Circular reasoning

Lance J. Rips[*]

Department of Psychology, Northwestern University, 2029 Sheridan Road, Evanston, IL 60208, USA

Abstract

Good informal arguments offer justification for their conclusions. They go wrong if the justifications double back, rendering the arguments circular. Circularity, however, is not necessarily a single property of an argument, but may depend on (a) whether the argument repeats an earlier claim, (b) whether the repetition occurs within the same line of justification, and (c) whether the claim is properly grounded in agreed-upon information. The experiments reported here examine whether people take these factors into account in their judgments of whether arguments are circular and whether they are reasonable. The results suggest that direct judgments of circularity depend heavily on repetition and structural role of claims, but only minimally on grounding. Judgments of reasonableness take repetition and grounding into account, but are relatively insensitive to structural role.
© 2002 Cognitive Science Society, Inc. All rights reserved.

Keywords: Reasoning; Argumentation

1. Introduction

A common criticism directed at informal arguments is that the arguer has engaged in circular reasoning. In one form of this fallacy, the arguer illicitly uses the conclusion itself (or a closely related proposition) as a crucial piece of support, instead of justifying the conclusion on the basis of agreed-upon facts and reasonable inferences. A convincing argument for conclusion c can't rest on the prior assumption that c, so something has gone seriously wrong with such an argument. There are, of course, conversations or patterns of thinking that lead back to where they started without being objectionable. A comment of Aimee's could provoke a dialogue that eventually leads her to make the same comment. Such a conversation might be aimless but

———
[*] Tel.: +1-847-491-5947; fax: +1-847-491-7859.
E-mail address: rips@northwestern.edu (L.J. Rips).

not necessarily circular. Circular dialogues or modes of thought are those that involve special patterns of *justification*.

Circularity is a defect in reasoning because it undermines correct attempts to justify a claim or an action. The psychological study of reasoning should have a natural interest in such patterns of thought, since they may indicate fundamental difficulties people have in constructing and in interpreting everyday discourse. There appears to be no prior empirical research on this topic, however, despite its importance in neighboring fields, such as philosophy and rhetoric. In particular, there is no evidence on how people who are untrained in these fields recognize arguments as circular.[1] Inability to detect circles in others' arguments leaves people at the mercy of inappropriate or unscrupulous attempts at persuasion. Inability to detect or to break out of circles in one's own thinking may lead to narrow-mindedness, or even delusions, in which one's beliefs about a topic are self-authenticating, sealed off from evidence that might cast doubt upon them.

In fact, however, circular reasoning in actual argumentation is sometimes difficult to spot. Convicting someone of this fallacy often requires careful analysis and argumentation in its own right. This article addresses the questions of which components of an argument contribute to circularity and how aware untrained people are of these components. In this respect, the research bears similarity to attempts to understand people's knowledge of other complex discourse types by systematically varying potential aspects of the type and asking participants whether the resulting instances belong to the category in question (e.g., Coleman & Kay, 1981).

1.1. Structural circles

What makes it difficult to decide whether an argument is circular? If sentence S_1 justifies sentence S_2 and S_2 justifies S_1 in the same argument, then it is likely that the argument is circular. But circularity can occur even when the arguer does not repeat S_1 verbatim. At the very least, we must make room for the case in which S_1 justifies S_2 justifies S_1', where S_1 and S_1' express the same proposition or claim. It is not always easy to tell, however, when two sentences are equivalent in this respect. We might call this aspect of circularity the *repetition* problem, since the presence of circularity depends in this case on whether later steps in the argument amount to a propositional repetition of earlier ones.

Repetition of the same proposition or claim, however, isn't the only component of a circular argument, since not all arguments with repetitions (even verbatim ones) are circular. An arguer can safely repeat a claim for the sake of clarity or emphasis without turning the argument into a fallacious one. Moreover, an arguer can sometimes repeat a claim nonredundantly in support of two different points. If you believe, for example, that preserving wilderness areas is important, you can use this principle to argue for two different positions—say, that Congress should pass a bill protecting Florida wetlands and that they should pass a second bill restricting logging in Alaska—without making your argument circular.

Circularity requires not just repetition of claims, but also that the arguer uses one repetition to support the other, as in example (1):

(1) Allen: The Evanston City Council should make it illegal to tear down the city's old warehouses.

  Beth: What's the justification for preserving them?

  Allen: The warehouses are valuable architecturally.

Beth: Why are they so valuable?

Allen: The older buildings lend the town its distinctive character.

Beth: a. But what's the reason the warehouses give it character?

b. But, anyway, why do you personally like these warehouses?

Allen: The warehouses are valuable architecturally.

Suppose Beth asks question (1a) in the next-to-last line of the dialogue. In this context Allen appears to be using the idea that the warehouses have architectural value to support the claim that they give unique character to Evanston, and he is also using the claim about Evanston's character to support the warehouses' architectural value. Assuming this is so, then Beth might correctly accuse Allen of circularity in his final statement. If Beth asks question (1b), however, she is not seeking justification for Allen's preceding claim, but is wondering about a different issue—what Allen finds appealing about the warehouses. In this case, Allen's repeated statement addresses a new point and does not seem circular.

As a start on a theory of circular arguments, we can make use of a slightly modified version of the structural rules for two-person arguments from Rips (1998) that appears in Table 1. These rules are analogous to phrase structure rules in syntax. Rule A, for example, indicates that an argument consists of two parts: a claim and a series of responses, possibly null (ϕ). Subscripts on the components denote the first or second speaker; thus, an argument begins with a claim by Speaker 1 (Claim_1) followed by a series of responses by the second speaker (Response_2^*, where the asterisk indicates the possibility of multiple responses), or with a claim by Speaker 1 followed by silence on Speaker 2's part (ϕ_2). The rules in Table 1 differ from those in Rips (1998)

Table 1
Structural rules for two-person argumentation (adapted from Rips, 1998)

A	$\text{Argument} \rightarrow \{\text{Claim}_1 + \text{Response}_2^* | \text{Claim}_1 + \phi_2\}$
B	$\text{Response}_2 \rightarrow \{\text{Challenge}_2 | \text{Rebutting defeater}_2 | \text{Acknowledgment}_2 | \text{Accepter}_2\}$
C	$\text{Subargument}_i \rightarrow \{\text{Claim}_i + \text{Subresponse}_{3-i}^* | \text{Claim}_i + \phi_{3-i}\}$
D	$\text{Subresponse}_i \rightarrow \{\text{Challenge}_i | \text{Rebutting defeater}_i | \text{Undercutting defeater}_i | \text{Acknowledgment}_i | \text{Accepter}_i\}$
E	$\text{Challenge}_i \rightarrow \{\text{Explanatory challenge}_i | \text{Evidentiary challenge}_i\}$
F	$\text{Explanatory challenge}_i \rightarrow \{\text{Explanatory query}_i + \text{Explanation}_{3-i}^* | \text{Explanatory query} + \phi_{3-i}\}$
G	$\text{Evidentiary challenge}_i \rightarrow \{\text{Evidentiary query}_i + \text{Evidence}_{3-i}^* | \text{Evidentiary query} + \phi_{3-i}\}$
H	$\text{Explanatory query}_i \rightarrow \{$*Why?*	*What's your explanation?*	*What's the theory behind this?*	...$\}$
I	$\text{Evidentiary query}_i \rightarrow \{$*Why?*	*What's your evidence?*	*What facts suport this?*	...$\}$
J	$\text{Acknowledgment}_i \rightarrow \{\text{Acknowledger}_i + \text{Explanation}_{3-i}^* | \text{Acknowledger}_i + \text{Evidence}_{3-i}^* | \text{Acknowledger}_i + \phi_{3-i}\}$
K	$\text{Explanation}_i \rightarrow \text{Subargument}_i$
L	$\text{Evidence}_i \rightarrow \text{Subargument}_i$
M	$\text{Rebutting defeater}_i \rightarrow \text{Subargument}_i$
N	$\text{Undercutting defeater}_i \rightarrow \text{Subargument}_i$
O	$\text{Acknowledger}_i \rightarrow \{$*I see*	*Okay*	*Uh-huh*	...$\}$
P	$\text{Accepter}_i \rightarrow \{$*That's right*	*I agree*	...$\}$

Subscripts on constituents indicate the first speaker ($i = 1$) or the second speaker ($i = 2$). The expression $3 - i$ denotes a change of speaker (since if $i = 1$ then $3 - i = 2$, and if $i = 2$ then $3 - i = 1$). Asterisks denote possible repetition of the same constituent. Accepters and null responses (ϕ) can appear only on the right-most branch of the lowest argument or subargument that dominates them.

first by distinguishing two types of justification—evidentiary and explanatory justifications—for reasons I will discuss momentarily. Second, Table 1 differentiates *acknowledgments* (e.g., *I see*, *Uh-huh*), which indicate a speaker's understanding of an earlier claim and willingness to go along with it temporarily, from *accepters* (e.g., *I agree*, *That's right*), which indicate explicit commitment to the claim. The other major types of response in Table 1 are *rebutting defeaters* (claims that a speaker uses to refute previous claims) and *undercutting defeaters* (claims a speaker uses to refute the support relation between previous claims). (The experiments in this article make use of rebutting rather than undercutting defeaters, and I use the terms *defeater* and *denial* interchangeably here.) Although the rules stipulate two speakers, they also apply to monologue arguments in which a single individual takes both parts. Earlier studies show that these rules give a reasonable account of naturalistic arguments and yield accurate predictions about participants' judgments of which speakers are committed to which claims and which speakers have the burden of proof (Rips, 1998; Rips, Brem, & Bailenson, 1999).[2]

To illustrate the argument structure that these rules produce, Fig. 1 diagrams both versions of dialogue (1). As shown here, these versions comprise a series of nested arguments and subarguments, each consisting of a claim by Allen and a response by Beth. In every case, Beth's response is a request for an explanation. In the first version of the dialogue in Fig. 1a, when Allen claims that the buildings have a distinctive character, Beth presses the point by asking for further justification for this idea. Thus, when Allen responds for the second time that the warehouses are architecturally valuable, he is using this claim to justify a point that was itself supposed to justify the very same claim about architectural value. Fig. 1a captures this dependence by placing the two copies of the claim on the same branch of justifications. By contrast, in the second version, Beth's challenge in the next to last line is not directed at the point about distinctiveness that Allen has just made, but is instead a separate query about Allen's personal reaction (*Why do you personally like these warehouses?*). Fig. 1b represents this new context as a separate branch in the argument. In this context, Allen's repeated statement does not occupy a position where it circularly justifies itself.

The two versions of argument (1) differ in whether the structure of justifications leads round in a circle, and we can call this aspect of circularity the *structural* problem. Although the difference seems fairly clear in examples like this one, it is not always easy to discern circular structure in real examples. It is sometimes a difficult matter to tell whether the argument has taken a new turn—one that is independent enough from earlier topics to allow safe repetition. Sometimes discourse markers help clarify such ambiguity. For example, the word "anyway" in (1b) signals the beginning of a new train of inquiry (Grosz, Pollack, & Sidner, 1989; Reichman-Adar, 1984). But discourse markers aren't always available, and it may be necessary to use deeper analysis or contextual clues to decide on the structure.

The rules in Table 1 suggest that one condition for a circular argument is that (within the structure that these rules produce) one claim *c-commands* another claim by the same speaker to which it is propositionally equivalent. The c-command relation (from theoretical linguistics) means that every branching node above the first claim in question is also above its propositional equivalent (e.g., de Swart, 1998). In Fig. 1a, for example, every branching node above the first appearance of the critical claim (*Warehouses are valuable*) dominates the repetition of this claim at the bottom of the structure, so the first claim c-commands the second. In Fig. 1b, though, neither claim c-commands the other, and no circularity arises.
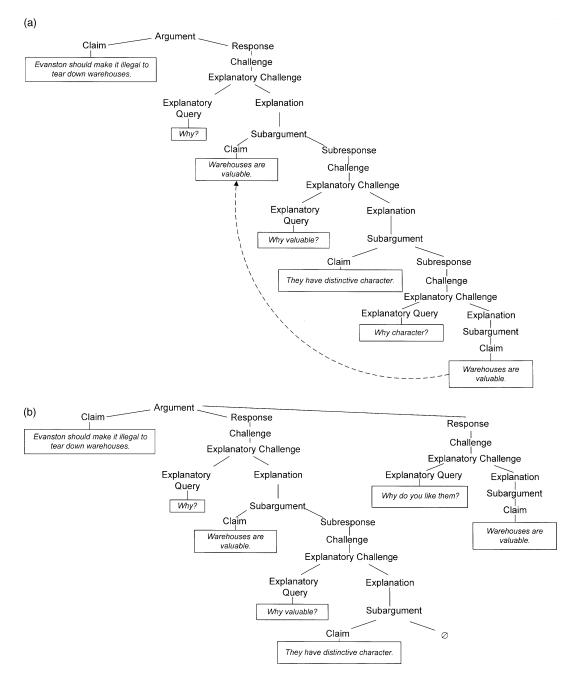
Fig. 1. A structural analysis of argument (1), according to the rules in Table 1. Panel a corresponds to the argument with line (1a), and panel b to the argument with line (1b).

It does not take long to notice, however, that c-command isn't sufficient for circularity. Justification for a claim—an answer to a "Why?" question—can take the form of evidence or explanation. If you are asked to justify a scientific claim, for example, you can cite data that help confirm that claim or you can cite larger theoretical considerations from which the claim follows. Although it is circular to give a series of evidential justifications (or a series of explanatory justifications) that starts and ends in the same claim, it is possible to use an assertion noncircularly if the chain involves both explanation and evidence. The dialogue in (2) provides an example:

(2) A: People mentally rotate the images of objects.
    B: What's the evidence?
    A: Same/different RTs are linear in the angular displacement of the objects.
    B: What explains the linear RTs?
    A: People mentally rotate the images of objects.

Although dialogues like (2) will not win awards for script writing, they are not circular. There is nothing wrong with holding both that mental rotation explains linear RTs and that linear RTs provide evidence for mental rotation. (We may want to insist that a theory should be supported by more than one source of evidence before it has sufficient explanatory power, and (2) may seem weak for this reason. But this is no reason to doubt that data can provide evidence for a theory that explains them.) This suggests that we need to supplement the condition mentioned earlier. Along these lines, we can say that an argument is circular if: (a) a claim c-commands a propositionally equivalent claim by the same speaker, (b) at least one explanation (or evidence) node occurs on the direct path between the equivalent claims; and (c) the path does not contain both explanation and evidence nodes and does not contain defeater nodes. A diagram of argument (2) would indicate that the justifications are of different types; by contrast, the diagram in Fig. 1a for the circular version of argument (1) marks all justifications as explanatory (see Rules E–L in Table 1).[3]

We need condition (c), above, to rescue (2) from circularity, since (2) is legitimate scientific discourse. All scientific endeavor depends on using data to provide evidence for theory and using theory to explain the data. However, the situation may not be so clear if the "data" is itself relatively abstract or theory-dependent, and recent experiments show that, under some conditions, people have difficulty distinguishing explanation and evidence (Brem & Rips, 2000; Kuhn, 1991; Ranney, Schank, Hoadley, & Neff, 1994). A natural prediction from these findings is that this difficulty will extend to situations in which people must differentiate circular from noncircular arguments.

1.2. Circular pragmatics

The structural conditions that we have discussed so far seem to capture one form of circularity, but there may be other types that depend more on the purposes of the argument than on its structure. In many dialogue-based arguments, proponents have the goal of convincing an opponent of the truth of some claim. If the opponent is already prepared to grant an initial claim on the basis of the proponent's authority, then no argument is necessary. If the opponent is not so prepared, however, then the proponent needs to come up with justifications for the claim that the opponent is able to accept—either because she already believes them or because

she finds them reasonable. An argument will fail in its purpose if the proponent continues to offer justifications that are unacceptable to the opponent, and arguments of this sort are often classified as circular. These stalemates can clearly occur even if the proponent never repeats a claim, either explicitly or implicitly, and they therefore fall outside the scope of the structural circularities that we glimpsed in the preceding section.

Disputes of this kind are fairly common in psychology. Suppose, for example, that a behaviorist claims that children learn nouns before they learn verbs because nouns are more frequent than verbs in natural language. If a cognitivist presses the behaviorist to explain why nouns are more frequent, the behaviorist might respond that production of nouns is more frequently rewarded than production of verbs. The cognitivist might, of course, find this last claim to be dubious, but even if she grants its truth, she might find the behaviorist's argument circular. This is not because the behaviorist has repeated the same claim; in fact, the behaviorist's reply adds substantive information to the initial statement. From the cognitive point of view, though, the behaviorist never anchors his claims in a sufficiently explanatory framework—one that shows how frequency of tokens or of rewards translates into something the cognitivist recognizes as a plausible mechanism for learning. We can call this aspect of circularity the *grounding* problem, since it depends on whether the proponent grounds the argument in a framework that the opponent can accept (cf. Clark & Schaefer, 1989). Recent pragmatic theories of circularity in philosophy (e.g., Jackson, 1984; Sorensen, 1991, 1999) and rhetoric (van Eemeren, Grootendorst, & Henkemans, 1996, chapter 10) depict circularity as a defect in grounding.

What is the relation between structural and pragmatic circularity? For the reasons just mentioned, pragmatic circularity may be an independent notion, since such circularity seems to be possible even in the absence of a structural "circle." This independence is consistent with proposals that distinguish *question-begging* from *circularity*, analyzing the first as lack of pragmatic grounding and the second in purely structural terms (e.g., Sinnott-Armstrong, 1999). It is also possible, however, that pragmatic factors have a role to play in all cases of true circularity, so that pragmatic circularity is the more general concept. To see how this could be, consider the argument in (3):

(3) Allen: The Evanston City Council should make it illegal to tear down the town's old warehouses.

    Beth: What's the justification for preserving them?

    Allen: The warehouses are valuable architecturally.

    Beth: a. I agree.

         b. Why are they so valuable?

    Allen: The older buildings lend the town its distinctive character.

    Beth: But what's the reason the warehouses give it character?

    Allen: The warehouses are valuable architecturally.

If Beth utters (3b), this should put Allen on notice that his statement about the warehouses' architectural value is not one she necessarily believes. His subsequent use of the same statement therefore will not provide Beth with any additional support for his claim about the warehouses' distinctive character. However, if Beth agrees that the warehouses do have architectural value, as in (3a), then he has reason to think that he can use this claim to justify further assertions. In this case, we might be hesitant to say that (3) is circular in any sense. Allen's final claim may be no more than a reminder of what Beth already agreed to. If this is the correct analysis, we

need to supplement the conditions from the preceding section with a further stipulation about grounding. An argument is circular, in this case, if: (a)–(c) are true, and (d) the opponent does not find the repeated proposition acceptable.

It is possible to make this point in a different way by considering the relation between circularity and deduction. Formal arguments that contain their own conclusion among their premises are deductively valid (the conclusion is true whenever the premises are true). Deductive validity would seem to be a strong explanatory relationship (e.g., in a mathematical proof), since one good explanation of why a statement is true is that it follows logically from others. Hence, some deductively valid arguments are structurally circular, according to criteria (a)–(c) of the preceding section. Moreover, circular arguments ought to include those in which a premise (or conjunction of premises) is propositionally equivalent to the conclusion, not just those in which the conclusion is a verbatim copy, for reasons mentioned earlier. But if we spell out propositional equivalence in terms of logical equivalence (S_1 and S_2 are propositionally equivalent whenever S_1 entails and is entailed by S_2), then many intuitively valuable deductive arguments become circular. For example, any proof showing that one theorem can be deduced from a mathematically equivalent one would be branded circular by criteria (a)–(c). Since these proofs are often crucial in mathematics, it seems odd to brand them as circular. This again suggests that pragmatic factors might be necessary conditions for the circularity of any argument, perhaps along the lines of (a)–(d). Of course, argumentation is not limited to proofs, as examples (1) and (3) make clear. However, proofs highlight the need for nonstructural components of circularity.

1.3. Overview of the experiments

Our initial analysis of persuasive dialogues, such as (1)–(3), suggests that circularities may depend on whether a proponent has repeated a claim or an equivalent statement, has used the repetition as part of a set of explanatory (or evidential) justifications leading back to the original, and has failed to anchor or ground the justifications in propositions that the opponent finds believable. This analysis stands in need of further refinement, but the fact that repetition, structural looping, and lack of grounding may all play a role in circularity helps explain why it is sometimes difficult to decide whether or not an argument is circular. This view of circular reasoning is consistent with other recent theories that emphasize the multifaceted nature of this problem (e.g., Walton, 1991). The present experiments address the question of which of these components untrained participants see as contributing to circularity. They also explore the issue just raised about the relation between structural and pragmatic factors: do people naturally see these as independent properties of an argument (so that some arguments can be structurally, but not pragmatically, circular), or do they see pragmatic factors as necessary components of all circularities. These issues bear on philosophical attempts to distinguish circularity from question begging and virtuous from vicious circles.

Naturally occurring instances of circularity typically take place in extended discussions that require detailed textual analysis (see, e.g., Goldfarb, 1988, and Schechtman, 1999, for recent examples), and it is hard to tease apart components responsible for circularity in these instances. It would also be a difficult matter to elicit instances of circularity in debates that could occur in laboratory settings. For these reasons, the experiments reported here use scripted

arguments, similar to (1) and (3), that participants evaluate. The experiments can therefore manipulate directly the structural and pragmatic factors that appear in current theories of circularity (though, of course, they sacrifice some of the richness of everyday arguments). In each experiment, one group of participants ranks the arguments in terms of the circularity of their final statement, and a second group ranks the arguments in terms of the reasonableness of this statement. Direct judgments of circularity help identify which components (e.g., structural or pragmatic factors) are part of the participants' own concept of circularity. Judgments of reasonableness tap beliefs about the overall defectiveness of the arguments, whether or not participants think them specifically circular.

An alternative method would have been to ask participants to make judgments about whether the arguments begged the question,[4] but a preliminary study found that many participants in the population used here—mostly college freshmen—did not know the meaning of "question-begging." Eight of 24 participants responded "don't know" when asked about the meaning of begging the question, whereas only one of 24 gave the same response when asked about circularity. (Most of the latter participants explained circularity in terms of repetition or restatement of an original position or as the use of a statement to prove an equivalent one.)

2. Experiment 1: repetition and ungroundedness as components of circularity

This study varies two factors that might influence people's impression of whether an argument has gone awry: whether the proponent repeats a claim and whether the opponent acknowledges, queries, or denies it. The sample argument in Table 2 illustrates these two ingredients. On A's third speaking turn (the first boldfaced statement in the table), he claims that bike lanes would mean fewer cars. I will refer to this assertion as the *target claim*. B either acknowledges this claim (*I see*), asks for further justification (*Why do you think . . . ?*), or rejects the claim outright (*There would not be fewer cars . . .*). Three lines later, A either repeats the target claim verbatim (*There would be fewer cars . . .*), gives a paraphrase (*Bike lanes will reduce the number of cars*), or provides a new statement (*Safe routes make biking*

Table 2
Sample argument schema for Experiment 1

A	The City of Chicago should provide a more extensive bike-lane network
B	Would bike lanes have any benefits for the majority of non-bikers?
A	An extensive bike-lane network would go far to reduce air pollution
B	What makes you say that?
A	**There would be fewer cars on the road**
B	a. I see
	b. Why do you think there would be fewer cars on the road?
	c. There would not be fewer cars on the road
A	Bike lanes encourage people to ride bicycles by providing safe routes
B	Why do you think that bike lanes encourage people to ride bikes?
A	d. **There would be fewer cars on the road**
	e. **Bike lanes will reduce the number of cars**
	f. **Safe routes make biking a more pleasant experience**

a more pleasant experience). The combination of the different replies by B and the different final statements by A creates nine versions of this argument.

Circularity is most obvious when a proponent simply repeats a claim, and we would therefore expect participants to judge repetitions like Line d in Table 2 as the most circular or least reasonable contribution to the dialogue. Similarly, a mere paraphrase of the target statement, as in Line e, should also be perceived as circular or unreasonable. But new claims, such as Line f, can provide noncircular justifications for the earlier statement, and these items should therefore receive better evaluations. This overall effect of repetition, however, may depend on B's response to the target claim. If B queries or denies the target claim, as in Lines b and c, she indicates that she is not prepared to accept the claim, and A's repetition or paraphrase of the same claim is much less likely than the new statement to provide a convincing justification in her eyes. However, if the opponent acknowledges the claim, as in Line a, then the target claim is more likely to be something she is willing to concede, and its repetition or paraphrase may be more similar to the new statement in its ability to support the proponent's case. If so, we should predict an interaction between the opponent's response and the proponent's justification: participants' assessments of Lines d–f should be more similar after an acknowledgment than after a denial or query.

In discussing stimulus arguments like that in Table 2, I will continue to use *proponent* to name the first speaker in these dialogues and *opponent* to name the second speaker. Thus, A is the proponent and B the opponent in this example. (Of course, in complex arguments, an opponent can advocate claims of her own that the proponent may then respond to.) To help discriminate these roles, I arbitrarily use male pronouns for the proponent and female pronouns for the opponent, but the stimuli and instructions did not differentiate the sex of the speakers for the participants in this experiment.

2.1. Method

Participants in this experiment received 20 packets each containing nine argumentative dialogues. Each stimulus dialogue contained two boldfaced statements, as in Table 2. In the *circularity* condition, participants ranked the nine dialogues in each set according to the degree to which the second boldfaced statement displayed circular reasoning. In the *reasonableness* condition, participants ranked the same dialogues according to the degree to which the second boldfaced statement was a reasonable contribution to the dialogue.

2.1.1. Procedure

At the beginning of the session, participants received the 20 sets of stimulus dialogues and a sheet of instructions. The experimenter read the instructions aloud and asked the participants to follow along as she did so. Participants learned from the instructions that each packet contained nine passages about a common topic, that they were to read all nine passages carefully, and that they were then to rank the passages by circling one of the letters A–I that appeared beneath the passage. In the circularity condition, participants were to "order the passages in terms of the extent to which the second boldfaced statement displays circular reasoning in each." They were to assign A to the passage in which the second boldfaced statement was least circular, I to the passage in which the second boldfaced statement was most circular, and to use intermediate letters for intermediate degrees of circularity. The instructions emphasized that participants

were to circle a different letter for each passage within a set of nine. The instructions in the reasonableness condition were similar, except that they asked participants to "order the passages in terms of how reasonable the second boldfaced statement is in each." These participants circled A for the most reasonable passage and I for the least reasonable one. (The scales were arranged so that As went to the "best" passages, as in conventional grading systems, in order to help participants remember the scale's orientation.) Participants did not receive any further definition of reasonableness or circularity. The experiment used rankings rather than ratings or simple yes/no judgments because earlier research shows rankings the more sensitive measure (Krosnick & Alwin, 1988). Ratings and similar judgments allow participants to avoid difficult choices by giving uniform responses for all stimulus types (see Experiment 2 for further discussion).

After the instructions, participants were able to ask questions about the procedure and were then allowed to work through the packets at their own pace. The sessions themselves lasted from 45 to 60 min. We tested participants in small groups of between three and six individuals in a quiet room containing partitioned carrels.

2.1.2. Stimulus arguments

The passages in this experiment centered around 20 current topics, such as whether there should be more bike lanes in Chicago, whether mace can successfully thwart attackers, and whether it is advisable to take a year off between college and graduate school. For each topic, we constructed an argument schema, similar to that in Table 2, between two individuals, A and B. In each schema, the proponent A first makes a claim, followed by a question from B. A then supplies a justification, and B a request for further justification. A's reply—his third speaking turn—is the target claim, as defined earlier. B then either provides an *acknowledgment* (always by saying *I see*), a direct *query* (e.g., *Why do you think there would be fewer cars on the road?*), or a direct *denial* (e.g., *There would not be fewer cars on the road*).[5] In the next two turns, A attempts a justification, and B again questions this justification. Finally, A ends the debate, offering either an exact *repetition* of the target claim, a *paraphrase* of the target claim, or a *new statement*. The new statement was intended to be a plausible reason for A's previous statement in the context of the dialogue but to have content distinct from the target claim. The example in Table 2 was one of the schemas in this experiment.

Each of the 20 schemas yielded nine stimulus dialogues, constructed by pairing one of B's three responses (acknowledgment, query, or denial) with one of A's three final statements (repetition, paraphrase, or new statement). We printed each of these nine arguments on a separate strip of paper (approximately 2.5 in. × 8.5 in.). A's target claim and his final statement appeared in boldface in the printed form. The letters A–I appeared in a horizontal line under each argument. New random permutations ordered the nine arguments for each packet and for each participant. The nine strips were put together in packets with binder clips, and participants were allowed to spread out the strips and reorder them. We also randomly permuted the packets at the beginning of the experiment, using a new order for each participant.

2.1.3. Participants

There were 60 participants in this experiment, 30 in the circularity condition and 30 in the reasonableness condition. All participants were undergraduates enrolled in introductory psychology, and they took part in the experiment to fulfill a course requirement.

2.2. Results and discussion

To examine the results, I transformed participants' letter ranks to a numeric scale, with 1 assigned to the argument judged most circular or least reasonable and 9 assigned to the argument judged least circular or most reasonable. This alignment means that higher numbers in both rankings correspond to the arguments participants thought were better, aiding comparison between conditions.

2.2.1. Effects of proponent's justification
Means of these ranks show that participants believed the arguments better (less circular and more reasonable) when A's final statement was new than when it was a paraphrase, and similarly, they viewed paraphrases as better than exact repetitions. In the circularity condition, the mean ranks were 6.28 for new statements, 5.23 for paraphrases, and 3.49 for repetitions. In the reasonableness condition, the means were 6.40 for new statements, 5.32 for paraphrases, and 3.27 for repetitions. An analysis of variance confirmed this effect of the proponent's justification, both when participants and when argument schemas served as random effects (for the participant analysis, $F_1(2, 116) = 98.52$, $MS_e = 4.11$, $p < .0001$; for the schema analysis, $F_2(2, 38) = 249.54$, $MS_e = 1.24$, $p < .0001$). Planned comparisons based on these analyses also confirmed that new statements differed from paraphrases and that paraphrases differed from repetitions. The critical value of a two-tailed t test of these means ($\alpha = .05$) is 0.6 scale units in the participant analysis and 0.4 scale units in the schema analysis. There was no interaction between the type of justification and condition (circularity vs. reasonableness); both F's < 1.[6]

2.2.2. Effects of opponent's replies
Participants were clearly sensitive to whether the proponent's justification was a mere repetition or paraphrase, but did their assessment of the argument also take into account the opponent's response? The results suggest that this response did have an impact, but one that depended on whether participants were evaluating the circularity or the reasonableness of the arguments. Mean circularity ranks were about the same, whether the opponent acknowledged the claim (5.09), queried it (4.88), or denied it (5.03). In the reasonableness condition, however, the rankings exhibited more variation, with lower ranks (indicating less reasonable arguments) for denials (4.61) than for acknowledgments (4.95) or queries (5.45). This difference was responsible for an interaction between condition and response type that was significant in both the participant and schema analysis ($F_1(2, 116) = 5.51$, $MS_e = 2.14$, $p < .01$; $F_2(2, 38) = 51.14$, $MS_e = 0.15$, $p < .0001$). Analysis of the reasonableness ranks yields a significant difference among the response types ($F_1(2, 58) = 5.76$, $MS_e = 2.79$, $p < .01$; $F_2(2, 38) = 129.14$, $MS_e = 0.08$, $p < .0001$).

In the circularity condition, the pattern of repeated justification—the presence of a "circle"—may have captured the participants' attention at the expense of other aspects of the dialogue. Participants in the circularity condition may therefore have ignored the opponent's response (i.e., B's willingness to accept A's target claim), basing their rankings solely on the statements A provided in support of his position. This does not mean, however, that participants ignore pragmatic factors. Results from the reasonableness condition show that the opponent's

response does affect evaluations of the proponent's reply. These participants apparently see the proponent's moves as more rational if they are conditioned on the opponent's beliefs.

The predictions for this experiment assumed, however, that rankings would be higher (the arguments judged better) for arguments in which the opponent acknowledged the target claim than for those in which she queried or denied it. Queries or denials imply that the opponent is not necessarily prepared to concede the claim and should therefore make A's repetition or paraphrase less convincing. But although the reasonableness ranks following acknowledgments were higher than for denials, the ranks following queries were even higher. One potential explanation of higher ranks for queries is that B's question provided motivation for A's further line of reasoning, making A's response appear more appropriate. In Table 2, for example, B's *Why do you think there would be fewer cars on the road?* forces A to justify his target claim and may therefore make any response on A's part more reasonable in these circumstances. Experiment 2 revisits this possibility.

If the participants are attuned to the pragmatics of the argument, they should view A's repetition or paraphrase as less problematic when the opponent acknowledged its original statement. Since the circularity rankings do not seem to reflect the status of the opponent's response in this experiment, it isn't likely that the predicted interaction would appear in this condition, but the reasonableness ranks may allow us to detect it. In fact, the results from the reasonableness condition do exhibit such an interaction, as appears in Fig. 2. Panel a of this figure plots mean ranks from the reasonableness condition, and panel b mean ranks from the circularity condition. As already noted, the circularity rankings vary with the proponent's reply, but not with the opponent's response; reasonableness rankings, however, depend on both factors. Moreover, repetitions are ranked less reasonable following denials than following acknowledgments, whereas new statements are about equally reasonable following denials as following acknowledgments. Paraphrases fall between these extremes. This is the pattern we would expect if denials signal that the opponent is unlikely to find convincing a mere repetition of the target claim. Mean reasonableness ranks for queries parallel those for denials, as they should, but are elevated, perhaps for the reason mentioned in the preceding paragraph. Analysis of variance of the reasonableness ranks indicates a reliable interaction between opponent's response and proponent's justification ($F_1(4, 116) = 4.60$, $MS_e = 0.168$, $p < .01$; $F_2(4, 76) = 5.37$, $MS_e = 0.062$, $p < .001$).

This interaction also cast doubt on the possibility that participants in the reasonableness condition were basing their judgments simply on the arguments' overall level of discord. According to this alternative, participants judge the argument more reasonable if it leads to more agreement, less reasonable if it leads to more disagreement. This simple heuristic thus predicts higher reasonableness ranks for acknowledgments than denials. (Queries would naturally fall between acknowledgments and denials, but may have elevated ranks for the reasons mentioned earlier.) But although such a heuristic could explain a main effect of opponent's replies, it has difficulty accounting for why the difference between denials and acknowledgments is bigger when followed by repeated statements than when followed by new ones.

2.2.3. Summary

The results from this experiment provide clear support for the idea that people view mere repetition of a claim (and, to a lesser extent, paraphrase of a claim) as detracting from the quality of an argument. This finding appears in Fig. 2 as the consistent left-to-right increase of the
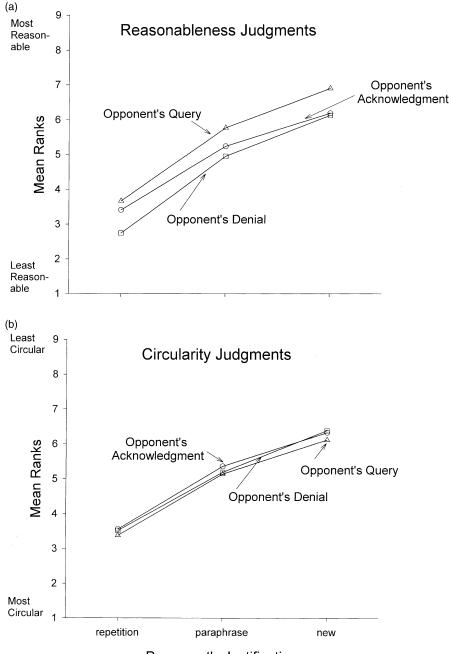
Fig. 2. Mean ranks for reasonableness (panel a) and circularity (panel b) for the nine stimulus argument types in Experiment 1. Lines with circles represent arguments in which the opponent acknowledges the target claim, triangles arguments in which the opponent queries the claim, and squares arguments in which the opponent denies the target claim.

curves, and it appears in participants' judgments of both the circularity and the reasonableness of the arguments. Of course, not all repetition is bad, but in the context of the present arguments the repetitions are self-justifying, in line with the participants' negative assessments. The following experiment explores the issue of whether people can discriminate different uses of repetition. It is also worth noting that the ranks of paraphrases were significantly lower than the ranks of new statements; so participants' responses were not solely based on superficial characteristics of the statements.

The earlier discussion of circular reasoning suggested that part of its fallaciousness might depend on whether the claim that the reasoner returns to is ungrounded—an assertion that the opponent has not acknowledged. The present data provided qualified support for this view. On one hand, participants ranked repeated claims as less reasonable when the target claim was met with a denial than when it was met with an acknowledgment. On the other hand, this effect was present only in the reasonableness judgments, not in the circularity judgments. Participants do not see use of ungrounded claims as increasing an argument's circularity, though they do see them as making the arguments less reasonable. Correctly or incorrectly, grounding does not seem to be part of participants' concept of circular argument, but does affect their overall evaluation of the argument. Experiment 2 pursues the issue of groundedness to determine whether the effects obtained here are peculiar to arguments like that of Table 2.

3. Experiments 2a and 2b: structural circularity

Experiment 1 suggests that people are aware of circularity in simple situations in which the proponent advances a single chain of reasoning and backs one claim with an equivalent one. But as noted in connection with Fig. 1, arguments are not always single-stranded: sometimes proponents or opponents begin separate lines of reasoning that reinforce, question, or attack an earlier point in a new way. When this type of branching occurs, the proponent can legitimately repeat a claim, at least under some circumstances. It is therefore of interest to see how easily people discriminate circular from noncircular reasoning that depends on the branching pattern.

As an example of the effects of branching, consider the argument in Table 3. In this dialogue, A supports his claim *Deep dish pizza has too much fat* with the further statement that patrons at Giordano's are overweight. If B asks for further justification of this last claim, as in Line d, A's repetition appears circular: the pizzas are too fatty because Giordano's patrons are overweight because the pizzas have too much fat. In Line e, however, B asks about a different issue, namely, whether Carmen's pizzas are any good, and in this context, A's repeated statement affirms that the pizzas also have too much fat. The issue about Giordano's is obviously related to the issue about Carmen's, so A's repeated claim may be redundant or have other defects. What's important about Line e, however, is that it creates a new branch or line of the argument and breaks the chain of justification from A's final restatement back to the target claim. The crucial issue in this experiment is whether participants see this final line as more circular and less reasonable after Line d than after Line e. In what follows, I will call arguments that continue along a single line (e.g., the argument with Line d) *one-branch* arguments and those that shift focus (e.g., the argument with Line e) *two-branch* arguments. As in Experiment 1, A's third statement (boldfaced in Table 3) is the *target claim*.[7]

Table 3
Sample argument schema for Experiments 2a and 2b

A	All Evanston pizza places are awful
B	What about Giordano's?
A	Their pizza stinks
B	What makes you say that?
A	**Deep dish pizza has too much fat**
B	a. I see
	b. Why do you think it has too much fat?
	c. Deep dish pizza does not have too much fat
A	People who eat there are overweight
B	d. Why do you think they're overweight?
	e. Anyway, what about Carmen's deep dish deluxe?
A	**Deep dish pizza has too much fat**

Our earlier discussion of argument pragmatics suggested that the opponent's response to A's target claim might affect how participants view a repetition of that claim. In particular, an acknowledgment by the opponent, as in Line a of Table 3, can assure the proponent that the claim is acceptable and can be recycled as warrant for further statements. By contrast, the opponent's denial of the target claim, as in Line c, indicates that she doesn't accept it and that its future use will not automatically recruit her support. Participants should therefore see repetition as more appropriate after an acknowledgment than after a denial. An opponent's query like that in Line b can also indicate that she is not ready to accept the target claim and thus warn the proponent that his claim is not part of common ground. The results of Experiment 1 suggest, however, that these queries can help motivate the proponent's later statements, making them more rather than less reasonable. We therefore anticipate lower reasonableness ratings for denials than for either queries or acknowledgments in this experiment.

Experiment 1 demonstrated an interaction between the way in which the opponent responded to the target claim and the type of justification the proponent then employed. Repetitions, but not new claims, appeared less reasonable if the opponent denied the target claim than if she acknowledged it. The key statement in the present experiment is a repetition (no paraphrases or new statements appeared here). However, it is of interest to see whether the opponent's response will also interact with branching. One possibility is that people will regard repetition of an unacknowledged claim as equally suspect whether the claim is repeated within one branch or two. Since the claim is ungrounded, any attempt to use this claim will fail to provide support. Another possibility, however, is that people may view repetition of an unacknowledged claim as especially bad if it is used to support itself. The unacknowledged claim may have a better chance of convincing the opponent when it appears in a new context than when it is restated within the old one. If so, we would expect to find larger effects of the opponent's response in one-branch than in two-branch arguments.

The two subexperiments reported in this section differ in whether participants ranked the stimulus arguments (Experiment 2a) or rated them (Experiment 2b). Experiment 2b (ratings) took place after 2a (ranking) and was intended to resolve a question that the earlier study

raised (see Section 3.2). I describe them together here, however, because of the similarity in their procedure and stimuli.

3.1. Method

One group of participants in Experiment 2a ranked sets of arguments in terms of the circularity of the proponent's final statement. A second group ranked the same arguments for the reasonableness of this statement. The six arguments in each set came from schemas such as Table 3 that varied how the opponent responded to the proponent's target claim (e.g., Lines a–c in Table 3) and, independently, whether the opponent continued a single branch of the argument, as in Line d, or started a new branch, as in Line e. Experiment 2b had the same design, the only difference being participants' use of ratings rather than rankings.

3.1.1. Procedure

Participants received a booklet consisting of a page of instructions followed by 20 pages of stimulus arguments. Participants in Experiment 2a indicated their ranking by circling one of the letters A–F, where A was labeled "most reasonable" or "least circular" and F "least reasonable" or "most circular." The procedure was similar to that of Experiment 1, except for the fact that the arguments in each set appeared on a single page rather than on separate slips. Participants in Experiment 2b indicated their ratings on the same scale, though of course they could use the same scale value for more than one argument in each set.

3.1.2. Stimulus arguments

As in Experiment 1, the stimuli comprised 20 argument sets, each concerning a current topic. For each topic, the arguments were formed around a schema that followed, line-by-line, the example in Table 3. (This example was one of the experimental schemas.) The proponent asserts the target claim (e.g., *Deep dish pizza has too much fat*) in his third turn. The opponent either acknowledges this claim (*I see*), queries it (*Why do you think it has too much fat?*), or denies it (*Deep dish pizza does not have too much fat*). The proponent responds with a justification of the target claim (*People who eat there are overweight*), and at this point the opponent either asks for further justification (e.g., *Why do you think they're overweight?*) or asks about a new aspect of the proponent's assertion in the very first line (*Anyway, what about Carmen's . . . ?*). The word *anyway* always preceded this new line of argument, since this is a conventional discourse marker signaling the end of an old topic and the beginning of a new one (or a return to an earlier point). In the final line of the argument, the proponent repeats the target claim verbatim.

Whether an argument contains one branch or two thus depends only on the content of B's question in the next-to-last line of the argument (see Table 3). The distance between the target claim and its repetition (i.e., the number of intervening sentences in the text) is exactly the same in one-branch and two-branch items. Note that the new branch of the argument can't be entirely unrelated to the initial one without rendering the argument incoherent. For example, the last three lines of Table 3 could not run as follows:

A: People who eat there are overweight.
B: Anyway, what are the prospects for peace in the Middle East?
A: Deep dish pizza has too much fat.

The stimulus arguments avoided this problem by introducing as the new topic an alternative aspect of the issue that A introduced in the argument's first line (Carmen's and Giordano's are two rival pizza parlors, well-known to the participants). This means that when A repeats his target claim in the context of the new topic, it is still directed at a conceptually related point. This relatedness seems unavoidable, however, and it works against the present hypothesis. To the extent that the topics of the two branches are similar, the chances of finding an effect of branching should decrease.

Each schema produces six arguments (one-branch vs. two-branch arguments crossed with the opponent's response—acknowledgment, query, or denial). We permuted each set of six in two different random orders, assigning one order to booklet type A and the other to booklet type B. The six arguments in each set appeared together on a single page of the booklets, with the letters A–F in a horizontal line to the right of each argument. The order of the argument sets (booklet pages) was shuffled in a new random sequence for each participant.

3.1.3. Participants

Sixty participants took part in Experiment 2a, 30 in the reasonableness and 30 in the circularity condition. There were 80 participants in Experiment 2b, 40 each in the reasonableness and the circularity conditions. Half the participants in each condition received booklet type A and the other half booklet type B. The participants were from the same population as those of Experiment 1, but had not taken part in the earlier study. We tested them in small groups of up to six individuals.
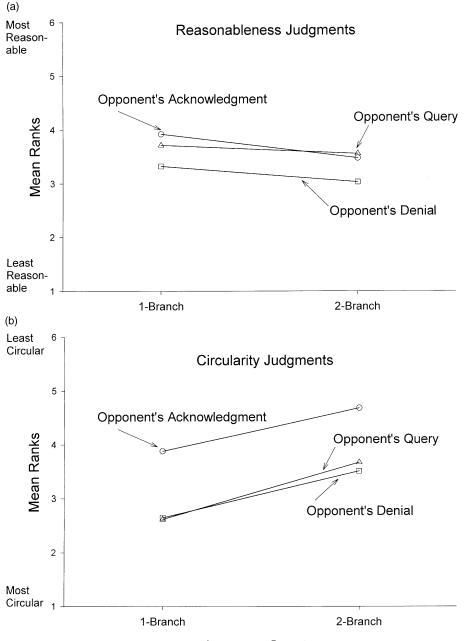
3.2. Results and discussion

In evaluating circularity or reasonableness, do participants rely on mere repetition of a claim or do they also attend to the structural role of the repeated claim in the overall discourse? One-branch arguments—in this case, those containing questions such as Line d of Table 3— have statements that appear to justify their own earlier mention and so should seem circular. Two-branch arguments—for example, the version of the Table 3 argument containing Line e—also have repeated statements, but the repeated item does not directly justify the target claim. Participants should therefore give better rankings or ratings to the two-branch items.

The ranking data from Experiment 2a show that participants do attend to the structural difference between one- and two-branch arguments. The rank for each argument was again converted to a numeric scale so that ranks near 1 represent those items participants judged most circular or least reasonable and ranks near 6 represent items judged least circular or most reasonable. On this scale, the mean rank for one-branch arguments is 3.35, and the mean rank for two-branch arguments is 3.65. This difference is significant in both an analysis by participants and an analysis by schemas, similar to those of Experiment 1 ($F_1(1, 58) = 5.68$, $MS_e = 1.45$, $p < .05$; $F_2(1, 19) = 4.51$, $MS_e = 1.22$, $p < .05$).

Participants in the circularity condition showed a greater preference for the two-branch arguments than did those in the reasonableness condition. The mean circularity ranks were 3.05 for one-branch and 3.95 for two-branch items, whereas the mean reasonableness ranks were weakly in the opposite direction (3.65 for one-branch and 3.35 for two-branch arguments). This difference between conditions appears in Fig. 3, which plots reasonableness ranks in

(a)

Reasonableness Judgments

Opponent's Acknowledgment

Opponent's Query

Opponent's Denial

(b)

Circularity Judgments

Opponent's Acknowledgment

Opponent's Query

Opponent's Denial

Argument Structure

Fig. 3. Mean ranks for reasonableness (panel a) and circularity (panel b) for the six stimulus argument types in Experiment 2a. Lines with circles represent arguments in which the opponent acknowledges the target claim, triangles arguments in which the opponent queries the claim, and squares arguments in which the opponent denies the target claim.
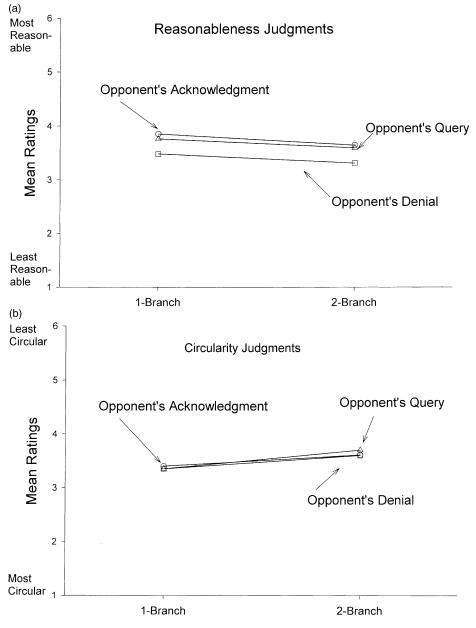
panel a and circularity ranks in panel b. The difference in the slopes of the lines in the two panels corresponds to the differing effect of argument structure in the two conditions. This variation produced a highly reliable interaction between condition and branching ($F_1(1, 58) = 22.46$, $MS_e = 1.45$, $p < .0001$; $F_2(1, 19) = 31.43$, $MS_e = 0.69$, $p < .0001$). Although this interaction was not predicted, it seems understandable on the grounds that circularity instructions call greater attention to the structural aspects of the argument than do the more general instructions to judge how reasonable the argument is.

Much the same results appeared in the ratings. For comparison with the earlier data, the ratings were recoded on a 1–6 scale. In these terms, participants gave one-branch arguments a mean circularity rating of 3.37 and gave two-branch arguments a mean rating of 3.63. Reasonableness ratings again showed a trend in the opposite direction: participants gave one-branch arguments a mean rating of 3.70 and gave two-branch arguments a rating of 3.51. This reversal again produced an interaction between number of branches and (circularity vs. reasonableness) condition ($F_1(1, 78) = 6.75$, $MS_e = 0.894$, $p < .05$; $F_2(1, 19) = 3.99$, $MS_e = 0.756$, $p = .06$). Fig. 4 plots this data in the same form as in Fig. 3.

3.2.1. Effects of opponent's replies

When an opponent denies or queries the proponent's target claim, mere repetition of that claim may seem futile because it adds no further support to the proponent's case. When the opponent acknowledges the claim, however, repeating it may provide some backing for the other statements from the opponent's point of view. Acknowledgments ground the target claim, whereas queries and denials do not. In line with this idea, participants in Experiment 2a gave better ranks to arguments in which the opponent acknowledged the target claim than to those in which she denied it, with ranks for queries in between. The mean rank was 3.99 for acknowledgments, 3.39 for queries, and 3.13 for denials ($F_1(2, 116) = 20.39$, $MS_e = 1.14$, $p < .0001$; $F_2(2, 38) = 189.51$, $MS_e = 0.08$, $p < .0001$). The critical value of the difference between the means (two-tailed t test, $\alpha = .05$) is 0.28 in the participant analysis and 0.09 in the schema analysis, so acknowledgments differ from queries or denials by a planned comparison in both cases. As noted in connection with Experiment 1, however, opponent queries may also motivate further justification on the part of the proponent. A closer look at the data suggests that the motivational aspect of queries also showed up here.

The effect of the opponent's replies, like the effect of branching, depends on whether the participants were evaluating the reasonableness or the circularity of the argument. In the reasonableness condition (see Fig. 3a), mean ranks were lower for denials (3.17) than for queries (3.63) or acknowledgments (3.70). Consistent with the Experiment 1 results, queries received better reasonableness ranks than one might expect on the basis of the "grounding" view that they simply express the opponent's doubts about the target claim. As just mentioned, these queries may provide more incentive for the proponent's later responses and, in this way, increase their reasonableness. This motivational component, however, should not affect the *circularity* of the proponent's claims, and in fact, participants in the circularity condition produced exactly the pattern expected on the basis of grounding: as shown in Fig. 3b, mean ranks were approximately the same for denials (3.08) and queries (3.14), and both were lower (indicating greater circularity) than for acknowledgments (4.28). The interaction between condition and

(a)

(b)

Fig. 4. Mean ratings for reasonableness (panel a) and circularity (panel b) for the six stimulus argument types in Experiment 2b. Lines with circles represent arguments in which the opponent acknowledges the target claim, triangles arguments in which the opponent queries the claim, and squares arguments in which the opponent denies the target claim.

the type of opponent's reply is significant both by participants and schemas ($F_1(2, 116) = 7.69$, $MS_e = 1.45$, $p < .001$; $F_2(2, 38) = 86.73$, $MS_e = 0.07$, $p < .0001$).

Participants in the circularity condition were obviously aware of the opponent's replies, giving better ranks to acknowledgments. This contrasts with the results from the same condition in Experiment 1. In that study, we also obtained an interaction between condition and type of opponent's reply, but this was because there was no reliable difference due to reply in the circularity condition (see Fig. 2b). Why were circularity participants sensitive to replies in Experiment 2a but not in Experiment 1? This discrepancy may have been an indirect consequence of the ranking method of these two studies. The ranking task encourages participants to compare the arguments carefully, as noted earlier; but it is possible that ranking also had the effect of shifting participants' attention. Participants in Experiment 2a may have leaned more heavily on opponent replies than did those of Experiment 1 because they had more difficulty discerning other components of circularity. Experiment 2b was designed to check this hypothesis. If people typically don't take opponent replies into account in evaluating circularity, we would expect to see a smaller effect of replies on ratings than rankings. Because ratings do not require a complete ordering of the arguments, there is less reason for participants in the circularity condition to consider these replies. Participants in the reasonableness condition, however, should produce results similar to those of Experiment 2a. Both Experiments 1 and 2a suggest that reasonableness judgments depend crucially on whether the proponent's assertions respect the opponent's attitudes, and if so, the effect of opponent replies should appear in reasonableness ratings as well as in rankings.

Fig. 4b plots the critical circularity ratings and shows that there is little or no remaining effect of the opponent's replies. Mean ratings in this condition were within a tenth of a scale point of each other: 3.50 for acknowledgments, 3.52 for queries, and 3.47 for denials ($F_1(2, 78) < 1$, $MS_e = 0.168$; $F_2(2, 38) < 1$, $MS_e = 0.034$). By contrast, the data from the reasonableness condition produced a highly significant effect of opponent's reply (see Fig. 4a). Mean reasonableness ratings were 3.75 for acknowledgments, 3.68 for queries, and 3.39 for denials ($F_1(2, 78) = 15.25$, $MS_e = 0.184$, $p < .0001$; $F_2(2, 38) = 34.87$, $MS_e = 0.040$, $p < .0001$). This difference in the size of the effects across conditions produced a significant interaction between condition and type of opponent's reply in an overall analysis ($F_1(2, 156) = 6.21$, $MS_e = 0.176$, $p < .01$; $F_2(2, 38) = 13.79$, $MS_e = 0.040$, $p < .0001$). A comparison of Figs. 3 and 4 suggests that the opponent's reply has about the same effect on the reasonableness data in Experiments 2a and 2b, but the effect on circularity judgments has all but disappeared here. A combined statistical analysis of the rankings and ratings is probably out of place. However, these results are compatible with the idea that the ranking task of Experiment 2a encouraged participants in the circularity condition to place special emphasis on the opponent's replies.

3.2.2. Joint effects of branching and opponent's reply

Figs. 3 and 4 show that the difference between acknowledgments and denials is about the same in one-branch as in two-branch arguments. The lines representing these types of reply are roughly parallel in both the reasonableness and the circularity conditions. Thus, participants apparently do not view an argument as more suspect if the proponent repeats a previously denied claim within the same line of reasoning than across two different lines. Acknowledgments and

queries, however, are not completely parallel in the ranking data of Fig. 3: the mean rank of queries decreases less than acknowledgments in the reasonableness judgments and increases more in the circularity condition. Thus, the number of argument branches interacts with the opponent's reply ($F_1(2, 116) = 4.49$, $MS_e = 0.12$, $p < .05$; $F_2(2, 38) = 5.40$, $MS_e = 0.07$, $p < .01$). As Fig. 4 suggests, however, this interaction was not significant in the rating data ($F_1(2, 156) = 1.25$, $MS_e = 0.073$, $p > .10$; $F_2(2, 38) = 1.20$, $MS_e = 0.038$, $p > .10$). The small size of the effect in Experiment 2a and its absence in Experiment 2b rules out any strong interpretation.

4. General discussion

Circular reasoning or question begging threatens the cogency of arguments. When we smuggle in a proposition in making a case for an equivalent one, we forfeit the hope of establishing the conclusion on independent grounds. This breakdown of reasoning can occur in informal arguments in all endeavors, not just in scientific or mathematical ones, so you might expect most adults to understand the problems associated with circularity and to be attuned to circular arguments when they read or hear them. The results of the experiments reported here, however, suggest some limitations on this ability.

On the positive side, Experiment 1 clearly indicates that the participants in the circularity condition took verbatim repetition or paraphrase of a statement as a clue that an argument is circular. (They also rank paraphrases of a claim as less circular than repetitions, though this may be due to the difficulty of constructing paraphrases that mean exactly the same as the target statement.) Experiment 2 shows that participants also see the overall structure of an argument as influencing circularity. When the proponent repeats a statement in the same line of reasoning, participants rank the argument more circular than when the proponent uses the same statement in two different lines.

On the negative side, participants do not always see key pragmatic factors as relevant to circularity. In Experiments 1 and 2b, participants gave no indication that a repeated statement was any more circular when the opponent had queried or denied the target statement than when she had acknowledged it. Experiment 2a suggests that participants can take these pragmatic factors into account, but only if stronger cues are unavailable and if participants are under pressure to discriminate among the arguments.

It is helpful to compare these circularity judgments to judgments of reasonableness for the same set of arguments. Participants in the reasonableness condition also saw repetitions as detracting from an argument's quality (Experiment 1); however, their decisions also depended on the opponent's opinion about the statement. Participants rated a repeated statement as more reasonable if the opponent had acknowledged the original than if she had denied it (Experiment 1). However, reasonableness judgments did not vary as a function of whether a repetition occurred within a single line of argument or across two different lines (Experiment 2).

The combined results from the reasonableness and circularity conditions show that the experiments' manipulations were effective. These factors influenced either the circularity judgments, the reasonableness judgments, or both. One way to summarize the results, then, might be to say that participants' concept of circularity appears to emphasize the structure of the

proponent's argument at the expense of the opponent's point of view. In the opposite direction, participants' notion of a reasonable argument seems to emphasize the opponent's point of view at the expense of certain structural aspects. The rest of this paper explores the issues that these converse findings raise.

4.1. Subjective circles

Why did participants tend to ignore the opponent's point of view in evaluating the circularity of the arguments? One simple answer might be that the circularity task drew attention toward the proponent's statements and away from the opponent's requests. According to this hypothesis, the participants were, in effect, evaluating monologues consisting of just the proponent's argument; so they failed to notice the difference between the opponent's denials (vs. acknowledgments). This account might draw support from previous studies suggesting that people sometimes have difficulty understanding a character's point of view in a story (Keysar, 1994) or evaluating an argument from an opposing standpoint (Baron, 1991; Perkins, Farady, & Bushey, 1991; Voss & Means, 1991). But although participants did not always see the opponent's responses as relevant to circularity, they didn't always ignore those responses. The difference between one-branch and two-branch arguments in Experiments 2a and b depended entirely on the question that the opponent raised in the next-to-last line (see Line d vs. Line e in Table 3). Since this difference influenced circularity scores in both experiments, participants must have attended to the question.

The results hint that participants in the circularity conditions made use of the opponent's responses mainly when those responses influenced the structure of the argument. The introduction to this article considered three conditions that seemed jointly sufficient for circularity:

  (a) a claim c-commands a propositionally equivalent claim by the same speaker;
  (b) at least one explanation (or evidence) node occurs on the path between the equivalent claims;
  (c) the path does not contain both explanation and evidence nodes and does not contain defeater nodes;
  (d) the opponent does not accept the repeated proposition.

The present results show that, although (a) is critical for circularity judgments, (d) is not. Further work (Rips, 2001, Experiment 4), also suggests that (c) has little impact on circularity decisions for participants from the same population. This experiment used a procedure similar to that of Experiments 1 and 2, but altered whether the repeated claims were separated by two evidentiary nodes or by one explanatory and one evidentiary node (see Table 1). According to conditions (b)–(c), participants should consider only the first of these to be circular, but the circularity ranks were nearly identical for the two types of argument.

Because participants in the reasonableness condition were able to spot pragmatic defects along the lines of (d), the issue for the circularity participants was how the term "circularity" should be applied, rather than whether they could detect such problems.[8] In the case of condition (c), however, the results just mentioned suggest that people may be insensitive to the difference between evidence and explanation (Rips, 2001). Participants in neither the circularity condition nor the reasonableness condition saw this difference as affecting the arguments' quality. Earlier

studies show that people distinguish evidence and explanation only when they are aware of the range of potential evidence available to the arguers (Brem & Rips, 2000), and it seems possible that arguments like those in Rips (2001) were too brief to convey this information completely. But although a richer set of arguments might be more successful in alerting participants to the evidence/explanation distinction, it may take more direct training to get them to see the way these different types of justification influence an argument's success.

4.2. Two types of circularity?

It is difficult to blame participants in the circularity condition for failing to take into account pragmatic factors, since even expert theories differ on this issue. According to a unitary view of circularity, the pragmatic form is the more general fallacy: in arguments with structural circles, a claim is part of a justification of itself and, for this reason, is unable to deliver support that an audience can accept. Structural circles therefore qualify as pragmatic failures, but pragmatically defective arguments can also include those that merely overlook the audience's viewpoint. This larger class of pragmatically circular arguments are unable to convince the audience because they never make contact with propositions that the audience is prepared to buy. It might be necessary to sharpen this view to impose limits on the audience's freedom to reject a proponent's justification—sheer stubbornness shouldn't cause an argument to become circular—but there is little doubt that arguments can sometimes be pragmatically inappropriate.

The evidence from these experiments, however, suggests a different possibility. Participants sometimes see arguments as circular even when they do not have obvious pragmatic problems. In Experiment 2b, for example, participants rated arguments circular as long as they contained a structural circularity, whether or not the opponent agreed with the repeated claim. Similarly, participants sometimes judge a repeated statement equally circular when it follows an explicit request for a restatement (*What's the evidence you gave [earlier]?*) as when it follows a request for a new justification (*What's the evidence you'd give [now]?*)—see Rips (2001). Reasonableness participants thought only the latter case unreasonable. Thus, the surprising result is that, according to the participants' judgments, structurally circular arguments are not a subset of pragmatically unreasonable ones, but the two classes only partially overlap.

This difference between structural and pragmatic circles may lend support to those who advocate a distinction between circularity and question begging, where the former is equivalent to structural circularity and the latter to pragmatic circularity. Similarly, we might use these results to construct a distinction between virtuous and vicious circles: virtuous circles contain structural circularities but no pragmatic defects, whereas vicious circles contain both. It is possible that some claims are so straightforward that there is no non-circular support for them. In such a case, a proponent can do little but repeat or paraphrase the claim if an opponent asks for further evidence. Even if the claim is more complex, there may simply be no more basic claims to provide justification. According to certain theories of knowledge, there are no facts that provide privileged support for other claims. Instead, the justification of a given claim depends on how well it coheres with the body of current beliefs as a whole. If each belief is ultimately connected to every other belief in this way, then it will always be possible to trace a chain of justification from an individual claim to itself through this belief web. Although structural circles are unavoidable, according to this theory, they are harmless to an argument

if the circle is large enough to provide coherence or if the beliefs converge in the long run to a relatively stable state (Bonjour, 1989; Thagard, 2000). As long as the justifications don't double back too quickly, they can still support a claim by locating it within a larger set of beliefs. Proofs of the equivalence of theorems may fall under the same heading of virtuous circularities if logical equivalence implies propositional equivalence, as discussed in the introduction.

The differing patterns of circularity and reasonableness judgments in these experiments are of interest because they dissociate structural and pragmatic aspects that some earlier theories of circularity have run together. However, this is not to say that participants' judgments about these arguments are always trustworthy. Factors that make an argument questionable—whether they are labeled "circular" or not—don't always register as either circular or unreasonable for these participants. Likewise, it is hard to defend the way in which participants in the reasonableness condition in Experiment 2 ignored the arguments' overall structure. Alerting people to these underlying difficulties may require more than modifying their technical vocabulary. Circular arguments, by whatever name, may have a more complex shape—may be shaped by more factors—than people are prepared to recognize.

Notes

1. Philosophers and rhetoricians, however, have no monopoly on accusing others of circularity or question-begging. It is rare to hear accusations of question-begging in ordinary conversation, probably because it is impolite to accuse others of incorrect reasoning of any sort, but more formal settings can sanction impoliteness. Here, for example, is a researcher from the Census Bureau charging yours truly with question begging (Martin, 2001, p. 32):

   > The possible role of memory decay in producing the seam bias is an important question for research. The authors beg the question by assuming that memory decay produces better recall for recent events than for more distant ones, taking the evidence of a seam effect as support for this explanation.

   I protest! There was independent evidence for memory decay in the studies in question (see Rips, Conrad, Fricker, & Behr, 2001). But the present point is simply that charging others with question-begging is an intermural sport.

2. The rules in Table 1 are intended as mental components that people tacitly use in following and participating in arguments (see Rips, 1998, and Rips et al., 1999, for evidence on psychological validity). People cannot employ rules like these, however, in a simple bottom-up manner. Parsers for sentence-level grammars can sometimes operate bottom-up by classifying individual words or morphemes as members of syntactic categories (e.g., nouns or adjectives) and classifying the lower-level syntactic categories into higher ones. Such a process depends on the fact that there are only a finite number of morphemes and only a small number of categories into which each morpheme falls. By contrast, there is no limit to the number of possible sentences or propositions that could qualify as a claim, for example, in the rules of Table 1 (see Garnham, 1983, for a criticism of story grammars along these lines). This disanalogy with bottom-up sentence parsing, however, does not imply that rules like those in Table 1 are cognitively

implausible. We *do* appear capable of recognizing stretches of discourse as constituting claims, denials, and other speech acts, and this ability is what is required to apply the rules in order to understand and create an argument. A complete theory of argumentation depends on speech-act recognition of this sort, but unless there is reason to think this recognition is impossible, there is no reason to put aside such proposals. Every cognitive theory presupposes some lower-level skills.

3. The intent of (a)–(c) is to classify as circular unbroken sequences of explanations (evidential statements) that begin and end with equivalent claims by the same speaker. You might suppose that condition (c) is too lax in failing to classify dialogs of the following form as circular:

>   Proponent: Claim 1
>   Opponent: What's the explanation for Claim 1?
>   Proponent: Claim 2
>   Opponent: What's the evidence for Claim 2?
>   Proponent: Claim 1
>   Opponent: What's the explanation for Claim 2?
>   Proponent: Claim 1

This dialog seems to escape circularity via condition (c) because of the mix of explanation and evidence. But it is plainly circular, since Claim 2 is offered as explanation (as well as evidence) for Claim 1 and Claim 1 is offered as explanation for Claim 2. However, a diagram of this dialog, like that of Fig. 1b, would show that it contains two main branches: one corresponding to lines 3–5 and the other to lines 3, 6, and 7. According to (a)–(c), the path from the initial assertion of Claim 1 to its first repetition in line 5 along the first branch is not circular, but the path to the second repetition in line 7 along the second branch *is* circular (consisting of a string of explanations). So (a)–(c) seems to deliver the correct verdict here. A more difficult issue concerns the presence of defeaters. If a proponent makes a claim, an opponent denies it, and the proponent then denies the denial on the basis of the initial claim, is the dialog circular? (E.g., "Giordano's has the best pizza in Chicago." "No, Carmen's has the best pizza." "No, Giordano's has the best pizza.") Criteria (a)–(c) do not label such dialogs circular. One justification for this decision is that the failure here seems less a matter of structural circularity than a pragmatic failure in grounding, as is discussed in the next section. But however this may be, we can take (a)–(c) as providing a sufficient condition for circularity, leaving it open whether there are other types of structural circularities.

4. The notion of question-begging seems to have originated in Aristotle's *Sophistical Refutations* where he describes debate-type games (perhaps an ancestor of modern Ph.D. orals) in which proponents had to defend a claim by getting the opponent to concede premises that imply the claim at issue. Asking the opponent simply to concede the main claim without proof would be begging the question—an improper move in the game (see Hamblin, 1970). As mentioned earlier, philosophers differ on whether question-begging and circularity are distinct fallacies. Moreover, in recent usage, "begging the question" has come to mean something more like raising the question or leaving the question open, rather than presupposing what one wants to prove. For example, "None of my Italian reference books supports this claim, but none of them even discuss it, which leaves the

question begging" (Mathiesen, 2000, p. 303). These problems about the meaning of "question begging" are additional reasons why the experiments did not use this term in the instructions.

5. The arguments used acknowledgments, such as *I see*, in preference to accepters (e.g., *I agree*) because the proponent's further explanation seems more appropriate following acknowledgments.

6. One-way analyses indicated some nonhomogeneity of variance for the participant (but not for the schema) data. The ANOVAs were therefore re-run using logit transformations of the ranks (see Mosteller & Tukey, 1977, p. 108). The results of the reanalysis were consistent (in terms of the pattern of significant effects) with the tests reported here.

7. In the Table 3 dialog, it is possible to interpret A's *People who eat [at Giordano's] are overweight* as giving evidence for the target statement *Deep dish pizza has too much fat*, and the repetition of the target statement as an explanation for why the people are overweight. Under this interpretation, A's repetition would not be circular, for reasons similar to those discussed in connection with example (2). This interpretation would then militate against the predicted difference between the one-branch and the two-branch conditions. The presence of this difference in the data from this experiment, as well as further research that specified the role of explanation and evidence (Rips, 2001), suggests that people are rather insensitive to the explanation/evidence dichotomy under the conditions of these studies. See Section 4.1 for further comments on this issue.

8. It is worth noting, however, that this hypothesis does not by itself explain why circularity ratings in Experiment 2b did not depend on the difference between acknowledgments, denials, and queries, whereas the ranks in Experiment 2a did. Filling in this gap would require an account of how participants' strategies vary with task restrictions. Task differences of this sort also suggest that it may be worthwhile in future research to consider more implicit measures of circularity than the present ratings and ranking. (Direct measures seem like a plausible start, however, in an area where there are no previous empirical results to go on.)

Acknowledgments

References

Baron, J. (1991). Beliefs about thinking. In J. F. Voss, D. N. Perkins, & J. W. Segal (Eds.), *Informal reasoning and education* (pp. 169–186). Hillsdale, NJ: Erlbaum.

Bonjour, L. (1989). *The structure of empirical knowledge*. Cambridge, MA: Harvard University Press.

Brem, S. K., & Rips, L. J. (2000). Evidence and explanation in informal argument. *Cognitive Science*, *24*, 573–604.

Clark, H. H., & Schaefer, E. F. (1989). Contributing to discourse. *Cognitive Science*, *13*, 259–294.

Coleman, L., & Kay, P. (1981). Prototype semantics: The English word lie. *Language*, *57*, 26–44.

de Swart, H. (1998). *Introduction to natural language semantics*. Stanford, CA: CSLI Publications.

Garnham, A. (1983). What's wrong with story grammars? *Cognition*, *15*, 145–154.

Goldfarb, W. (1988). Poincaré against the logicists. In W. Aspray & P. Kitcher (Eds.), *History and philosophy of modern mathematics* (pp. 61–81). Minneapolis: University of Minnesota Press.

Grosz, B. J., Pollack, M. E., & Sidner, C. L. (1989). Discourse. In M. I. Posner (Ed.), *Foundations of cognitive science* (pp. 437–468). Cambridge, MA: MIT Press.

Hamblin, C. L. (1970). *Fallacies*. London: Methuen.

Jackson, F. (1984). Petitio and the purpose of arguing. *Pacific Philosophical Quarterly*, *65*, 26–36.

Keysar, B. (1994). The illusory transparency of intention: Linguistic perspective taking in text. *Cognitive Psychology*, *26*, 165–208.

Krosnick, J. A., & Alwin, D. F. (1988). A test of the form-resistant correlation hypothesis: Ratings, rankings, and the measurement of values. *Public Opinion Quarterly*, *52*, 526–538.

Kuhn, D. (1991). *The skills of argument*. Cambridge, UK: Cambridge University Press.

Martin, E. (2001). Remarks on "Seam effects for quantitative and qualitative facts." In *Seminar on the funding opportunity in survey research* (Statistical Policy Working Paper 33, pp. 30–33). Washington, DC: Statistical Policy Office, Office of Information and Regulatory Affairs, Office of Management and Budget.

Mathiesen, J. (2000). Cioppino. In J. Thorne (Ed.), *Pot on the fire*. New York: North Point Press.

Mosteller, F. & Tukey, J. W. (1977). *Data analysis and regression*. Reading, MA: Addison-Wesley.

Perkins, D. N., Farady, M., & Bushey, B. (1991). Everyday reasoning and the roots of intelligence. In J. F. Voss, D. N. Perkins, & J. W. Segal (Eds.), *Informal reasoning and education* (pp. 83–105). Hillsdale, NJ: Erlbaum.

Ranney, M., Schank, P., Hoadley, C., & Neff, J. (1994). "I know one when I see one": How (much) do hypotheses differ from evidence? *Proceedings of the 5th ASIA SAG/C Classification Research Workshop,* 139–155.

Reichman-Adar, R. (1984). Extended person-machine interface. *Artificial Intelligence*, *22*, 157–218.

Rips, L. J. (1998). Reasoning and conversation. *Psychological Review*, *105*, 411–441.

Rips, L. J. (2001). *Circularities*. Unpublished manuscript, Northwestern University, Evanston, IL.

Rips, L. J., Brem, S. K., & Bailenson, J. (1999). Reasoning dialogues. *Current Directions in Psychological Science*, *8*, 172–177.

Rips, L. J., Conrad, F. G., Fricker, S. S., & Behr, J. (2001). Seam effects for quantitative and qualitative facts. In *Seminar on the funding opportunity in survey research* (Statistical Policy Working Paper 33, pp. 7–25). Washington, DC: Statistical Policy Office, Office of Information and Regulatory Affairs, Office of Management and Budget.

Schechtman, M. (1999). Personhood and personal identity. *Journal of Philosophy*, *87*, 71–92.

Sinnott-Armstrong, W. (1999). Begging the question. *Australasian Journal of Philosophy*, *77*, 174–191.

Sorensen, R. A. (1991). 'P, therefore, P' without circularity. *Journal of Philosophy*, *88*, 245–266.

Sorensen, R. (1999). An empathic theory of circularity. *Australasian Journal of Philosophy*, *77*, 498–509.

Thagard, P. (2000). *Coherence in thought and action*. Cambridge, MA: MIT Press.

van Eemeren, F. H., Grootendorst, R., & Henkemans, F. S. (1996). *Fundamentals of argumentation theory*. Mahwah, NJ: Erlbaum.

Voss, J. F., & Means, M. L. (1991). Learning to reason via instruction in argumentation. *Learning and Instruction*, *1*, 337–350.

Walton, D. N. (1991). *Begging the question*. New York: Greenwood Press.