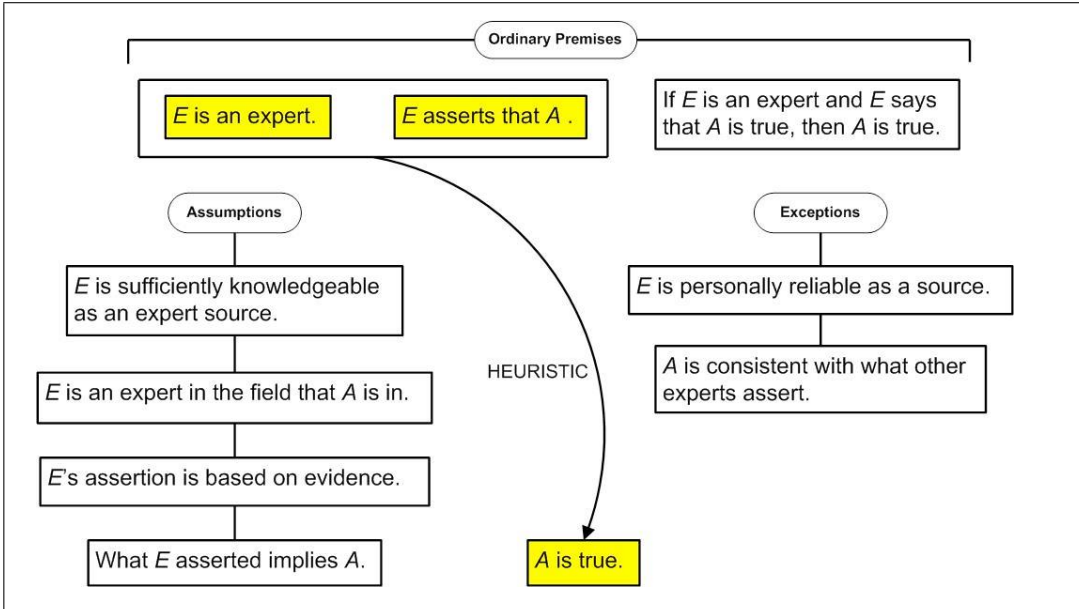


Figure 2: Heuristic of argument from expert opinion, taken from Walton [44, p. 170] (The permission of the editors of *Informal Logic* to reproduce this diagram is gratefully acknowledged.)

scandal in the UK in which thousands of children and adults received blood products infected with HIV and hepatitis). As I write, there are calls by politicians and health professionals for an inquiry to be conducted into the UK Government's handling of the Covid-19 pandemic [26]. If this inquiry comes about — all indications are that it almost certainly will — its chairperson and members will have powers to call forward and interrogate witnesses and access communications not normally seen by the public. Members of the inquiry team will use critical questioning of the type envisaged by Walton. The outcome will be a set of conclusions that the public can be confident are based on the most detailed examination of the evidence possible.

Public inquiries are not the only context for systematic reasoning in medicine and health (see Cummings for discussion of systematic reviews [17]). But they illustrate very clearly why this type of reasoning is poorly equipped to address many of the most pressing challenges that arise in health. These inquiries are costly in economic and cognitive terms, with significant amounts of money needed to execute them and input from hundreds of government officials and health experts required. Public inquiries also rarely deliver their conclusions in a prompt fashion. In fact, many often exceed by a considerable margin the timeframes to which they were expected to

operate. What public inquiries achieve in terms of critical scrutiny and deliberation of an issue is often outweighed, sometimes grievously so, by the costs incurred and time taken to conduct them. These inquiries are better suited to an investigation of historical events (e.g. responses to a pandemic that has passed) rather than events that are still unfolding. The reasoning that health experts must use to make decisions about how to handle the Covid-19 pandemic, as the disease transmits with alarming speed around the world, is more akin to heuristic reasoning. Extended deliberation conducted through detailed critical questioning is a cognitive luxury that many public health agencies dealing with Covid-19 can ill afford. Investigators need to use mental shortcuts in reasoning that can bypass critical questions. I have argued that these shortcuts or heuristics are none other than the informal fallacies [17, 10, 16].

To illustrate what is involved in this view of the fallacies as heuristics, let us return to the Covid-19 pandemic. The Centers for Disease Control and Prevention (CDC) in the USA presented a series of clinical questions on its website. One question examined those groups who were most likely to experience severe clinical outcomes as a result of Covid-19 infection. The CDC acknowledged that the available data on Covid-19 was ‘currently insufficient’ to address this question but that certain groups could nevertheless be identified ‘based on data from related coronaviruses’. The coronaviruses in question are Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome (MERS-CoV). The CDC used an argument from analogy to draw conclusions about Covid-19 from what was already known about SARS-CoV and MERS-CoV:

Textbox (D)

Source	Centers for Disease Control and Prevention, USA, 16 April 2020
Who is at risk for severe disease from COVID-19?	
“The available data are currently insufficient to clearly identify risk factors for severe clinical outcomes. Based on limited data that are available for COVID-19 patients, and data from related coronaviruses such as severe acute respiratory syndrome coronavirus (SARS-CoV) and MERS-CoV, people who may be at risk for more severe outcomes include older adults and persons who have certain underlying chronic medical conditions. Those underlying chronic conditions include chronic lung disease, moderate to severe asthma, cardiac disease with complications, diabetes, or immunocompromising conditions.”	

Argument from analogy

SARS-CoV and MERS-CoV are human coronaviruses that pose serious risks for older adults and those with underlying chronic medical conditions.

Covid-19 is a human coronavirus.

Therefore, Covid-19 will pose serious risks for older adults and those with underlying chronic medical conditions.

If this argument were part of a process of systematic reasoning based on critical questions, we would interrogate, to the fullest extent possible, the presumed similarity between Covid-19 and the two better known coronaviruses, SARS-CoV and MERS-CoV. We might ask about the genetic composition of these viruses, how they replicate in the cells of a host, and how transmissible they are. We might also ask about the mortality rates associated with each virus, if people infected with these viruses may be asymptomatic, and if people who are asymptomatic can still transmit these viruses to others. We might also consider if it is possible to establish immunity to Covid-19 infection and the other human coronaviruses. Answers to some of these questions may strengthen the presumed similarity between Covid-19 and the SARS and MERS coronaviruses. For example, on 12 January 2020, China publicly shared the genetic sequence of Covid-19, so scientists could be certain of the genetic similarities of this new coronavirus to other human coronaviruses. Answers to other questions may suggest significant differences between these coronaviruses. For example, SARS and MERS have mortality rates of more than 10% and 35%, respectively [30]. Although the exact mortality rate of Covid-19 is still to be determined, it looks likely that it will be lower than that of either SARS or MERS.² The reason Covid-19 is taking such a large toll in human life, one much higher than either SARS or MERS, is that it is more transmissible than either of these other human coronaviruses.³ These differences in mortality and transmissibility may weaken any presumed similarity between Covid-19 and the SARS and MERS coronaviruses.

During systematic reasoning, every possible similarity and difference between Covid-19 and the SARS and MERS coronaviruses can be extensively investigated. Some of these investigations may deliver findings quickly. For example, we already know the respective genetic sequences of these viruses. Other investigations may take much longer to produce findings. We still do not know, for example, if people who develop Covid-19 infection can develop immunity to the disease that might protect

²A case fatality rate of 2.3% is reported for Covid-19 based on data obtained from the outbreak in Hubei province in China at the start of 2020 [23].

³The transmissibility of an infectious disease is indicated by its reproductive number. A reproductive number of 2 indicates that each infected person infects two more people. The reproductive number for Covid-19 is between 2 and 2.5. For SARS, it is between 1.7 and 1.9, while for MERS it is <1 [25].

them from reinfection at a future point in time. But the important point is that the CDC could not await the outcome of these different investigations before issuing public health advice about the groups who are most at risk of severe outcomes of Covid-19 infection. This is because this advice must be disseminated early in the course of the pandemic in order to shield certain groups against infection. Against this urgent backdrop, the CDC carried out its public health role by drawing a tentative analogy between Covid-19 and two better known human coronaviruses. This analogy was not true beyond all doubt. But it was also not without rational warrant. It was already supported, for example, by what was known about the genetics of Covid-19 and some preliminary evidence in other areas, such as that asymptomatic people appeared to transmit the virus [22, 24]]. But with so much still unknown about this novel coronavirus, the CDC could not exclude the possibility that it may need to retract its tentative analogy at a later point in time. However, in the meantime, it provided a rational basis upon which to licence important public health advice, any delay of which could have had serious consequences for human health.

The CDC's analogy functioned as a mental shortcut or heuristic in its reasoning about Covid-19. It allowed scientists to bypass extensive critical questions about the virus that would only serve to delay urgent health advice to the public. That Covid-19 is a coronavirus was enough for the CDC to establish the analogy with SARS and MERS and go on to advise that older adults and those with underlying chronic medical conditions are most at risk of adverse outcomes from this novel virus. This quick judgement based on incomplete evidence has all the hallmarks of a 'fast and frugal' heuristic. Reasoning is not slowed down by extended consideration of evidence but can respond with speed and agility to a serious, emerging health crisis. In the final analysis, Covid-19 may be found to be a coronavirus with properties that are significantly dissimilar from other human coronaviruses. These dissimilarities may substantially shift the extent to which we can base conclusions about the likely behaviour of Covid-19 on other human coronaviruses. This situation arose in the UK's BSE crisis, for example, when an analogy between scrapie (a brain disease in sheep) and BSE in cattle was found to be flawed in a way that had direct relevance to public health — only BSE was transmissible to humans and yet public health advice was based almost entirely on the non-transmissibility of scrapie [6]. But even if an analogy between Covid-19 and other human coronaviruses must eventually be retracted, it nevertheless provides the CDC with a rationally warranted presumption on which to base its public health advice (see Figure 3).

What You Can do if You are at Higher Risk of Severe Illness from COVID-19

Are You at Higher Risk for Severe Illness?



Based on what we know now, those at high-risk for severe illness from COVID-19 are:

- People aged 65 years and older
- People who live in a nursing home or long-term care facility

People of all ages with underlying medical conditions, particularly if not well controlled, including:

- People with chronic lung disease or moderate to severe asthma
- People who have serious heart conditions
- People who are immunocompromised
 - Many conditions can cause a person to be immunocompromised, including cancer treatment, smoking, bone marrow or organ transplantation, immune deficiencies, poorly controlled HIV or AIDS, and prolonged use of corticosteroids and other immune weakening medications.
- People with severe obesity (body mass index (BMI) of 40 or higher)
- People with diabetes
- People with chronic kidney disease undergoing dialysis
- People with liver disease

Here's What You Can do to Help Protect Yourself



Stay home if possible.



Wash your hands often.



Avoid close contact (6 feet, which is about two arm lengths) with people who are sick.



Clean and disinfect frequently touched surfaces.



Avoid all cruise travel and non-essential air travel.



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Call your healthcare professional if you are sick.

For more information on steps you can take to protect yourself, see CDC's [How to Protect Yourself](https://www.cdc.gov/coronavirus/2019-nCoV/how-to-protect-yourself.html).

cdc.gov/coronavirus

Figure 3: Health advice to people most at risk of severe Covid-19 infection (reproduced courtesy of the Centers for Disease Control and Prevention in the USA)

5 Postscript

It is often the case that ideas can have their most profound impact in places far removed from where they first took root. Douglas Walton's work in fallacy theory, both in collaboration with John Woods and independently, has resulted in one of the richest lines of inquiry into this area of logic that has ever been undertaken. But neither philosopher could have foreseen that they were developing an approach to the study of the informal fallacies that some forty years later would be applied to problems in medicine and health. In fact, not only to medicine and health but also, as this paper has demonstrated, to the greatest health crisis to affect the world in over 100 years, namely, the Covid-19 pandemic. It is a sign of the depth of Walton's thinking on the fallacies, and argumentation theory more generally, that this cross-fertilization with issues in medicine and health has been possible. Douglas Walton has undoubtedly made a significant contribution to logic and argumentation theory as well as legal reasoning and artificial intelligence. All those who have directly worked with him, or been influenced by his ideas, can testify to that contribution. But, as I hope to have conveyed in this discussion, one of Walton's most enduring contributions in the final analysis may be to public health and epidemiology. I have taken considerable inspiration from his ideas when addressing issues in these medical and health disciplines. It is my fervent hope that other argumentation theorists will do likewise in the years to come. This would be a fitting tribute to a truly great scholar.

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