

Circular Reasoning in Public Health¹

El razonamiento circular en la Salud Pública

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Abstract: Public health must continually invent new ways to make its science accessible to the public and its benefits transparent for all. One of the ways in which this can be achieved is through the development of new modes of reasoning. An expansion of our rational resources is made possible by the emergence of disciplines such as informal logic which have brought hitherto neglected forms of reasoning to prominence. One such form is circular reasoning. Although question-begging or circular argument has exercised philosophers and logicians over two millennia, the idea that this argument can function as a facilitative heuristic in our reasoning is a largely new one. The paper examines the historical development of this argument which has seen it emerge from a much maligned position in logic to its role as a beneficial cognitive heuristic in our deliberations about public health problems. The results of a study of public health reasoning are reported. This study confirms that lay people are adept at recognizing the conditions under which circular arguments are more or less rationally warranted. Where circular arguments are judged to be rationally warranted, it will be

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demonstrated that this is on account of their perceived benefits for the wider process of inquiry of which they are a part.

Keywords: Circular argument, heuristic, informal fallacy, public health, uncertainty.

Resumen: La salud pública debe continuamente inventar nuevas formas de hacer para que su ciencia sea accesible al público y sus beneficios transparentes para todos. Una de estas formas en las que esto puede alcanzarse se obtiene del desarrollo de nuevos modos de razonamiento. Una expansión de nuestras fuentes racionales se hace posible a través del desarrollo de disciplinas tales como la lógica informal que se ha preocupado por formas de razonamiento que fueron comúnmente negadas. Una de esas formas es el razonamiento circular. Aunque el razonamiento circular ha entrenado a filósofos y lógicos por más de dos mil años, la idea de que este argumento puede funcionar como heurística facilitadora en nuestro razonamiento es claramente una nueva idea. Este trabajo examina el desarrollo histórico de este argumento que lo ha visto emerger de una posición mucho más maligna en lógica contraria a la que lo concibe como una heurística cognitiva beneficiosa para nuestras deliberaciones sobre problemas de salud pública. Aquí se reportan los resultados de un estudio sobre éste razonamiento en salud pública. Este estudio confirma que la gente común puede reconocer las condiciones bajo las que los argumentos circulares están más o menos justificados racionalmente. Se demostrará que esto es así sobre la base de los beneficios percibidos para un proceso más amplio de cuestionamiento del cual ellos son una parte.

Palabras clave: Argumento circular, falacia informal, heurística, incertidumbre, salud pública.

1. Introduction

Public health must continually seek new ways to engage the populations it serves. From the communication of health risks to securing compliance with public health interventions, this engagement depends on a vast range of cognitive and technical resources. In an age of increasing technological sophistication, one cognitive resource which continues to be significant is reasoning. Our rational resources still represent our best prospect of addressing the various health challenges that confront us. But in saying this, a revision of these resources is now needed. Deduction is no longer the only, or even the dominant, form of reasoning in public health. And inductive reasoning can sometimes appear to have limited utility in public health when a lack of knowledge and uncertainty precludes even the cal-

culuation of probabilities.² In taking a fresh look at the rational resources we bring to problems in public health, it is proposed that we expand those resources to include several ‘new’ forms of reasoning. These novel modes of reasoning include a much disparaged group of arguments known as the informal fallacies. These arguments include question-begging or circular argument,³ the argument from ignorance and appeal to force, among many others. It will be argued in this paper that what unites these fallacies are logical features which fall short of a deductive logical standard (hence, their fallaciousness), but which nonetheless have the capacity to navigate the uncertainty that is a feature of many public health problems. To this extent, it will be contended that these arguments – and circular argument in particular – are performing an important heuristic function within public health reasoning. This function has been all but completely neglected in logical analyses of circular argument.

The paper will unfold along the following lines. It begins with a brief discussion of the call in public health for new modes of reasoning to address the increasingly complex health problems faced by human populations. Circular or question-begging argument, it is contended, can play a part in responding to this call. There follows an overview of some of the historical views which have been prominent in philosophical analyses of question-begging argument. For the most part, these views have held this argument in rather low regard. Its weakness is typically characterized as a dialectical or epistemic flaw. We will examine attempts to characterize the error in this reasoning as well as efforts to proscribe circles in reasoning. With the emergence of informal logic, the overwhelmingly negative evaluations of question-begging argument which had dominated the literature began to give way to more positive characterizations of this fallacy. While most circular arguments were still considered to be fallacious, some of

² Fischbacher-Smith et al. (2010: 31) make this same point as follows: ‘How can we put a probability on something we have not imagined and for which no established models exist? In other words, how can we know what we don’t know? To label such risks as ‘uncertain’ implies that there should be confidence limits to our understanding. The more radical (and troublesome) possibility is that such risk categories cannot be understood since they present potentialities that we do not – and cannot – envisage’.

³ Other names for circular argument include *petitio principii*, question-begging argument, *circulus probandi* and arguing in a circle.

these arguments were viewed for the first time as non-fallacious within certain contexts of use. The work of the informal logicians who spearheaded this alternative approach will be briefly considered. However, even many of these theorists could not anticipate the most recent evolution in the development of this fallacy. This evolution casts circular argument in the role of a cognitive heuristic in reasoning. In this role, circular argument is not just non-fallacious but confers significant gains on the cognitive inquiries of which it is a part. These gains will be illustrated by an examination of the role of circular argument in an important episode in the UK's public health, the emergence of BSE in British cattle. Finally, to the extent that circular argument is serving as a *cognitive* heuristic, it must have some psychological reality for cognitive agents. This issue is investigated in a study of public health reasoning in members of the public.

2. New modes of reasoning in public health

Few fields have been as receptive to ideas from social scientific and humanities disciplines as public health. Sociological concepts and theories have helped to shape our understanding of the pervasive influence of class, race and gender on the health of populations. One humanities subject – philosophy – has had particular relevance to the concerns of public health. Beyond the obvious contribution of philosophy in areas like ethics, philosophy can also contribute valuable insights to public health on issues such as the nature of knowledge and reasoning. A closer integration of philosophy with public health is urged by Christakos et al. (2005: 66) as a means of addressing the challenging public health issues of the day:

‘In the end, public health scientists may find themselves acting as a kind of *applied philosopher*. The interdisciplinary, multi-cultural, and multi-objective nature of the world could leave them with no choice. Indeed, regardless of how technical or formal their research may be, they will always need to gain intellectual access to issues such as the nature and reliability of knowledge, the conceptions of reality, the reasoning mode, and the underlying methodological assumptions’ (italics in original).

Christakos et al. give particular prominence to ‘the reasoning mode’ within

their discussion of the current paradigm in epidemiology and public health. It is clear from several comments that they view new forms of thinking and reasoning as a means of overcoming problems with this paradigm:

‘[N]ew ways of thinking are needed to establish an improved public health methodology based on genuine interdisciplinary interactions and intellectual exchanges’ (2005: 3-4).

‘[O]ne can hardly overestimate the importance of the argumentation modes and styles of reasoning under conditions of uncertainty, for they form an essential part of the background intellectual context of public health inquiry’ (2005: 55).

The new argumentation modes and styles of reasoning include logical procedures not typically found in deductive (formal) logic. Nevertheless, they play a vital role in the epistemic cognition schema which Christakos et al. (2005: 22) aim to develop as part of a cognitive science of human health:

‘[T]he epistemic cognition schema is more general than the logical one, because it involves representations and procedures (diagrams, visual images, mental metaphors, etc.) that may not be found in formal logic’.

Christakos et al. are not alone in pressing for an expansion of the rational resources that we bring to problems in public health. Vaughan and Tinker (2009: S329) are supportive of a central role for non-deductive reasoning strategies in public health communication:

‘Unless a communication plan is compatible with the affected populations’ reasoning strategies, often characterized by different decision rules or simpler heuristics to assess the validity of risk information, then even the most valid and reliable scientific information may be ignored, minimized, or processed in a way that results in unanticipated public responses’.

This call for new modes of thinking and reasoning in public health is not without rational basis. For there is now substantial empirical evidence to suggest that when thinking about public health problems, both experts and lay people draw on reasoning strategies which are not found in deductive

logic.⁴ This has been amply demonstrated in the case of the bovine spongiform encephalopathy (BSE) epidemic in the UK, where expert scientists and the general public were shown to use non-deductive reasoning strategies to arrive at judgements about the risks of this disease to human health (Cummings, 2002a, 2004, 2005, 2009, 2010a, 2011, 2012a, 2012b). These strategies included arguments from ignorance and authority and circular and analogical arguments, to name but a few. Extensive use is made of a further non-deductive reasoning strategy, the fear appeal argument, in public health communication (Cummings, 2012c). People have been shown to use metaphorical reasoning in relation to public health issues such as obesity (Barry et al., 2009) and cancer (Downs et al., 2009). In addition to these various non-deductive strategies, there is now a well-developed literature on the use of heuristics in public health reasoning. Trumbo (2002) found that subjects used heuristic reasoning in an assessment of risks that were communicated in epidemiological information about cancer rates. Subjects have also been found to employ heuristic reasoning when assessing risks posed by a semi-hypothetical industrial facility (Johnson, 2005) and by genetically modified food crops (Wilson et al., 2004). These various studies demonstrate that modes of reasoning other than deduction are already a vibrant area of enquiry in public health. The current paper aims to make a contribution to this area by examining the role of circular argument in public health reasoning.

3. Approaches to circular argument

In a circular argument, one assumes the conclusion-to-be-proved within the premises of the argument. The arguer who assumes the conclusion has not presented reasons for it. He has simply 'begged for' the conclu-

⁴ It is interesting to note that this same observation has been made in other domains. Disciplines such as linguistics (specifically, utterance interpretation in pragmatics) and psychology (Johnson-Laird, 1983) are cases in point. De Beaugrande and Dressler (1981: 93-94) remark of the former as follows: 'Humans are evidently capable of intricate reasoning processes that traditional logics cannot explain: jumping to conclusions, pursuing subjective analogies, and even reasoning in the absence of knowledge....The important standard here is not that such a procedure is logically unsound, but rather that the procedures work well enough in everyday affairs'.

sion – hence the name of the fallacy. Despite a burgeoning philosophical literature on circular or question-begging argument,⁵ it continues to provoke puzzlement for those logicians who study it. Part of this puzzlement is related to the fact that circular argument is alone amongst the fallacies in being formally valid *and* fallacious.⁶ This paradoxical feature has prompted efforts to produce formal and non-formal models of this argument. These models not only attempt to capture the fallaciousness of circular argument but also contain rules and criteria which prohibit circular sequences in argument. The sheer number of these models precludes a comprehensive examination of them in the current context. Nevertheless, discussion of the main approaches which have been adopted in analysing this fallacy will be undertaken. These approaches can be broadly classified as (1) epistemic analysis; (2) semantic analysis; (3) psychological analysis; (4) rhetorical analysis; (5) pragmatic analysis and (6) dialectical analysis. Each of these approaches has a very different emphasis. The rules on the use of speech acts in a pragma-dialectical analysis, for example, differ markedly from the concept of epistemic seriousness in an epistemic analysis. Yet, we will consider each of these approaches in turn for the distinctive insights that they can contribute to our understanding of this argument. Although these approaches are unified by a concern to proscribe circular argument, we will also consider attempts by a number of informal logicians to characterize non-fallacious variants of this argument. The features of these variants which permit them to function non-fallaciously in certain contexts of use have particular relevance to attempts to characterize circular argument as a cognitive heuristic. In section 4, these features will be examined within an account of the heuristic function of circular argument.

⁵ Since the emergence of informal logic, circular or question-begging argument has consistently been studied more than any other fallacy. Johnson and Blair (1985: 186) stated that '[o]ver the past five years researchers have been refining the accounts of the informal fallacies. Begging the question continues to be a preoccupation...'. The five-year period to which Johnson and Blair refer is from 1978 to 1983. This same preoccupation with question-begging argument is again evident in Schmidt's (1987) bibliography of the fallacies. At 28 entries, begging the question accounts for the highest number of entries for any fallacy. In Hansen's (1990) informal logic bibliography, 31 entries are devoted to begging the question, which is second only to the category 'all fallacies other than the 'ad' fallacies and begging the question'.

⁶ Woods and Walton (1975: 107) state that '[a]rguments of the form 'p, therefore p' always or nearly always beg the question, yet their formal validity is impeccably reflected in standard first-order logic'.

3.1. Epistemic analysis

Central to an epistemic analysis of circular argument are the notions of *knowledge* of or *belief* in the premise(s) and conclusion of an argument. These notions are formalised within some epistemic accounts of this fallacy and are given a non-formal treatment in other accounts. Jacquette (1993: 322) pursues a formal analysis of question-begging argument within the resources of epistemic logic. This analysis depends on a relation of epistemic presupposition which involves the concept of justified belief:

‘(1) *Argument A is circular or begs the question* if and only if *A* contains premise *P* and conclusion *C*, and *P* presupposes *C*.

(2) *P presupposes C* if and only if it is not *justified to believe P* unless it is *justified to believe C*.

The revised definition of epistemic presupposition can be symbolized in an adequate theory of justified belief, formalized in epistemic-doxastic logics’ (italics in original).

Sanford (1972: 198) argues that ‘[b]egging the question [...] is not a purely formal matter’. He advances ‘degree of reasonable confidence’ as his epistemic criterion of question-begging argument:

‘A primary purpose of inference is to increase the degree of reasonable confidence which one has in the truth of the conclusion. This purpose can be accomplished only if the antecedent *degree of reasonable confidence* (DRC) the inferer has in the premisses and in the proposition that the premisses imply the conclusion is higher than his antecedent DRC in the conclusion. This condition is not satisfied if either his belief in the premisses or his belief that the premisses imply the conclusion is based on his prior belief in the conclusion’ (Sanford, 1981: 150; italics in original).

Biro (1977) proposes a non-formal epistemic analysis of question-begging argument. His analysis employs a concept of ‘epistemic seriousness’. This is a feature of arguments ‘which has to do with the relative *knowability* of

premisses and conclusion' (1977: 264; italics in original). An epistemically serious argument, Biro contends, should be able to show us that something we did not know was true, is true by virtue of it following from something we know is true. Question-begging argument fails in this regard:

'An argument's ability to do this presupposes that its premisses *can be known*, are *knowable*, independently of its conclusion being known, and BQC [begging-the-question criticism] is a claim that in the case under consideration this is not so' (1977: 264; italics in original).

For Walton and Batten (1984), arguing in a circle violates a requirement of evidential priority in argument. A proposition can only function as a premiss in an argument to the extent that it is better known than the conclusion. This cannot occur if the premiss is the conclusion:

'The assumption is that the evidentiary wellknownness of A, in order to make A of utility as a premiss, must be prior to that of B. Once the deduction is granted however, the value of B should be adjusted upwards to a plausibility value equal to (and not greater than) A. Once A has been so utilised as a premiss for B however, B could never be used as a premiss in an argument that has A as a conclusion. Reason: to be useful as a premiss, the value of B must be greater than that of A. But as was just shown above, the value of B should not be greater than that of A, if A has been used as a premiss for B in a previous deduction. Thus arguing in a circle, from A to B, and then subsequently from B to A, violates some requirement of *evidential priority*' (1984: 154; italics added).

Each of the epistemic concepts pursued within this analysis is attempting to capture a key feature of any 'good' argument: a conclusion can only be proved or established through the use of premisses which are better known than the conclusion. If the premisses or some part thereof *is* the conclusion, then this requirement cannot be met. Concepts such as evidential priority and epistemic seriousness certainly hold of most argumentative contexts. If the aim is to establish a claim by adducing reasons, the premisses which express those reasons must be well known or, at a minimum, better known than the claim they are intended to support. But there are other argumentative contexts in which these same epistemic concepts must be held in suspension. At the outset of a scientific inquiry, for example, there may

be few, if any, well-known propositions. In the absence of such propositions, a requirement for evidential priority serves only to stall an inquiry. An inquiry which is stalled from the outset may have few implications for the resolution of a theoretical issue. But where the aim of an inquiry is to address a pressing public health problem, any delay in its implementation and progress may present considerable risks to human health. We will return to these epistemic concepts in section 4 when we come to characterize the heuristic function of circular argument. In the meantime, it is already clear that this function of circular argument will involve a suspension of concepts such as evidential priority.

3.2. Semantic analysis

The emphasis of a semantic analysis of circular argument is on the *truth* and *falsity* of the propositions which constitute the premises and conclusion of this argument. This analysis also includes notions such as *soundness* and *validity* and is closest to a traditional (deductive) view of argument. Sanford (1981: 149) describes the semantic criteria (what he calls ‘constitutive conditions’) of argument analysis as follows:

‘Constitutive conditions: (i) p; (ii) p implies q’. Condition (i) states that p is true. ‘Some writers apply the term “sound” to arguments which satisfy both constitutive conditions, of which the second covers the currently well entrenched sense of “valid”’.

Semantic concepts such as truth and validity have particular relevance to circular argument. It was described above how circular argument is deductively valid notwithstanding its fallaciousness. So the flaw in this argument cannot be captured in terms of the truth or falsity of the propositions which constitute its premises and conclusion. Nor is the error in circular reasoning attributable to any ‘fault of demonstration’, as Perelman remarks (1982: 21-22):

‘To be concerned with the audience’s adherence to the premises of the discourse is to commit the gravest error: *petitio principii* or begging the question. This error, traditionally considered a logical fault, is not a fault of demonstration, because it has nothing to do with the truth or falsity of the propositions that constitute a line of reasoning. The affirmation if

p, then p, stating that a proposition implies itself, is not only true but is a fundamental logical law: it is the principle of identity’.

The deductive validity of circular argument is already something of a paradox. How can an argument be deductively valid and yet be flawed as a form of reasoning? But a further paradox is evident in the following claim on the part of some logicians: all deductively valid syllogisms are question-begging and, hence, fallacious in nature. This claim has attracted considerable historical attention as well as the views of present-day logicians. In Book II, Chapter iii of *A System of Logic*, John Stuart Mill poses the question ‘Is the syllogism a *petitio principii*?’ Mill states that ‘[i]t must be granted that in every syllogism, considered as an argument to prove the conclusion, there is a *petitio principii*’. According to Woods and Walton (1975), the origin of ‘Mill’s dictum’ is to be found in Mill’s institution of epistemic properties in the place of semantic properties of argument:

‘...What Mill may have been struggling clearly to perceive was that the inference-theoretic counterpart of what we know as truth-functionality just is circularity [...] The moral, of course, is that inference does well to steer clear of the epistemic analogues of truth-functionality’ (1975: 113).

This debate is an interesting one which cannot be examined further in the present context. But it does have relevance for the view of circular argument as a cognitive heuristic which will be developed subsequently. The essence of Woods and Walton’s charge against Mill is that he has instituted (incorrectly) an epistemic conception of inference on the truth-functional (semantic) relations that properly obtain in a deductively valid syllogism. In so doing, he has mistakenly represented a deductively valid argument as a form of reasoning that is circular and fallacious in nature. This same misapplication of evaluative criteria to arguments has seen many rationally warranted arguments characterized as fallacies or errors of reasoning.⁷ In-

⁷ The tendency to apply an incorrect standard to the evaluation of arguments, and then condemn arguments as fallacious when they fall short of this standard, has been widespread in logic and argumentation. Finocchiaro (1981: 15-16) remarks of this practice as follows: ‘[L]et us examine the second element of textbook accounts of fallacies, the description of various devices which I wish to call by the neutral term of “disputed practices”.

deed, many of the so-called informal fallacies appear not so fallacious after all when an appropriate logical standard is applied to their analysis. This is the essence of attempts to characterize non-fallacious variants of most of the informal fallacies. It is also the essence of the view that when assessed in certain contexts and according to appropriate criteria, several informal fallacies including circular argument are not only non-fallacious, but actually confer gains on the cognitive inquiries of which they are a part. We will return to this point subsequently.

3.3. Psychological analysis

While psychological studies of deduction and induction abound,⁸ few investigations have examined the psychology of informal fallacies such as circular argument. This section will briefly consider two approaches to the psychology of informal fallacies. (Of course, the experiment reported in section 5 is also a psychological study of these fallacies.) The first approach is a cognitive analysis of fallacy advanced by Dale Hample. Hample (1982) begins his analysis with an overview of psychological studies into the cognitive processes of language reception and memory. According to Hample, these studies give weight to his claim that ‘a message can only stimulate a fallacy; the actual fallacy is a *cognitive event*’ (1982: 59; italics in original). Hample uses Allan Paivio’s dual coding theory to develop this view. This

One problem with these descriptions is that they are usually prejudicial in the sense that their fallaciousness is built right into their description...There is a pattern in these biased descriptions, and it is the following. If the disputed practice is a type of inductive argument, namely one claiming that the conclusion is only strongly, but not conclusively, supported by the premises, then the practice will be described as a type of deductive argument, namely one claiming that the conclusion is conclusively supported by the premises. If the disputed practice is a type of what might be called a partial argument, namely one claiming that the conclusion is only partly, but not too strongly supported by the premises, then the practice will be described as a type of allegedly inductively strong argument...the pattern (or shall I say the fallacy?) is that of exaggerating the strength of the connection claimed between various assertions...’.

⁸ Philip Johnson-Laird and colleagues have conducted extensive investigations of the psychology of deduction. These studies include fallacies of deduction such as denying the antecedent and affirming the consequent. The reader is referred to Johnson-Laird and Byrne (1991) for an extensive discussion of this work. Some of the earliest and most influential studies of the psychology of induction have been undertaken by Amos Tversky and Daniel Kahneman. The reader is referred to a significant article by Tversky and Kahneman (1974).

theory is a general theory of information processing. It draws a distinction between the processing of concrete and abstract (two modes of) information. According to Hamble (1982: 75-76), a rhetor can effectively encourage his audience to commit certain fallacies by altering the concreteness of the message which he emits:

‘By altering the concreteness of a message, a rhetor can determine which mode the audience uses for the text. Since the two codes operate differently, each has the potential to draw some kinds of inference and to miss others. The kinds of implications noticed in each mode are at least generally predictable. This means that the speaker can control what kinds of implications his/her text will stimulate by choosing the appropriate level of concreteness’.

Hamble advances what he claims are testable examples of this effect. Among these examples are the *post hoc ergo propter hoc* fallacy (literally, ‘after this, therefore because of this’) and fallacies of conditional reasoning, both of which fall within Hamble’s category, the fallacy of the forced image. Causality and conditionality, Hamble argues, are problems which are ‘naturally verbal’. As such, they are problems which are optimally processed by the verbal (abstract) system. However, when the verbal processing of these relations is forcibly subordinated to the nonverbal (concrete) processing of these relations, as is the case when subjects are asked to image causality and conditionality, Hamble argues that dual coding theory predicts that errors such as the *post hoc ergo propter hoc* fallacy and fallacies of conditional reasoning will occur. Hamble’s discussion continues with an examination of several studies which appear to support his claims in this regard.

A quite different psychological analysis of the fallacies is offered by Van Eemeren et al. (2009). Unlike Hamble, this approach does not attempt to characterize fallacies as cognitive events. Rather, the psychological dimension of this investigation consists in the attempt to elicit the views of ordinary arguers concerning fallacious argumentative moves. Pragma-dialectical argumentation theory, which will be examined below, provides the theoretical framework for this empirical investigation. In this theory, fallacies consist in discussion moves that hinder the resolution of a difference of opinion in a critical discussion. Among the fallacies examined by Van Eemeren et al. are the *ad baculum*, *ad hominem* and *ad misericordiam*

fallacies. As illustration of this approach, in one study 17 members of staff of the ING Bank in Amsterdam were asked to judge the reasonableness of a number of *ad hominem* fallacies. These managers judged fallacies to be substantially more unreasonable than non-fallacies. The direct attack form of *ad hominem* was judged to be least reasonable, followed by the indirect type and finally the *tu quoque* variant of the fallacy. Only the *tu quoque* variant was deemed to be an unreasonable move in a scientific discussion context. Although this is not the first empirical investigation of its type, it is a systematic attempt to subject critical discussion rules to people's judgements of reasonableness and is a significant contribution to our understanding of the psychology of a number of the informal fallacies.

The significance of psychological analyses of the informal fallacies for the investigation of circular argument in this paper cannot be overstated. This is because in order to characterize informal fallacies as *cognitive* heuristics, there must first be a cognitive or psychological reorientation of these fallacies. This point is effectively made by Woods (2004: xxvi) when he states that 'an account of fallacies needs to be set in a more general theory of *cognitive agency*' (italics in original). Such a reorientation has been almost universally resisted in the logical study of the fallacies on account of its purported introduction of psychologism into logic:

'Investigators who make room for context and agency are drawn to a form of what used to be called the Laws of Thought approach and, accordingly, are committed to an element of *psychologism* in logic...Psychologism is once again an open question in the research programme of logical theory. Its re-emergence should not be prejudged. Better to wait and see how, once it is up and running, a psychologically real, agent-based logic fares as a theory of reasoning' (Gabbay and Woods, 2006; italics in original).

The approach of Gabbay and Woods in their empirically sensitive logic seems eminently reasonable as a pragmatic way forward on the issue of psychologism. It will, accordingly, be the approach adopted in this paper with its emphasis on a central role for cognitive agency in the study of the fallacies. However, such a cognitive reorientation of the fallacies is undertaken in the knowledge that there will inevitably be readers of a more traditional logical bent who view such a move as deeply problematic.

3.4. Rhetorical analysis

To appreciate the contribution of a rhetorical analysis to our understanding of circular argument, it is worth thinking again about the three forms of analysis that we have considered so far. These analyses have attempted either to place the locus of circular argument in the mind of the arguer (epistemic and psychological analyses) or to abstract this argument from the human mind altogether (semantic analysis). In a rhetorical approach, we find circular argument reflecting the complex interrelationship between an arguer and an audience. To this day, probably the clearest articulation of a rhetorical approach to argument analysis remains that of Chaïm Perelman and Lucie Olbrechts-Tyteca. In a seminal work published in 1952, Perelman and Olbrechts-Tyteca set about the rediscovery of ‘a part of Aristotelian logic that had been long forgotten or, at any rate, ignored and despised. It was the part dealing with dialectical reasoning, as distinguished from demonstrative reasoning – called by Aristotle analytics – which is analysed at length in the *Rhetoric*, *Topics*, and *On Sophistical Refutations*’ (Perelman, 1979: 9). This ‘new rhetoric’, as it was called, brought with it an emphasis on audience adherence, the attributes of speakers and listeners, rules of discussion, communication and a juridical, as opposed to a mathematical, model of reasoning with its focus on opinion as the starting point of argumentation and its rejection of the ‘unicity of truth’. Given the orientation of this new rhetoric, it is hardly surprising that Perelman should locate the flaw of circular or question-begging argument in the lack of audience adherence to a thesis or claim advanced as a premise. He remarks:

‘[T]he orator who builds his discourse on premises not accepted by the audience commits a classical fallacy in argumentation - a *petitio principii*. This is not a mistake in formal logic, since formally any proposition implies itself, but it is a mistake in argumentation, because the orator begs the question by presupposing the existence of an adherence that does not exist and to the obtaining of which his efforts should be directed’ (Perelman, 1979: 14-15).

Perelman’s views have not always been well received (see Cummings (2002b) for discussion). His rhetorical approach has been criticized for

its reliance on user-relative (hence, subjective) notions of assent and acceptance (Biro, 1977). According to Finocchiaro (1980: 277), Perelman's new rhetoric exhibits 'abstractness in the double sense of separateness of rhetorical analysis from logical analysis and of the analyzed material (reasoning) from its context'. These criticisms aside, Perelman's approach and a rhetorical analysis in general remind us that an argument is only effective to the extent that it succeeds in bringing an audience round to an arguer's point of view. But such persuasion need not thereby be without rational or logical merit. Rhetorical effectiveness is not a poor cousin of logical validity, and has a lot to teach us about the effective conduct of reasoning. The idea that an argument can achieve a certain result, and yet still be rationally justified or warranted, is integral to the view of circular argument as a cognitive heuristic which will be developed in section 4.

3.5. Pragmatic analysis

As a form of verbal communication, argumentation has also been studied using the theoretical frameworks and concepts of linguistic pragmatics.⁹ Prominent among this approach is the work of Frans van Eemeren and Rob Grootendorst who, in their development of pragma-dialectics, have been influenced to a large extent by Searle's (1969) speech act theory (see Cummings (2010b) for discussion of pragma-dialectics). According to Searle, utterances can be used to perform a number of acts such as promising, requesting, asserting and apologising. Each of these so-called speech acts carries with it a set of felicity conditions that jointly constitute the meaning of such acts and that are required for their appropriate performance. Felicity conditions are also integral to the model of argument analysis pursued by van Eemeren and Grootendorst (1995: 135), a model in which '[t]he principles authorizing the distribution of the verbal moves over the consecutive

⁹ 'Argumentation, being a phenomenon of verbal communication, should be studied as an integral part of the conduct of argumentative discourse. Its quality and possible flaws are to be measured against criteria that are appropriate for determining the reasonableness of such discourse. The study of argumentation should therefore be construed as a special branch of linguistic pragmatics in which descriptive and normative perspectives on argumentative discourse are methodically integrated' (Van Eemeren and Grootendorst, 1995: 131).

stages [of argumentative discourse] are accounted for in a set of rules for the performance of speech acts'. These rules constitute a theoretical definition of a critical discussion, the aim of which is to resolve a difference of opinion. Any discussion move which hinders the resolution of a difference of opinion frustrates this aim and is to be labelled as a 'fallacy' accordingly:

'Any infringement of one or more of the rules, whichever party commits it and at whatever stage in the discussion, is a possible threat to the resolution of a difference of opinion and must therefore be regarded as an incorrect discussion move. In the pragma-dialectic approach, fallacies are analyzed as such incorrect discussion moves in which a discussion rule has been violated. A *fallacy* is then defined as a speech act that prejudices or frustrates efforts to resolve a difference of opinion and the use of the term "fallacy" is thus systematically connected with the rules for critical discussion' (1995: 136; italics in original).

In this way, the violation of rule 6 in a critical discussion – 'A party may not falsely present a premise as an accepted starting point nor deny a premise representing an accepted starting point' (1995: 136) – leads to the fallacy of *petitio principii* among others:

Rule 6 can be violated – at the argumentation stage – by the protagonist by falsely presenting something as a common starting point or by the antagonist by denying a premise representing a common starting point. By falsely presenting something as a common starting point, the protagonist tries to *evade the burden of proof*; the techniques used for this purpose include [...] advancing argumentation that amounts to the same thing as the standpoint (*petitio principii*, also called *begging the question* or *circular reasoning*)' (1995: 140; italics in original).

The criticism of rhetorical effectiveness in argument is that it had little normative weight. Merely succeeding in persuading an audience to accept a thesis, it was argued, is not an adequate logical basis for the acceptance of a claim. With its emphasis on rules, a possible criticism of a pragmatic approach is that it privileges normative considerations over the description of how argumentation actually proceeds. Sensitive to this possible criticism of their approach, Van Eemeren and Grootendorst (1995: 131) attempt to head it off as follows:

‘The pragma-dialectical research program is based on the assumption that, on the one hand, a philosophical ideal of reasonableness must be developed and, starting from this ideal, a theoretical model for acceptable argumentative discourse. On the other hand, argumentative reality must be investigated empirically, so that it becomes clear how argumentative discourse is in fact conducted. Then the normative and descriptive dimensions must be linked together by developing instruments that make it possible to analyze argumentative practice from the perspective of the projected ideal of reasonable argumentative discourse’.

This combination of normative and descriptive elements is, I contend, exactly right as a model of argument analysis in general, and for the view of circular argument as a cognitive heuristic which will be developed in the next section. A heuristic based on circular argument which cannot fulfil a philosophical ideal of reasonableness is of as little value as a heuristic which satisfies the most exacting normative standard but which has no bearing whatsoever on our argumentative practices. It is through the integration of normative and descriptive elements that we can hope to obtain a circular heuristic that is both practically oriented and normatively respectable.

3.6. Dialectical analysis

Several frameworks and models fall within the dialectical camp of argument analysis (see Cummings (2003) for discussion). Two of the most prominent are Hamblin’s formal dialectic and Rescher’s dialectics. Rules of dialogue are integral to both of these approaches, although the form and purpose of these rules differ markedly in Hamblin’s and Rescher’s frameworks. Hamblin pursues a formal analysis of rules of dialogue which are intended to prescribe or prohibit moves in a dialogue:

A formal approach [...] consists in the setting up of simple systems of precise but not necessarily realistic rules, and the plotting of the properties of the dialogues that might be played out in accordance with them [...] Rules may prescribe, prohibit, or permit; may be directed to particular people, who play roles in a dialogue; and may be conditional on any feature of the previous history of the dialogue’ (Hamblin, 1970: 256-257).

Hamblin's account of *petitio principii* begins with a brief description of the structure of two dialectical forms of this fallacy:

'The simplest possible such argument is 'Why A? *Statements A, A \supset A*'; and, if S and T are statements equivalent by definition, another is 'Why S? *Statement T. Why T? Statement S*' (1970: 271; italics in original).

It is Hamblin's aim to prohibit these argument sequences. To this end, he proposes the following rules:

'Why S?' may not be used unless S is a commitment of the hearer and not of the speaker.

The answer to 'Why S?', if it is not 'Statement – S' or 'No commitment S', must be in terms of statements that are already commitments of both speaker and hearer (1970: 271).

In relation to the argument sequence 'Why S? Statement T. Why T? Statement S', the second of these rules guarantees that where statement T is offered as a justification of S, both T and $T \supset S$ must already be among the commitments of the speaker and the hearer of the dialogue. In such a case, however, the further question Why T? is prohibited by the first of these rules – the questioner is prohibited from asking a question about a statement to which he is already committed.

A quite different aim motivates Rescher's model of formal disputation (dialectics). As Rescher conceives of formal disputation, its purpose is epistemological in nature:

'We shall explore this particular sector of dialectics (formal disputation) to see what epistemological lessons can be drawn from it in order to exhibit the utility of such 'dialectics' for the theory of knowledge. The goal of this exploration is the development of a dialectical model for the rationalization of cognitive methodology - scientific inquiry specifically included (1977: xii).

According to Rescher, certain circular dialectical moves fail 'to deepen the grounding of the contentions at issue'. This is problematic within the con-

text of an inquiry where the aim is to expand upon the rational grounds for a thesis or claim. For these moves at least, a special blockage rule must be introduced in order to prohibit their occurrence in disputation:¹⁰

‘It is necessary to preclude the repetitive - indeed circular sequence:

PROPONENT	OPPONENT
!P !P	+~P

This blockage is accomplished by adopting a special rule to proscribe the simple *repetition* of a previous move. The reason for such a non-repetition rule lies deep in the rationale of the process of disputation. A disputation must be *progressive*: it must continually advance into new terrain. Since its aim is to deepen the grounding of the contentions at issue, it must always endeavour to *improve* upon the reasoning already laid out, in the interests of achieving greater sophistication. Mere repetition would frustrate the aim of the enterprise’ (1977: 10-11; italics in original).

‘[T]he diagram needs to be supplemented by [a] blockage rule which precludes the proponent from reasserting (or the opponent from rechallenging) something he has effectively asserted (or challenged) before. Examples of such blocked sequences are (1977: 20):

PROPONENT	OPPONENT
!P !~P=!P	+~P

PROPONENT	OPPONENT
!P P/Q&!Q Q/P&!P	+~P +~Q

¹⁰ Rescher defines his notation as follows: (1) !P stands for ‘P is the case or it is maintained (by me, the assertor) that P’; (2) +~P stands for ‘not-P is the case for all that you (the adversary) have shown’; and (3) P/Q stands for ‘P generally (or usually or ordinarily) obtains provided that Q’.

The idea that the rational grounds of a thesis can be revealed through the dialectical exchange between a proponent and an opponent in a dialogue is integral to the view of circular argument which will be developed in the next section. A key component of this view, which resonates with Rescher's dialectical account, is that circular argument can subvert (and, I will argue, facilitate) a cognitive inquiry. This can be a large-scale inquiry of the type encountered in science (à la Rescher) or the inquiry of an individual cognitive agent in the course of one's daily affairs. As with each of our previous approaches, a dialectical analysis makes a distinctive contribution to our understanding of circular argument. A summary of these insights is presented below in preparation for the discussion of section 4:

Epistemic analysis: Circular argument violates a requirement of epistemic priority between the premises and conclusion of an argument. The suspension of this requirement may be necessary in certain contexts.

Semantic analysis: Circular argument is always formally valid. A circular argument which is fallacious by one evaluative standard may not be fallacious by another evaluative standard.

Psychological analysis: Circular argument can be conceived of in terms of the cognitive states of arguers without necessarily incurring the spectre of psychologism.

Rhetorical analysis: The rhetorical effectiveness of circular argument is not without logical merit and can tell us something about the effective conduct of reasoning.

Pragmatic analysis: The integration of both normative and descriptive components is essential to an understanding of circular argument.

Dialectical analysis: The rational basis of circular argument can be laid bare through successive dialectical exchanges between a proponent and an opponent in a dialogue. Such a dialogue may be co-extensive with the rational methodology of science or other cognitive inquiry.

4. Circular argument as a cognitive heuristic

In delineating different approaches to the analysis of circular argument in section 3, the ground has been prepared for a new view of this informal fallacy. On this view, circular argument functions as a cognitive heuristic during reasoning about public health problems. A key feature of these problems is their reliance on expert knowledge and disciplinary specialization. The high levels of scientific and technical knowledge that are needed to make an informed assessment of these problems place them beyond the cognitive grasp of lay people. Yet, the urgency of many of these problems – decisions about the health risks of infectious diseases, for example, cannot be delayed without serious consequence – means that we must arrive at *some* solution to these problems rather than postponing judgements about them on an indefinite basis. The epistemic context in which many public health problems are assessed is, thus, one of pervasive uncertainty combined with a need to take urgent, preventative action. Against this backdrop, cognitive scientists are increasingly demonstrating that human beings have developed specially adapted cognitive strategies which facilitate judgement-making under uncertainty (Gigerenzer, 2008; Gigerenzer and Brighton, 2009; Todd and Gigerenzer, 2000). These strategies which, it will be argued, include informal fallacies such as circular argument, bypass gaps in our knowledge en route to judgements about public health problems. An extensive literature already exists on heuristics (see Gigerenzer et al. (1999) for an excellent overview of this work). However, limitations of space preclude its examination in the present context. Instead, the concern of this paper is to characterize one particular cognitive heuristic – circular argument – and to demonstrate its utility in a public health setting. To this end, we will return time and again to the features of circular argument which were examined in section 3.

The emphasis of the approaches described in section 3 is on the prohibition of circular sequences in argument. While most theorists have been concerned to devise dialectical rules and other criteria (e.g. epistemic priority) to prohibit circular arguments, some informal logicians have attempted to characterize the conditions under which circles in arguments may be non-fallacious. In this way, non-fallacious circular arguments have been described in mathematics (Walton, 1985), geology and palaeontology (Ras-

tall, 1956), economics (Walton, 1995), public health (Cummings, 2010) and epistemology (Cummings, 2000). An examination of these so-called 'virtuous' circles is instructive for what it can tell us about the conditions under which circular arguments are rationally warranted. One of these conditions concerns the availability of evidence. When evidence which is independent of the conclusion is not available in an inquiry, the use of conclusion-dependent evidence to support a claim may not be fallacious after all. This is particularly true in the case where if two or more lines of evidence were available, there would be no 'contradiction' between them. Rastall (1956: 168) argues that such a case occurs in geology and palaeontology where investigators use rock strata to determine the order of fossils, and the order of these organisms to establish the relative ages of rocks:

'It cannot be denied that from a strictly philosophical standpoint geologists are here arguing in a circle. The succession of organisms has been determined by a study of their remains embedded in the rocks, and the relative ages of the rocks are determined by the remains of organisms that they contain [...] It is possible to a very large extent to determine the order of superposition and succession of the strata without any reference at all to their fossils. When the fossils in their turn are correlated with this succession they are found to occur in a certain definite order, and no other. Consequently, when the purely physical evidence of superposition cannot be applied as for example to the strata of two widely separated regions, it is safe to take the fossils as a guide; this follows from the fact that when both kinds of evidence are available there is never any contradiction between them; consequently, in the limited number of cases where only one line of evidence is available, it alone may be taken as proof.

In many inquiries, multiple lines of evidence are not available to investigators. This is particularly true at the outset of a scientific inquiry where a lack of experimental evidence may compel investigators to use evidence which is dependent on the conclusion-to-be-proved. In this context, circular reasoning is not an aberration of our rational procedures but an adaptation of those procedures to the adverse epistemic conditions which confront investigators. In addition to the limited availability of evidence, there is another condition under which it may be rationally warranted to argue in circles. In the scenario Rastall describes, arguing in a circle al-

lows investigators to make progress in their geological inquiry by arriving at *some* conclusion about rock strata rather than *no* conclusion *at all*. This conclusion represents a positive outcome to this inquiry. And so it is with all the non-fallacious circular arguments mentioned above. When an economist argues that the economy is depressed because people are permanently leaving *and* that people are permanently leaving because the economy is depressed, there can be little doubt that a circle is present in the economist's reasoning. But it would be unjustified to claim that the economist has committed the fallacy of begging the question. For he or she could quite reasonably reply: 'I am just pointing out the feedback loop inherent in human collective (economic) behavior' (Walton, 1995: 233). The positive outcome which results from circular reasoning in this case is the advance in our understanding of this economic behaviour. The presence of a positive outcome to circular reasoning, even if that outcome is a tentative conclusion which has to be relinquished at a later point in inquiry, represents a further condition under which circular argument is rationally warranted. Both of these conditions are empirically tested in section 5.

So it is claimed that circular argument can indeed be rationally warranted under certain epistemic conditions within the context of an inquiry. A detractor may object along the following lines: by basing the rationality of circular argument on the adverse epistemic conditions that obtain at the start of an inquiry, a philosophical ideal of reasonableness has been subordinated to practical considerations such as the availability of evidence. The latter is too weak a normative standard for our rational procedures. Yet, this is the only standard that we should be prepared to countenance. Features of the practical sphere should have normative weight within an account of rationality. These features include constraints relating to the availability of evidence as well as to the actual cognitive dispensations of thinking agents. Rationality which demands omniscience on the part of cognitive agents, and which can only be put into effect when evidence is in abundance, is not a rationality that a well-adapted organism can even recognise, let alone afford to adopt. Such rationality overlooks the finite resources of cognitive agents who must allocate memory, reasoning and other cognitive processes in a parsimonious way to the solution of problems. It is contended that when these practical constraints are given due consideration within an account of rationality, circular argument is not only non-fallacious, but can

be seen to function as a facilitative heuristic within our cognitive affairs. In order to see how this is possible, we must return to several aspects of the analyses of circular argument discussed in section 3 (in addition to the psychological and pragmatic analyses of this section which have shaped comments thus far).

There are many epistemic contexts in public health in which knowledge and evidence are lacking. At the outset of a scientific inquiry, for example, scientists often lack experimental evidence of the type that is needed to form judgements about public health problems. For their part, lay people often lack knowledge of the technical and scientific issues that are needed to assess the types of public health problems that confront them. Faced with adverse epistemic conditions, cognitive agents can either decide to suspend judgement about public health problems – an imprudent cognitive policy given the urgency of many of these problems – or they can place procedural requirements on the conduct of a cognitive inquiry on hold. One such requirement is epistemic priority (see section 3.1). If epistemic priority is suspended temporarily in the absence of knowledge, it becomes possible for a proposition which is not better known than the conclusion-to-be-proved to act as a premise in argument. Indeed, there is nothing to prohibit the conclusion itself from assuming the role of this proposition in argument. The assumption of the conclusion as a premise of an argument – the pattern of reasoning that is circular argument – permits investigators to inch forward in inquiry until such times as new lines of evidence emerge. This evidence may either provide independent validation of the assumed conclusion, in which case the epistemic standing of this thesis increases, or it may force the rejection of this thesis. But in either scenario, an important epistemic gain has been achieved through the use of circular argument. A cognitive inquiry, which threatened to stall at its outset, has been able to progress to the point where new lines of evidence become possible. The only alternative to this course of action – do nothing in the absence of knowledge – is not a viable option for the well-adapted cognitive agent.

But we still have some way to go in terms of capturing the heuristic function of circular argument. To be worthy of the name 'heuristic', circular argument must prove itself to be capable of doing more than simply arriving at a successful solution or outcome to a problem. It must also distinguish itself as a cost-effective procedure within our rational affairs. Cognitive effi-

ciencies must accrue from the use of this argument. These same efficiencies are not evident during systematic reasoning, a slower, deliberative form of reasoning that attends to every detail and is costly in cognitive terms. The suspension of a second procedural requirement on inquiry, the use of critical questions during dialectical exchanges, is the means by which these efficiencies are achieved. Through bypassing critical questions, rational agents achieve a significant reduction in their cognitive expenditure, as resources from attention and perception to reasoning and memory are utilised to the minimal extent possible. Walton (2010) proposes an analysis of the heuristic function of several informal fallacies based on critical questions (see Cummings (2012c, 2014a, 2014b) for further discussion). These questions are bypassed in heuristic reasoning and explicitly addressed during systematic reasoning. According to Walton's framework, a heuristic associated with the informal fallacy, argument from expert opinion, involves a 'leap' directly to the conclusion, bypassing a number of critical questions on the way. However, *petitio principii* or begging the question is among several fallacies which, Walton (2010: 175) argues, do not appear to be amenable to this type of analysis.

But question-begging or circular argument is amenable to this analysis if we envisage the heuristic function of this argument in terms of the temporary suspension of two procedural requirements in inquiry. The suspension of *dialectical exchanges* at the global level of the conduct of an inquiry effectively licenses the suspension of *epistemic priority* at the local level of an argument's premises and conclusion. This is because in the absence of a dialectical requirement to lay bare the rational grounds of a thesis, there is no corresponding epistemic requirement to bring forward propositions as premises which are better known than this thesis (the latter construed as the conclusion of an argument). The dialectical expansion of the grounds of a claim just is the requirement to bring forward theses which are better established or more 'knowable' than this claim or which have epistemic priority over it. It is the simultaneous suspension of these dialectical and epistemic requirements which makes it possible for circular argument to function as an effective cognitive heuristic at the outset of inquiry. The heuristic function of circular argument is depicted in Figure 1. This function is represented as a 'fast and frugal' leap between the premise and conclusion of a circular argument (see arrow B in Figure 1). This leap effectively

circumvents critical questions which normally apply to the premises and conclusions of arguments, questions such as ‘Is the conclusion among the grounds that provide rational warrant for the premise?’. Cognitive agents expend considerable cognitive effort addressing these questions during systematic reasoning (see arrow A in Figure 1). This costly form of reasoning is avoided under specific conditions such as at the outset of an inquiry when conclusion-independent evidence is lacking.

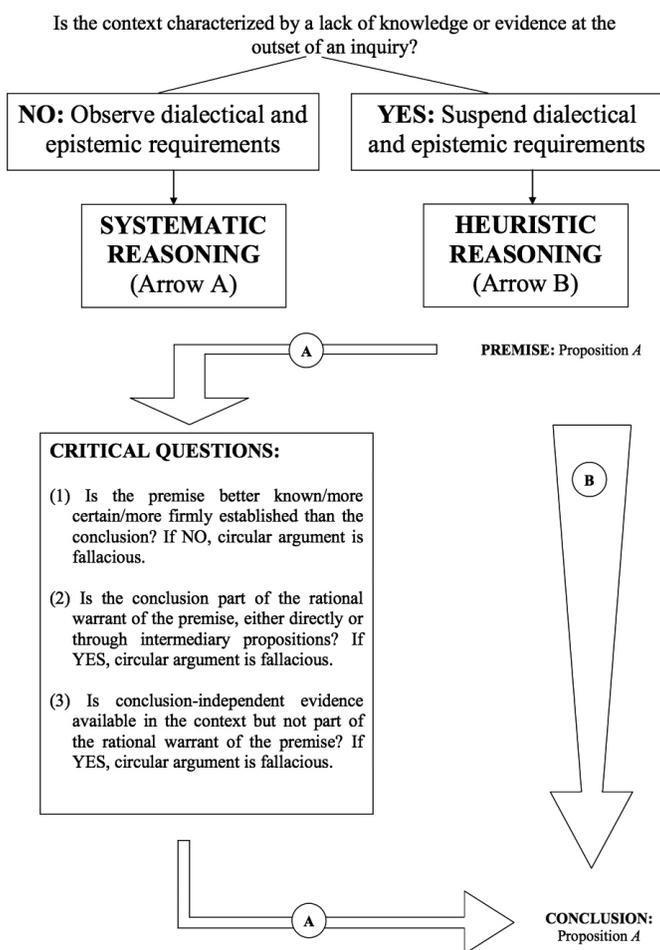


Figure 1. Circular argument as heuristic reasoning.

5. Study of public health reasoning

The largely philosophical considerations examined so far lead one to ask if lay people are able to identify the conditions under which circular argument functions as a cognitive heuristic during reasoning about public health problems. This question was the focus of a recent study of public health reasoning by members of the public. In section 4, two conditions were identified as warranting the use of circular argument as a heuristic in reasoning. These conditions are (1) the limited availability of evidence at the outset of an inquiry such that investigators are warranted in using conclusion-dependent evidence during reasoning and (2) the assumption of the conclusion-to-be-proved allows investigators to arrive at a positive outcome or solution to a problem rather than a negative outcome or no outcome at all. To this end, it was predicted that subjects would be inclined to rate circular arguments as valid under conditions in which there is limited availability of evidence and a positive outcome to reasoning. It was also predicted that subjects would be inclined to rate circular arguments as not valid at all under conditions in which there was abundant evidence which was overlooked by investigators in an inquiry and a negative outcome to reasoning. Circular argument was one of four arguments examined in the study. The three remaining arguments, which included arguments from ignorance and authority and analogical argument, are reported elsewhere (Cummings, 2014a, 2014b). What unites these arguments is their capacity to function as heuristics during reasoning about public health problems. A detailed discussion of this investigation cannot be undertaken in the present context. This section will, therefore, describe in brief the method used in the study and report some of its quantitative and qualitative results. For further discussion of the rationale for the study and an analysis of its findings, the reader is referred to Cummings (2014a).

A total of 879 subjects participated in the study. All subjects were between 18 and 65 years of age. Male and female subjects from any ethnic or socioeconomic background and of any educational level were admitted to the study (see Table 1 for subject characteristics). For the most part, the participation of subjects was secured through a series of formal recruitment activities conducted in local hospitals, large retail outlets and private

health clubs in the East Midlands region of the UK. There was no financial or other incentive offered to subjects for their participation in the study. Subjects received a brief explanation of the study prior to giving their agreement to participate in it. Each subject was presented with eight public health scenarios in the form of written passages in a postal questionnaire. The questionnaire was completed anonymously in the subject's own time. Scenarios described a range of actual and non-actual public health problems. Background beliefs and knowledge are known to influence reasoning.¹¹ The inclusion of non-actual scenarios, about which subjects were less likely to have prior beliefs, served to control this effect to some extent. Each scenario had been examined by two public health consultants before the start of the study in order to assess their plausibility as public health problems. Two academic linguists also examined the passages in order to assess their comprehensibility to the lay person. On the basis of these pre-study checks, all passages were considered to be plausible and comprehensible.

Four passages were used to examine circular arguments. These passages were based on the following public health scenarios: (1) an investigation of fever in patients following vaccination for pneumonia; (2) an investigation of a disease outbreak in the Congo by scientists from the World Health Organization; (3) the study of a purported link between electromagnetic radiation and birth defects; and (4) the discovery of a novel disease by medical anthropologists working in Peru. These passages were carefully constructed in order to represent the two conditions which subjects might deem significant in an assessment of the rational warrant of circular arguments. Four questions followed each passage. Two of the questions required a yes/no response or a response of a few words, and could be answered on the basis of information explicitly presented in the corresponding passage. These

¹¹ It is expected that background knowledge and beliefs will affect the information that subjects attend to in the passages and the significance that subjects attach to this information. As Klahr (2000: 30) remarks: 'When people are reasoning about real world contexts, their prior knowledge imposes strong theoretical biases...These biases influence not only the initial strength with which hypotheses are held – and hence the amount of disconfirming evidence necessary to refute them – but also the features in the evidence that will be attended to and encoded'.

questions were intended to give respondents the impression that they were engaging in a reading comprehension task and thus served to distract subjects from the main purpose of the study. A third question was intended to establish if subjects accepted the conclusion of a circular argument. Conclusions could be rated as valid, moderately valid or not valid at all, where 'validity' was intended in a mundane (and not a strictly deductive) sense. A fourth question asked subjects to explain their answer to this question. It was intended to elicit an open response from which information could be gleaned about the factors that had been significant in the individual subject's reasoning. The following passage and questions examined a circular argument with the features <vicious circle: abundant evidence>:

A group of medical anthropologists is conducting field work amongst a tribe of people in a remote region of Peru. They discover a bizarre disease in these people which has an onset in young adulthood and is invariably fatal after an illness of six months. The illness is neurological in nature and only affects young adult males. Given the large number of cases in this group, the anthropologists believe that a cultural practice, in which males eat the flesh of a dead member of the tribe, is the cause of the disease. In order to establish if this practice is the cause of the disease, the anthropologists call on colleagues to join them in Peru. A team of experts arrives within two weeks of the call for assistance. The team has the expertise and facilities to gather extensive evidence by conducting tests of water and soil in the area and the food that is consumed by people in the tribe. They also have equipment to take blood samples, perform neurological examinations and conduct post-mortem examinations of those who died of the disease. However, the anthropologists encourage their colleagues not to gather evidence in each of these areas and to concentrate their efforts on investigating the cultural practice to which young males are exposed. In this way, the scientists conduct tests of the human flesh consumed by these males and disregard all other sources of toxins in their diet.

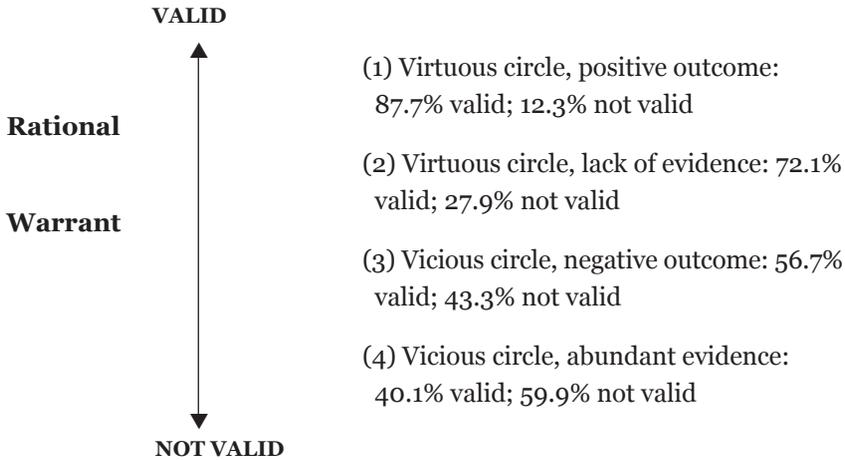
(a) The team of scientists *assumed* that the cultural practice was the cause of the disease in young adult males even as they were attempting to *establish* if this was the case. Was this strategy (i) valid, (ii) moderately valid or (iii) not valid at all (please circle answer)?

(b) Please explain your response to (a).

(c) In what country were the medical anthropologists conducting field work?

(d) Did the scientists arrive equipped to take blood samples?

As predicted, subjects consistently rated circles that reflected the conditions *positive outcome* and *lack of evidence* (so-called 'virtuous' circles) as either valid or moderately valid, and as more valid than circles which embodied the conditions *negative outcome* and *abundant evidence* (so-called 'vicious' circles). Circular reasoning which led to a positive outcome was rated as valid or moderately valid by 87.7% of respondents, while circles which resulted in a negative outcome were rated as valid or moderately valid by 56.7% of subjects. When a lack of evidence was available to investigators, 72.1% of subjects rated circular reasoning as valid or moderately valid. This dropped to 40.1% when circular reasoning occurred in the presence of abundant evidence. Also as predicted, the percentage of subjects who rated circular reasoning as not valid at all was highest for the conditions *abundant evidence* (59.9%) and *negative outcome* (43.3%) and lowest for the conditions *lack of evidence* (27.9%) and *positive outcome* (12.3%). These figures suggest that respondents are aware of the conditions under which circles in reasoning are more or less valid or rationally warranted. Moreover, they are prepared to use their knowledge of these conditions in shaping their judgements about a range of public health problems. These figures are presented below in a format which reveals the quite different rational standing of these conditions for subjects:



A qualitative analysis of the comments made by subjects to support their validity ratings confirms these figures. These comments suggest that respondents are attune to, and are influenced in their reasoning by, the conditions under which circular arguments are more or less rationally warranted. Where circular reasoning was seen to lead to a positive outcome, respondents were keen to endorse these arguments. A positive outcome included 'being right or correct' about a problem, with no concern expressed about the merits of the process by means of which that outcome was achieved:

Being right or correct:

'They were proved right by the 95%' (51-year-old, university educated, French man)

'It proved to be correct' (44-year-old, university educated, White Irish woman)

As a variant of this theme, many subjects appeared to attribute logical merit to an investigation 'matching' predictions. In this way, circles which confirmed original hypotheses and predictions were more likely to be rated

as valid by subjects than those which did not. This may simply reflect the strong confirmatory bias in human reasoning:¹²

Confirming predictions:

‘The investigations discovered that the results of their investigations matched their predicted outcomes’ (48-year-old, university educated, White British man)

Positive outcomes were also judged in terms of being able to make progress in an investigation or an inquiry. Circles which facilitated the research process, for example, received a high validity rating:

Facilitating inquiry:

‘The strategy was valid as it provided control groups and a basis for collecting and comparing data. It did not prejudice the outcome of the investigation’ (63-year-old, university educated, White Irish man)

A negative outcome to circular argument was often taken to invalidate the reasoning that led to that outcome. In many cases, a negative outcome simply involved ‘being wrong’ about an issue or not being able to arrive at a solution to a problem. Where circular reasoning was not judged to lead to a successful or positive outcome for investigators, subjects often advanced suggestions for why this had occurred. In most cases, these suggestions pointed to a lack of investigation of other causes and factors:

Investigate other causes and factors:

‘You would need to evaluate other factors, such as family influences such as smoking, diet, well-being, hereditary diseases/conditions’ (48-year-old, secondary school educated, White British woman)

‘it may have prevented/hampered an adequate search for an alternative cause’ (50-year-old, university educated, White British man)

¹² Although the confirmatory bias describes the tendency of subjects to seek out information which confirms their prior beliefs, it seems that some type of bias towards the confirmation of hypotheses may lie at the heart of these comments.

The neglect of other causes and factors was explained in terms of psychological attributes of investigators. Specifically, investigators were characterized as setting out with 'preconceived ideas' and as not keeping a sufficiently 'open mind' during an investigation, both of which were seen to limit the scope of an inquiry:

Negative psychological attributes of investigators:

'No assumptions should be made. Investigations should start with no preconceived ideas or assumptions' (53-year-old, university educated, White British man)

'When research is undertaken, where an assumption has been made, any data collected could be interpreted in a biased and inaccurate manner. To obtain an accurate conclusion to the research, it is essential to start with an open-mind' (33-year-old, secondary school educated, White British woman)

The availability of evidence in a particular context or inquiry held considerable logical sway for subjects as they rated the validity of circular arguments. Where evidence was lacking or sparse, the use of circular arguments by investigators was given a high validity rating. Specifically, respondents described them as providing a good 'starting point' to an inquiry, with some also cautioning that further investigation was necessary:

Good starting point:

'There had to be a starting point and from the symptoms the Haemostriathus virus seemed to be the best one' (62-year-old, university educated, White British woman)

'A good starting point (due to the similar symptoms) but further investigation is necessary' (40-year-old, university educated, White British man)

In the absence of evidence, many respondents described circular argument as a type of *faute de mieux* strategy which was used for lack of anything bet-

ter. Comments to this effect described investigators as having ‘no choice’, ‘nothing else to go with’, ‘no other leads’ and ‘no real option’. Quite simply, when confronted with the stark choice of using circular argument or nothing at all, investigators opted for the former course of action:

Faute de mieux considerations:

‘In the absence of any other direction or viable course of action, they had no choice but to proceed, the results of the blood tests should provide new direction’ (38-year-old, secondary school educated, White British man)

‘They had nothing else to go with. They had to make the assumption to test the hypothesis’ (55-year-old, university educated, White British man)

‘If there are no other leads, the scientists have to start somewhere’ (31-year-old, university educated, White British woman)

‘In the situation described (ie no clear evidence) the scientists have no real option other than to set up what to their judgment (on the basis of their initial preliminary assessment of the situation) was a reasonable hypothesis and to test it. That’s how science works’ (62-year-old, university educated, White British man)

However, circular argument was widely viewed as an invalid reasoning strategy if conclusion-independent evidence was available to investigators but was neglected by them. Under a condition of abundant evidence, the use of circular argument was characterized as ‘bad science’, in which investigators ‘disregarded all other sources of evidence’ and pursued a ‘blinkered approach’ to the cause of a disease:

Neglect of evidence:

‘blinkered approach...these people were trying to establish a cause, not exclude a particular option. Very bad science’ (42-year-old, university educated, White British man)

‘Assumption leads to a circularity → if it’s what you expect to find and disregard all other sources of evidence, it will be what is found’ (45-year-old, university educated, White British woman)

6. Concluding remarks

This paper has argued for a new view of circular argument as a cognitive heuristic in public health reasoning. Circular or question-begging argument has had a long and inglorious history in logic as an informal fallacy. During this time, many theorists have attempted to characterize the essential logical flaw of this argument. The result has been a proliferation of approaches to the analysis of circular argument over many years. Although each of these approaches has contributed valuable insights to the understanding of circular argument, none is entirely satisfactory by itself as an account of this fallacy. It is argued that we must draw on insights from all these approaches if we are to succeed in characterizing circular argument as a cognitive heuristic. Specifically, there must be a cognitive reorientation of this fallacy such that circular argument comes to be viewed as an effective cognitive procedure within the rational affairs of the well-adapted cognitive agent. The argument provides such an agent with cost-effective solutions to problems, primarily in the context of an emerging inquiry in which knowledge and evidence are lacking. Against this adverse epistemic backdrop, circular argument permits investigators to inch forward in inquiry until such times as new evidence is forthcoming. The epistemic and dialectical mechanisms by means of which this is achieved were examined. The conditions under which circular argument functions as a heuristic were subjected to empirical testing in a study of public health reasoning in 879 members of the public. The results of this study confirm a significant heuristic function for this argument during the public health deliberations of lay people.

As well as its theoretical value, this paper has implications for the work of public health, particularly in the area of public health communication.

There has been a tendency in much public health communication to conflate the public's lack of knowledge of many health problems with a lack of a rational capacity to logically evaluate those problems. There can be little doubt that the public lacks to a large extent knowledge of the technical and scientific issues that are the basis of many public health issues, including the risks posed by new technologies (e.g. mobile phones), infectious diseases (e.g. emerging influenzas) and a range of lifestyles (e.g. excessive consumption of alcohol). But in acknowledging this very real lack of knowledge on the part of lay people, it is important for public health communicators not to take the extra step of denying a rational capacity to people with which to assess those problems. If this paper demonstrates anything, it is that lay people are adept at identifying the conditions under which circular arguments are more or less rationally warranted. Moreover, they are able to use their understanding of these conditions to arrive at judgements about complex public health problems often in the absence of knowledge. To the extent that circular argument represents a significant rational resource on the part of lay people, it is suggested that public health experts should attempt to exploit this resource wherever possible in their communications with the public. This could involve an expansion of the rational grounds for many public health recommendations, particularly those for which urgent compliance is needed but is often woefully lacking. The effectiveness of this approach to public health communication could be empirically investigated in future studies.

7. Appendix

Table 1. Subject characteristics

	SUBJECT CHARACTERISTICS
AGE	Average: 43.8 years Range: 18-65 years
GENDER	Male: 292 subjects Female: 587 subjects
EDUCATION	University level: 589 subjects Secondary school level: 290 subjects
ETHNICITY	White British: 789 subjects White Irish: 30 subjects Asian or British Asian Indian: 15 subjects Asian or British Asian Pakistani: 4 subjects Black or Black British Caribbean: 3 subjects Black or Black British African: 3 subjects Mixed: White and Black Caribbean: 1 subject Mixed: White and Black African: 1 subject Mixed: White and Asian: 1 subject Other: 32 subjects

Table 2. Circular argument

VIRTUOUS CIRCLE POSITIVE OUTCOME	Results: Valid: 57.9% Moderately valid: 29.8% Not valid at all: 12.3%
VIRTUOUS CIRCLE LACK OF EVIDENCE	Results: Valid: 28.6% Moderately valid: 43.5% Not valid at all: 27.9%
VICIOUS CIRCLE NEGATIVE OUTCOME	Results: Valid: 31.1% Moderately valid: 25.6% Not valid at all: 43.3%
VICIOUS CIRCLE ABUNDANT EVIDENCE	Results: Valid: 10.6% Moderately valid: 29.5% Not valid at all: 59.9%

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