

Argumentation Schema and the Myside Bias in Written Argumentation

Christopher R. Wolfe

Miami University

M. Anne Britt

Jodie A. Butler

Northern Illinois University

This article describes a cognitive argumentation schema for written arguments and presents three empirical studies on the “myside” bias—the tendency to ignore or exclude evidence against one’s position. Study 1 examined the consequences of conceding, rebutting, and denying other-side information. Rebuttal led to higher ratings of agreement and quality and better impressions of the author than when the same arguments excluded other-side information (i.e., exhibited the myside bias). In Study 2, claims had a significantly greater impact on agreement ratings and reasons had a significantly greater impact on quality ratings. When participants were given myside reasons supporting other-side claims, they acknowledged argument strength while making relatively minor changes in agreement. In Study 3, the authors found that a brief, theoretically motivated written tutorial was effective in improving undergraduate students’ written argumentative essays by significantly increasing the precision of claims, improving the elaboration of reasons, and reducing the myside bias.

Keywords: *writing arguments; rebuttal; counterargument; claim; writing tutorial*

The ability to comprehend and construct written arguments is an important skill for academic learning as well as for pursuits outside of school. Academically, students are expected to be able to comprehend, evaluate, and construct arguments within and across most subject-matter areas (Ackerman, 1993; National Center for History in the Schools, 1996). Despite its importance, national assessments find that only 15% of 12th graders are adequately skilled in producing written arguments (National Assessment of Educational Progress, 1996, 1998). Most students’ essays fail to state a clear claim, fail to

provide relevant, elaborated support for their claims, and lack coherent organization. Moreover, many less skilled writers of argumentative essays fail to address arguments contrary to their own positions, a shortcoming referred to as the myside bias (Wolfe & Britt, 2008).

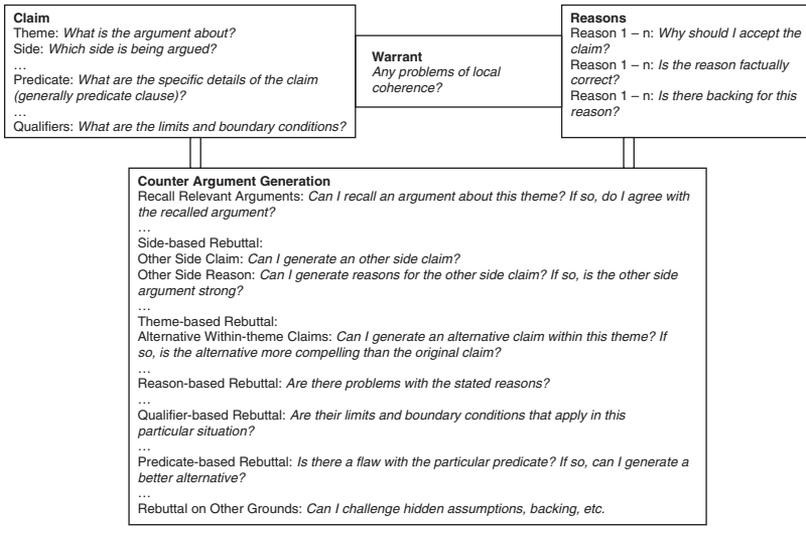
An argument is, at minimum, a claim supported by data (Toulmin, 1958) or “reasons” in the parlance of Voss and his colleagues (Voss, 2005; Voss, Fincher-Kiefer, Wiley, & Silfes, 1993). According to Voss (Voss, 2005; Voss et al., 1993), the claim of one argument commonly serves as the reason of a second argument, and the backing of a given argument can itself be another argument (Voss, 2005). Thus, argumentation is a recursive process, sometimes with multiple lines of argument, rather than one characterized by long chains such as geometry proofs.

Argumentation Schema

Writing argumentative essays requires the engagement and coordination of several cognitive processes such as retrieving a schema and encoding information from sources. While there is no specific model of how people write argument essays, Hayes and Flower’s model of writing (Hayes, 1996; Hayes & Flower, 1980) is the most elaborated model of how the relevant cognitive processes and knowledge structures are used during writing and how they are coordinated. Hayes (1996) highlights the role of genre-specific schemata in setting goals and subgoals to guide writing. According to Flower and Hayes (1981), “If a writer’s representation of her rhetorical problem is inaccurate or simply underdeveloped, then she is unlikely to ‘solve’ or attend to the missing aspects of the problem” (p. 369). Taking the Flower and Hayes notion of a mental representation to mean a schema, one possible source of poor argument writing is that the writer has a deficient argument schema, thereby making it unlikely that important subgoals will be created. For example, if one has a minimalist argument schema that has slots for only a claim supported by a single reason, then the important sub-

Authors’ Note: This research was supported by a grant from the U.S. Department of Education Cognition and Student Learning Research Program (Grant No. R305H020039). Any opinions, findings, conclusions, or recommendations expressed in this article are those of the authors and do not necessarily reflect the views of this organization. The authors wish to thank the Discourse and Technology group at Northern Illinois University for comments on this research and Deborah Okey and Melina Bar for help in scoring student essays. Address correspondence to Christopher R. Wolfe, Department of Psychology, Miami University, Oxford, OH 45056; e-mail: WolfeCR@muohio.edu.

Figure 1
Argumentation Schema



goals of including backing for reasons and rebutting other-side information will be absent. Our understanding of the argumentation schema expands on the work of Hayes (1996) and Voss (2005) and our own work (Britt, Kurby, Dandotkar, & Wolfe, 2008; Britt & Larson, 2003; Wolfe & Britt, 2008) and applies to the reading and writing of argumentative essays.

In our view, following classic work on schemata (e.g., Anderson & Pichert, 1978; Schank & Abelson, 1977), when people comprehend a written argument, they make use of an argumentation schema (see Figure 1). A schema organizes knowledge according to the manner in which it is used (Sweller, van Merriënboer, & Paas, 1998; van Merriënboer & Sweller, 2005). We believe that the argumentation schema is a learned, culturally derived set of expectations and questions evoked by argumentative texts. In both reading and writing argumentative texts, individuals presumably differ in the extent to which they use schema, with a general preference for expending minimal cognitive effort. More elements of the schema can be brought to bear, though generally at the cost of increased cognitive burdens (Simon, 1982; van Merriënboer & Sweller, 2005). In writing, our conjecture is that the argument schema is evoked by demands of an assignment, expectations about the audience, and the goals of the

author. As noted by Perkins, Allen, and Hafner (1983), successful argumentation depends, in part, on “selling” a particular mental model.

We hypothesize that a claim produces three expectations or “slots” in the schema to be filled using the text: the theme, side, and predicate of the claim (Britt et al., 2008). As we use the terms, the theme is the topic or subject of the argument, the side is represented as either pro or con, and the predicate is the particular position taken by the author. For example, for the claim, “Talking on cell phones while driving should be outlawed,” the theme is driving and talking on the phone, the side is against the practice, and the predicate is that it should be outlawed. In theory, knowledge, attitudes, and beliefs are activated pertaining to the theme. We consider the argument predicate to be the specific position taken by the author. Thus, a similar claim, “Talking on cell phones while driving should be discouraged,” has the same theme and side as the earlier example, but this specific predicate affords different arguments and counterarguments.

In our thinking, if a reader is less inclined toward the claim, then the schema provokes a consideration of counterarguments. Perhaps, the easiest approach to counterargument is to search memory for stored examples of relevant arguments. For well-worn arguments such as those about abortion, we suspect that retrieval from memory, rather than reasoning, is the predominant form of thinking. If retrieval fails, or if the reader exerts additional energy, then the reader may attempt to generate a rebuttal based on the theme or side. We hold that readers are less likely to spontaneously generate counterarguments based on specific argument predicates (Britt et al., 2008). Readers who recall or who can readily generate counterarguments may be less likely to “buy” an argument. However, the tendency of readers to minimize cognitive load (Ericsson & Kintsch, 1995; Gigerenzer & Goldstein, 1996; Simon, 1982) suggests that if the author can fill a counterargument slot in the reader’s schema, and then adequately address the counterargument, readers are more likely to be satisfied. Moreover, if readers generate counterarguments themselves, then authors who rebut those counterarguments may be more likely to satisfy the readers’ acceptance criteria.

The Myside Bias in Reasoning and Argumentation

The myside bias (Perkins, 1985) is a bias against information supporting another side of an argument. The myside bias was first identified by Perkins and his colleagues (Perkins, 1985, 1989; Perkins, Bushey, & Farady, 1986; Perkins, Farady, & Bushey, 1991; Perkins & Tishman, 2001) and has been

studied by a number of researchers for more than two decades. According to the typical operational definition, the myside bias is defined by the degree to which research participants generate more arguments (reasons) in favor of a position they support than reasons on the other side (Perkins, 1985; Perkins et al., 1991; Toplak & Stanovich, 2003). In research on reasoning, this approach has proved useful in assessing individual differences among people (Macpherson & Stanovich, 2007), shedding light on the effects of education (Toplak & Stanovich, 2003) and determining correlations between measures of intelligence and the proportion of other-side reasons generated (Perkins et al., 1986). However, we (Wolfe & Britt, 2008) have argued that,

with respect to written argumentation, it is not at all clear that the tendency to generate more arguments on myside is an adequate definition of the myside bias, or if it even constitutes a bias of any kind. Indeed it would be surprising and generally counterproductive for authors to write more other side arguments than myside arguments. (p. 3)

In research on reasoning, Toplak and Stanovich (2003) asked undergraduate participants to generate arguments on both sides of three issues. They found that people consistently generated more myside arguments than other-side arguments. They also found that the discrepancy between the number of myside and other-side arguments diminished significantly with years of education. However, Perkins (1985) found little change in the proportion of other-side arguments generated as a result of educational experiences. Perkins et al. (1986) found significant positive correlations between general intelligence, as measured by Quick Word scores, and myside arguments but practically no correlation between general intelligence and the generation of other-side arguments. Indeed, Baron (1991, 1995) found that many people expressed beliefs that one-sided arguments are better than two-sided arguments.

To better understand the myside bias in the context of written argumentation, we have defined the myside bias in argumentations as the failure to include any reference to other-side arguments or positions in written essays (Wolfe & Britt, 2008). This may be contrasted with the typical operational definition in the psychology of reasoning literature of generating a larger portion of myside reasons on a generation task. Thus, if we wrote an essay supporting legalized gambling, it would exhibit the myside bias if it failed to include any information in opposing the legislation. Thus, essays that rebut, contest, or even concede other-side arguments would not be guilty of

the myside bias, nor would those that have more arguments on myside than on other sides.

Wolfe and Britt (2005) found that authentic arguments—those published for the purpose of persuading a real audience as distinct from materials developed for the classroom or the laboratory—often included other-side information. They conducted a content analysis of 35 published essays and found that 89% of these essays contained other-side information. Among essays that included other-side information, 84% engaged in rebuttal, 72% engaged in concession and rebuttal, and 41% dismissed other-side claims without providing counterarguments. Only 3% made concessions without rebuttal. We (Wolfe & Britt, 2008) found, however, that under typical essay conditions, 50% of our undergraduate research participants excluded all other-side information from their written arguments. Even when participants reviewed a booklet of brief arguments on both sides of an issue while writing, 33% exhibited the myside bias.

In previous work, we (Wolfe & Britt, 2008) identified three reasons for the myside bias in written arguments. First was a failure to fully evoke an argumentation schema that encourages participants to consider both pro side and con side information. Second, some participants read both pro and con side arguments but “mined” them only for information on their side of an issue. Finally, some participants provided evidence of a fact-based argumentation schema, a tendency to view argumentation as a simple matter of arraying facts.

Predictions About the Myside Bias

Authentic essays often address other-side information, yet undergraduate students frequently exclude other-side information from their essays (Wolfe & Britt, 2005). Our understanding of argumentation suggests several consequences of the myside bias in written arguments. We hypothesize that when argumentative texts fill slots in the readers’ schema for counterarguments, readers are less likely to expend additional cognitive effort themselves generating counterarguments. Rebutting other-side information should increase agreement with arguments and increase the perceived strength or quality of arguments. In addition, rebutting other-side information should lead to a more favorable impression of the author. For arguments exhibiting the myside bias, we predict a smaller association between impressions of the author, perceived quality, and agreement. In other words, including counterarguments is hypothesized not only to increase agreement but also to increase coherence.

Previously, we (Wolfe & Britt, 2005) found that many authors concede points on the other side of an argument as a prelude to rebuttal. We pose the hypothesis that such concessions improve our impressions of the author. Moreover, simply dismissing other-side information would have the opposite effect. We hypothesize that dismissing other-side information without providing reasons will lead to more negative impressions of the author.

Our understanding of argumentation suggests that both claims and reasons activate knowledge, attitudes, beliefs, and values. We suggest that claims disproportionately affect agreement and reasons disproportionately affect judgments of argument quality. In other words, our hypothesis is that when readers agree with an argument, they generally concur with the entire argument but are principally agreeing with the claim. When readers find that an argument is strong, they are endorsing the strength of the entire argument, but we are primarily endorsing the quality of the reasons supporting the claim. When participants are given myside reasons to support other-side claims, they are more likely to acknowledge the strength of the argument while making relatively minor changes in ratings of agreement. Finally, if our understanding is correct, then a brief written tutorial addressing the three components of the argumentation schema—claims, reasons, and counterargument generation—should significantly improve the precision of claims and elaboration of reasons and reduce the myside bias in student essays.

Study 1: Consequences of Rebuttal, Dismissal, and the Myside Bias

The three most common ways that authors include other-side claims and reasons in their essays are to rebut them, to simply dismiss them, or to concede them (Wolfe & Britt, 2005, 2008). We use rebuttal in the traditional sense of presenting counterarguments. Dismissal occurs when opposing claims are denied without any supporting arguments. Thus, we distinguish between simply denying opposing claims and providing counterarguments. Concession occurs when the author favorably acknowledges or agrees with an other-side claim or reason. As we found in previous research (Wolfe & Britt, 2008), concessions are often accompanied by rebuttal, qualifications, or a minimization of the scale or scope of the other-side information.

Three of the most fundamental questions about arguments concern their quality, the reader's impression of the author, and the extent to which the reader agrees with the author. Although there are a myriad of social and

psychological phenomena associated with reading argumentative texts, “To what extent do I agree?” “Is this a strong argument?” and “Do I have a favorable impression of the author?” are among the most basic. Our understanding of argumentation schema suggests that rebutting other-side arguments will lead to greater levels of agreement (Hypothesis 1), perceived argument strength (Hypothesis 2), a more favorable impression of the author (Hypothesis 3), and a greater association between the three when compared to myside only arguments (Hypothesis 4). It also suggests Hypothesis 5, that concessions improve our impressions of the author, and Hypothesis 6, that simply dismissing other-side information results in a lower impression of the author.

Method

Participants. Eighty-four (84) native English-speaking students from an introductory psychology class at Miami University participated for partial course credit.

Materials. Each participant received 35 brief target arguments and 10 filler arguments and rated agreement, quality, and impression of the author on a 7-point scale. As can be seen in Appendix A, there were seven target argument types. The first, basic myside arguments (claim supported by a reason), was contrasted with arguments that included other-side information. There were six argument types that included other-side information arranged in 3×2 permutations of rebuttal alone, concession and rebuttal, or dismissing other-side information crossed with the other-side claims and reasons or other-side claims alone (see Appendix A).

Design. In a within-subject design, all of the base arguments were presented to each participant, and each participant received 5 arguments of each type. The permutations of base arguments and argument type were counterbalanced in randomized blocks of 28 with block treated as a between-subjects nuisance variable to permit generalization across all 35 arguments. Within-subject research designs are sometimes favored over the more common between-subjects design (e.g., Birnbaum, 1999) because all of the participants receive all of the treatments. In other words, all of the participants read all of the arguments, so the results cannot be attributed to differences among participants’ beliefs about particular claims. The design can be said to be conservative because individual differences among participants in their agreement with specific claims are “noise” that must be

overcome to produce statistically significant differences. By the same token, although particular reasons, concessions, dismissals, and rebuttals may be relatively strong or weak, any differences in materials of this kind result in a “higher hurdle” because these effects are collapsed across all 35 arguments and each research participant.

This design allows us to make several comparisons. First, we compared the presence of other-side information with the absence of other-side information and rebutting other-side information with the absence of other-side information (the consequences of the myside bias). Second, we compared the consequences of presenting an other-side claim alone with presenting an other-side claim and reason (the consequences of presenting other-side reasons). We also compared rebuttal with dismissal, and concession and rebuttal with rebuttal alone (the consequences of conceding other-side arguments before rebutting them). These are robust comparisons across the 35 arguments and generalize over a wide range of argument content.

Procedure. After providing their informed consent, participants were given 45 arguments (including 10 filler arguments) one at a time and asked to rate their agreement with the claim (e.g., “You shouldn’t believe what you read on the Internet.”) on a 7-point scale from 1 (*strongly agree*) to 7 (*strongly disagree*). They were then asked to rate the quality or strength of the argument on a 7-point scale from 1 (*very strong argument*) to 7 (*very weak argument*) and to rate their impression of the author from 1 (*very favorable impression*) to 7 (*very unfavorable impression*) before turning to the next argument. At the end of the study, participants were thanked and debriefed.

Results

Table 1 presents the mean ratings of each argument in each condition. A key question concerns the consequences of excluding other-side information—the myside bias. Comparing the agreement ratings for other-side information versus no other-side information, we found that rebuttal leads to significantly higher agreement ratings [3.67 ($SD = .64$)] compared with arguments with no other-side information [3.93 ($SD = .96$); $t(83) = 2.19, p = .031$], thus confirming Hypothesis 1. Agreement ratings in the dismissal condition averaged 4.00 ($SD = .59$), which is approximately equal to arguments with no other-side information [3.93 ($SD = .96$); $t < 1$]. Concerning Hypothesis 2, rebuttal leads to significantly higher quality ratings [3.77 ($SD = .67$)] than arguments with no other-side information

Table 1
Mean Ratings of Agreement With Claim, Quality, and
Impression of Author for All 35 Arguments

	Agree With Claim	Quality of Argument	Impression of Author
A) No other-side information	3.934 (.96)	4.729 (.92)	4.176 (.81)
B) Full other-side argument & rebuttal	3.644 (.83)	3.827 (.77)	3.803 (.78)
C) Full other-side argument & dismissal	4.029 (.83)	4.657 (.73)	4.369 (.75)
D) Full other-side argument, concession, & rebuttal	3.733 (.87)	3.843 (.90)	3.817 (.84)
E) Other-side claim only & rebuttal	3.702 (.98)	3.929 (.96)	3.871 (.80)
F) Other-side claim only & dismissal	3.971 (.82)	4.740 (.82)	4.340 (.83)
G) Other-side claim only, concession, & rebuttal	3.746 (.86)	3.943 (.82)	3.948 (.89)

Note: 1 = high. Standard deviations are in parentheses.

[4.73 ($SD = .92$); $t(83) = 5.97$, $p < .0001$]. Quality ratings following dismissal of other-side information yielded a mean rating of 4.70 ($SD = .63$), which is approximately equal to arguments with no other-side information [4.73 ($SD = .92$); $t < 1$]. Rebuttal led to significantly higher ratings of the impression of the author, with a mean of 3.84 ($SD = .61$), compared with arguments with no other-side information [4.18 ($SD = .81$); $t(83) = 3.71$, $p < .0002$]. This confirmed Hypothesis 3. Dismissal led to significantly lower ratings of the impression of the author [4.36 ($SD = .63$)] compared with arguments with no other-side information [4.18 ($SD = .81$); $t(83) = 4.94$, $p < .03$] in accordance with Hypothesis 6.

Following Hypothesis 4, comparing rebuttal arguments to those exhibiting the myside bias, among arguments with rebuttal, quality accounts for a great deal more of the variance in agreement ($r^2 = .62$) than for arguments exhibiting the myside bias, where quality or strength of argument accounts for $r^2 = .12$ of the variance in agreement. This difference is statistically significant [$z(83) = 6.34$, $p < .0001$]. Thus, as predicted, rebuttal not only increases persuasiveness and the perceived quality of arguments, but it also sharply increases the relationship between the two.

Concerning the consequences of presenting other-side claim alone versus other-side claim and reason, there were no significant differences in ratings of agreement, argument quality, or impression of the author. Other-side reasons neither strengthened or weakened the arguments. On measures of agreement, rebuttal alone yielded a mean rating of 3.67 ($SD = .64$), which is approximately equal to the mean for concession and rebuttal [3.74 ($SD = .60$), $t < 1$]. On ratings of quality, rebuttal alone produced a mean of

3.77 ($SD = .67$), and this is close to the mean for concession and rebuttal [3.89 ($SD = .71$); $t(83) = 1.69, p = .09$]. Considering the impression of the author, rebuttal alone produced a mean rating of 3.84 ($SD = .61$), which is approximately equal to the mean rating for concession and rebuttal [3.88 ($SD = .68$); $t < 1$]. Thus, Hypothesis 5 was not supported by the data.

Discussion

In this study, rebutting other-side information led to better ratings of agreement, quality, and impression of author than excluding other-side information. The myside bias weakens arguments measurably. Simply dismissing other-side information had no positive effects and led to worse impressions of the author. Concession followed by rebuttal was not significantly different from rebuttal alone. Contrary to our hypothesis, concession did not improve impressions of the author. As predicted, presenting and rebutting other-side arguments not only increased agreement and perceived argument quality, but it also sharply increased the correlation between the two.

There are several inherent limitations of this study. These arguments were brief, averaging about 70 words or 4 sentences in length in the longest condition. It is not clear whether these findings would hold in essay-length or book-length argumentative texts. Our one-dimensional measures clearly do not capture the rich and subtle nuances of all the social and psychological phenomena related to argumentation. Although our results suggest that rebutting and dismissing counterarguments has some effect on our impression of authors, the nature of that impact and how it compares to the influence of other important factors such as gender, race, power, and credibility is not known. Our measure of agreement corresponds with persuasion to a degree, but clearly key dimensions of persuasion were not measured in this study.

Study 2: The Relative Weight of Claims and Reasons

We found previously (Wolfe & Britt, 2008) that the myside bias is not limited to positions with which one personally agrees. Thus, it is theoretically interesting to consider what happens when readers are presented with a claim with which they agree coupled with a supporting reason on the other side, or when a reason that readers like is used to support a claim with which they are inclined to disagree. Although quality and persuasiveness are clearly correlated, our Hypothesis 7 is that ratings of agreement with an argument are disproportionately weighted toward agreement with the claim and ratings of the quality of an argument are disproportionately weighted

toward the quality of the reasons. Thus, myside reasons are predicted to disproportionately increase ratings of argument strength and myside claims are predicted to disproportionately increase actual agreement ratings.

Method

Participants. One hundred (100) native English-speaking introductory psychology students at Miami University participated for partial course credit.

Materials. Each participant received 32 single-sentence written arguments and was asked to rate agreement and quality of the arguments as a whole on a 7-point scale. There were eight sets of four arguments—two pro side and two con side claims. Crossed with this were two similar reasons and two dissimilar reasons. The similarity of reasons was based on causal, ideological, religious, or aesthetic similarities. Thus, for most individuals on most problems, there would be one claim and one reason that each person tended to agree with and another with which they tended to disagree. Consider the following four sample arguments:

Argument 1: Creation Science should be taught in the public schools along with evolution because the Bible teaches that God created the world.

Argument 2: Creation Science should not be taught in the public schools along with evolution because liberal public school teachers will only distort the word of God.

Argument 3: Creation Science should not be taught in the public schools along with evolution because it is important to maintain a separation of church and state.

Argument 4: Creation Science should be taught in the public schools along with evolution because students learn from a range of diverse, opposing perspectives.

Arguments 1 and 4 have the same claim that Creation Science should be taught in the public schools along with evolution, and Arguments 2 and 3 have the opposite claim that Creation Science should not be taught in the public schools along with evolution. The reasons supporting Arguments 1 and 2 reflect a similar ideology of religious conservatism, with reasoning based upon Biblical teaching and concerns about liberal public school teachers distorting the word of God. Thus, two arguments with religious conservative reasons were used to support opposing claims. By the same token, Arguments 3 and 4 reflect a similar ideology that some might label secular humanist, with reasoning based upon the desire to maintain a separation of church and state, and the belief that students learn from a range of

diverse, opposing perspectives. Even though these reasons support opposing claims, they rely upon reasons reflecting a similar ideology. Although the symmetry of reasons is not as strong as the symmetry of claims (many religious conservatives are not concerned about “liberal public school teachers” and many secular humanists do not endorse the proposition that “students learn from a range of diverse, opposing perspectives”), the similarities and differences among reasons are generally perceived by participants. This technique permits us to measure the relative weight of claims and reasons. Analyzing the eight sets of four arguments together allowed us to “tease apart” the relative influence of myside and other-side claims and myside and other-side reasons on ratings of strength and agreement.

Design. Each participant received all 32 single-sentence written arguments in a within-subject design. Arguments were presented in four separate blocks with each block containing a version of each of the 8 core arguments, presented in random order, and with random assignment of problem to block. To control for any order effects, blocks were presented to participants in four counterbalanced orders as a between-subjects nuisance variable.

Procedure. After providing their informed consent, participants were given 32 arguments one at a time and asked to rate their agreement with the argument as a whole on a 7-point scale from 1 (*strongly agree*) to 7 (*strongly disagree*). They were then asked to rate the quality or strength of the argument on a 7-point scale from 1 (*very strong argument*) to 7 (*very weak argument*) before turning to the next argument. At the end of the study, participants were thanked and debriefed.

Results

The relative weight of claims and reasons on measures of agreement and quality was assessed by examining the absolute value of the difference between the sum of pro claims minus the sum of con claims as an index to the relative weight of claims. The absolute value of the difference between the sum of similar reasons minus the sum of dissimilar reasons was used as an index to the relative weight of reasons. This was done to assess the difference between claims and reasons regardless of opinion, ensuring that pro and con side participants would be weighted equally. In the case of the four arguments about Creation Science, the positions of those in favor and opposed to teaching Creation Science were meaningfully combined by taking the absolute value of versions 1 + 4 minus versions 2 + 3 to assess the relative weight of claims and

the absolute value of versions 1 + 2 minus versions 3 + 4 to assess the relative weight of reasons.

To illustrate the procedure, Participant #22 was in favor of teaching Creation Science. On a scale where 1 = *strongly agree*, she or he rated agreement with Argument 1 (should be taught, Bible teaches) as 1, Argument 2 (should not be taught, liberal teachers) as 4, Argument 3 (should not be taught, church and state) as 6, and Argument 4 (should be taught, learn diverse perspectives) as 1. For Participant #22, the relative weight of claims was $[1 + 1 - 4 - 6 = |-8| = 8]$, and the relative weight of reasons was $[1 + 4 - 6 - 1 = |-2| = 2]$. Participant #33 was opposed to teaching Creation Science. On a scale where 1 = *strongly agree*, he or she rated agreement with Argument 1 (should be taught, Bible teaches) as 7, Argument 2 (should not be taught, liberal teachers) as 2, Argument 3 (should not be taught, church and state) as 1, and Argument 4 (should be taught, learn diverse perspectives) as 7. For Participant #33, the relative weight of claims was $[7 + 7 - 3 - 1 = |10| = 10]$. For Participant #33, the relative weight of reasons was $[7 + 1 - 3 - 7 = |-2| = 2]$. Whether or not a participant agreed with the claim that Creation Science should be taught, the value of interest is the absolute difference between these two measures. In the case of both Participant #22 and Participant #33, claims had a greater impact on agreement weightings than reasons, despite the fact that they expressed opposing positions. Both the claim and reason contributed to ratings of agreement and quality as indicated by weights significantly different from 0.

As predicted, claims had a significantly greater impact on agreement ratings than reasons for all eight sets of problems (see Table 2), with a grand mean difference of 2.13 and $t(95) = 13.29, p < .0001$. Also as predicted, reasons had a significantly greater impact on quality ratings than claims for most of the problems (see Table 2), with a grand mean difference of 0.46 and $t(94) = 6.00, p < .0001$. These results suggest that when participants rate their agreement with an argument, they are primarily rating our agreement with the claim, and when participants rate the quality of an argument, they are primarily rating the strength or quality of the reason. As expected, the correlation between agreement ratings and quality ratings was high over 32 arguments ($r = .597, p < .0001$).

Discussion

In this study, we learned that in one-sided arguments, judgments of agreement with the argument as a whole are primarily driven by agreement with the claim, and judgments of argument strength or quality are primarily

Table 2
Marginal Absolute Differences of Agreement and Quality Means
for Claims and Reasons by Problem

Argument Theme	Agreement Weight of the Claim	Agreement Weight of the Reason	Quality Weight of the Claim	Quality Weight of the Reason
Creationism	5.200 (3.098)	3.080 (2.321)	2.778 (2.401)	4.818 (2.670)
Death penalty	4.320 (3.443)	2.580 (2.170)	2.455 (2.205)	2.939 (2.402)
Flag burning	3.804 (2.988)	2.374 (1.930)	2.948 (2.356)	2.990 (2.452)
Gays	3.707 (2.723)	3.263 (2.418)	1.439 (1.429)	4.469 (2.718)
Jefferson	5.660 (2.843)	2.280 (1.907)	3.768 (2.903)	2.798 (2.060)
Obesity	3.930 (2.495)	2.710 (2.162)	3.212 (2.177)	2.808 (2.225)
Pornography	4.880 (3.160)	2.260 (1.884)	2.949 (2.562)	3.561 (2.810)
U.N.	5.910 (2.854)	1.830 (1.608)	3.724 (2.802)	2.561 (2.046)
Sum	37.411	20.337	23.273	26.944
Grand mean	4.676	2.547	2.909	3.368
Difference (claim – reason)		+2.129*		–0.459**

Note: Standard deviations are in parentheses. Claim weight = absolute value \sum pro claims – \sum con claims; Reason weight = absolute value \sum same reason type – \sum opposite reason type. * $t(95) = 13.29, p < .0001$. ** $t(94) = 6.00, p < .0001$.

driven by the extent to which the supporting reason is favored. The finding was stronger and more robust for claims than reason. In this study, claims were diametrically opposed whereas reasons were similar or dissimilar. This distinction may account for the difference between the relative weight of claims and reasons on judgments of agreement and argument quality. This study also exhibits many of the weaknesses of Study 1. Here, the arguments were very brief—only a single sentence averaging 20 words in length. This study also used two unidimensional measures and a population of undergraduates. These results support the notion that both claims and reasons activate attitudes, beliefs, and values. Within the argumentation schema, the focus of attitudes, beliefs, and values activated by claims is judgments of agreement or disagreement whereas attitudes, beliefs, and values activated by reasons focus on judgments of argument strength or quality.

These findings also help explain why even good arguments may fail to be persuasive. If individuals are not already favorably disposed toward a claim, even when they are given what they consider to be good reasons, they may be quite willing to acknowledge that a strong argument has been made—while making relatively minor changes in their agreement.

Study 3: Improving Essays and Reducing the Myside Bias

Based on our understanding of argumentation schema and the results of Studies 1 and 2, we created a brief written tutorial to enhance students' knowledge of the structure of written arguments (i.e., their argumentation schema). The tutorial, shown in Appendix B, explains important, but often missing, components of an elaborated argument's structure and helps motivate the inclusion of these elements in participants' essays. A clear, well-developed argument schema should enable students to create subgoals (Hayes, 1996) for adding elements to an argument essay. In each section of the tutorial, we addressed four issues: what they should do, why they should do it, what it means to do it, and what it means to not do it. In addition to the instructional text, the tutorial also included a worksheet for students to use to prepare their essay (see Appendix B). On this worksheet, participants are prompted to fill in their main claim, their reasons, an obvious objection, and a rebuttal to that objection. It also reminds them about the structure of an argumentative essay, thereby helping students translate their training into procedures.

The first area addressed in the tutorial is presenting a *precise claim statement*. Following the argumentation schema, this section of the tutorial instructs students to present a clear, precise, and consistent main claim. Then, it explains the importance of precise language in argument writing by explaining the implications of subtle differences in the wording of claims, such as "speeding is harmful," "speeding is immoral," or "speeding should be prohibited." It provides an example of claim precision and mentions a common error students make when writing an argument essay. To help guide the development of a clear claim, the tutorial also explains the typical problem space of a policy claim: the existence of a problem, the ability to regulate, the quality of the proposed solution, and alternative solutions. Each category was briefly defined to increase students' ability to engage in strategic search for reasons that will support, oppose, or qualify the specific claim asserted.

The second area addressed in the tutorial is *providing elaborated and supported reasons*. Again based on the schema, the tutorial instructs students that each reason should be elaborated with examples or explanation and, if possible, supported by evidence that works toward the goal of an argument: to persuade. Then, it advises students about the common mistake

of merely listing unelaborated reasons and gives a short example of a more elaborately backed reason.

The final area addressed in the tutorial is *presenting and dismissing common counterarguments* (i.e., reducing the myside bias). Here, the tutorial suggests that students should present a common objection to their claim and then explains that readers can usually think of at least one objection to most claims. By addressing this objection immediately, the writer will be perceived as more knowledgeable, and the objection will be put aside, allowing the reader to focus more attention on the rest of the argument.

The purpose of Study 3 was to test the effectiveness of this brief written tutorial on students' argumentative essays compared to a baseline control group that did not receive a tutorial. To the extent that college writers' problems are due to an underdeveloped argumentation schema, then the tutorial that elaborates an argument schema should be effective at improving their writing. Our Hypothesis 8 is that the tutorial should increase claim precision, Hypothesis 9 is that the tutorial should lead participants to write more elaborate supporting reasons, and Hypothesis 10 is that the tutorial should reduce the myside bias.

Method

Participants. Sixty (60) native English-speaking students from an introductory-level psychology class at Northern Illinois University participated for partial course credit.

Materials. The 15 arguments used in this study were excerpts from authentic arguments found on the Web that addressed whether cell phones should be banned while driving. Seven argued for the ban, 7 argued against the ban, and 1 was a presentation of results of a survey from the U.S. Department of Transportation. The arguments were short, ranging from 135 to 498 words ($M = 226$ words).

The controversy was a policy claim ("Should or should there not be a ban on using cell phones while driving?"). The problem space for the predicate of the policy claim includes several elements. One can present support for the existence of a problem (e.g., "Cell phone use while driving increases accidents and deaths.") or against the existence of a problem (e.g., "Cell phones are not the problem; bad drivers are," or "Cell phone use can save lives."). If there is no problem, then there is no reason to change the status quo. If one establishes that a problem exists, then the specific merits of the proposal must be addressed. The proposed solution in the policy claim can

be attacked or supported on three grounds. The agent of the proposed solution must be able to regulate the behavior and the proposed regulation should be appropriately restrictive or fairly applied. The quality of the proposed solution can be addressed in terms of its effectiveness (e.g., “The law will make roads safer for all.”) and its repercussions (e.g., “Over-regulation will be too costly.”). Finally, alternative solutions can be assessed (e.g., “Hands-free phones are not an option because they are just as distracting.”). The arguments were selected to ensure that all segments of the problem space were mentioned across the set for both sides. This will ensure that each argument provides a unique contribution to the controversy and so the selecting side (con and pro) was not confounded with type of contribution.

Procedure and design. Participants were randomly assigned to either the tutorial condition or the control condition prior to the beginning of the study. The tutorial group began by reading the two-page argument tutorial. Then, both groups were given the controversy (“Should there or should there not be a ban on using cell phones while driving?”) and the packet of arguments. The instructions told all participants that the documents in the packet were actual texts taken, unedited, from the Web pertaining to the stated controversy. They were asked to read every Web document and rate its usefulness on a 7-point scale from 1 (*very unhelpful*) to 7 (*very helpful*). They were instructed to read with the goal of writing an argumentative essay (approximately 200 to 1,000 words) “with an audience in mind that is educated and good at understanding arguments, but who hasn’t thought much about the controversy.” They were also told that they would only have their notes available during writing.

Participants read the arguments and took notes. Then, participants in the tutorial condition completed a one-page Pre-Writing Worksheet to plan the key parts of their essay (shown in Appendix B). Re-enforcing the three points mentioned in the tutorial, the Pre-Writing Worksheet required participants to precisely state their main claim, briefly list their supporting reasons, present an obvious objection, and rebut that argument. Other than receiving the tutorial text and workbook shown in Appendix B, the tutorial group participants were treated identically to those in the control group, and they did not receive any additional instruction. Then, participants in both groups wrote an essay using only their notes. The instructions reminded participants of the length, audience, and specific controversial statement. The students wrote their essays on a computer. The essays and accompanying materials were evaluated blind to whether or not the authors received the tutorial.

Results and Discussion

Many participants in the control group (40%) did not present a precise claim statement on the cell phone proposal. The tutorial, however, was helpful in this respect. While only 60% of the control group wrote an argument taking a position on the main policy claim, 90% of the tutorial group did [$\chi^2(1) = 7.20, p < .01$]. Thus, without instructions, participants were not precise in stating their main claim. When instructed, however, the vast majority of participants were more precise.

The second problem was the extent of support. The control group mentioned a sufficient number of reasons ($M = 3.90, SD = 1.97$) but provided only minimal support or elaboration for each reason ($M = 2.93, SD = 2.42$). Again, the tutorial significantly improved students' performance on providing support [$t(58) = 4.67, p < .05, \eta^2 = .27$]. For the tutorial group, their number of reasons ($M = 4.60, SD = 2.28$) was similar to the control group but they provided significantly more backing statements ($M = 6.43, SD = 3.32$). (The large variability here is due to the fact that several participants included as many as 8 or 10 reasons or support statements in their essays.)

The final problem was the myside bias in the essays. There was a significant difference between the control group and the tutorial group in terms of other-side information in the essays [$t(58) = 2.78, p < .05, \eta^2 = .12$]. The average number of other-side statements was higher for the tutorial group ($M = 1.87, SD = 1.28$) than the control group ($M = 1.07, SD = .94$). This suggests that a tutorial that explains that other-side information is an important part of an argument can help students include this information in their essays and thus reduce the myside bias.

As a measure of overall quality of the essays, two teachers (one composition teacher from Northern Illinois University and one from a local community college) served as expert graders for the essays. They were asked to score the essays as an in-class assignment on a 5-point scale with 5 being equivalent to an "A" and 1 being equivalent to an "F." Although the community college teacher gave overall higher ratings, both teachers gave the tutorial condition essays higher grades ($M = 3.21, SD = 1.21$ and $M = 3.93, SD = 1.20$, respectively) than the control condition essays ($M = 2.53, SD = 1.22$ and $M = 3.10, SD = 1.40$, respectively) [$t(58) = 2.13, p < .05, \eta^2 = .07$, and $t(57) = 2.48, p < .05, \eta^2 = .10$]. Thus, a tutorial focused on explaining an elaborated argumentation schema improved the quality of the essays by approximately two thirds of a letter grade.

General Discussion

The results of Study 1 demonstrate the efficacy of rebuttal and show that the myside bias weakens written arguments measurably. Including other-side information increases the degree of agreement, judgments of quality, and the impression of the author, but only when that information is actually rebutted. These findings are consistent with O’Keefe’s (1999) observation that persuasive messages refuting the opposing side are more persuasive than those exhibiting the myside bias. Yet, simply denying the truth or relevance of opposing claims (O’Keefe, 1999) is not effective. In Study 2, we learned that when reading an argument with a claim one disagrees with, supported by a reason one favors, a person is likely to judge the argument strong but remain relatively unpersuaded. However, when arguments include other-side information that is rebutted, arguments will be perceived as stronger and more persuasive.

In Study 3, a short two-page tutorial addressing the three components of the argumentation schema, claims, reasons, and counterargument generation significantly improved all three facets of student essays: They directly addressed the assigned predicate, they increased their support for the main claim and reasons, and they mentioned the opposing side more. These improvements were confirmed by the ratings of two teachers who regarded these essays as being higher quality. However, little is known about the written argumentation in out-of-school contexts (Hull & Schultz, 2001). Clearly, more research is needed about everyday argumentation in settings such as work (Hull, 1999) and home.

Studying the myside bias in the context of written argumentative essays provides both practical and theoretical advantages over the more commonly used argument generation task. These studies confirm that the myside bias—defined here as excluding other-side information from our arguments—is indeed a weakness. Ignoring the other side is not an effective strategy in developing written arguments. Yet, these studies also show that addressing other-side information is fraught with difficulties. Simply dismissing other-side arguments actually weakens our impressions of the author without increasing persuasiveness. Conceding other-side information did little to improve impressions of the author. Moreover, even presenting reasons the reader likes to support claims the reader is unfavorably disposed toward may have a relatively small effect on agreement. Including other-side information appears to be helpful only when other-side

claims are actively rebutted. Overcoming the myside bias requires a sophisticated argumentation schema including the requisite skills and knowledge to make compelling counterarguments.

Appendix A

Study 1 Sample Argument: Myside Argument, Full Other-Side Argument (claim and reason), Concession, and Rebuttal Plus Dismissal

This argument “On Thomas Jefferson” spells out all seven conditions and their constituents.

On Thomas Jefferson by Alfred Dennison

(a) Basic Myside Argument:

Thomas Jefferson was a great person because he fought for individual liberties even against the wishes of more powerful interests.

(b) Myside Argument, Full Other-Side Argument (claim and reason), Rebuttal:

Thomas Jefferson was a great person because he fought for individual liberties even against the wishes of more powerful interests. Some say that no slave owner should be considered great because slave holding is an awful thing that no great person would do. But when looked at in the historical context of his time and culture, this aspect of Jefferson’s personality is better understood and more easily forgiven.

(c) Myside Argument, Full Other-Side Argument (claim and reason), Dismissal:

Thomas Jefferson was a great person because he fought for individual liberties even against the wishes of more powerful interests. There are those who say that as a slave owner Jefferson was not great because slave holding is an awful thing that no great person would do. But that’s not really the issue here.

(d) Myside Argument, Full Other-Side Argument (claim and reason), Concession, and Rebuttal:

Thomas Jefferson was a great person because he fought for individual liberties even against the wishes of more powerful interests. There are those who say that as a slave owner Jefferson was not great because slave holding is an awful thing that no great person would do. It’s true that slavery was invalid and immoral. But when looked at in the historical context of his time and culture, this aspect of Jefferson’s personality is better understood and more easily forgiven.

(continued)

Appendix A (continued)

(e) Myside Argument, Minimal Other-Side Argument (claim only), Rebuttal:

Thomas Jefferson was a great person because he fought for individual liberties even against the wishes of more powerful interests. Some say that no slave owner should be considered great. But when looked at in the historical context of his time and culture, this aspect of Jefferson's personality is better understood and more easily forgiven.

(f) Myside Argument, Minimal Other-Side Argument (claim only), Dismissal:

Thomas Jefferson was a great person because he fought for individual liberties even against the wishes of more powerful interests. Some say that no slave owner should be considered great. But that's not really the issue here.

(g) Myside Argument, Minimal Other-Side Argument (claim only), Concession, and Rebuttal:

Thomas Jefferson was a great person because he fought for individual liberties even against the wishes of more powerful interests. Some say that no slave owner should be considered great. It's true that slavery was invalid and immoral. But when looked at in the historical context of his time and culture, this aspect of Jefferson's personality is better understood and more easily forgiven.

Appendix B

Constructing Clear and Strong Argument Essays (written tutorial for Study 3)

Writing clear arguments is a skill that all college students have to develop both for continued success in the academic world as well as for future success in the career world. This tutorial will assist you in writing stronger argument essays. Here are three skills that you should focus on developing: 1) presenting a precise claim, 2) providing elaborated and supportive reasons, and 3) presenting and dismissing common counterarguments.

1. Presenting a Precise Claim

Your main claim (a disputable statement that an author is trying to persuade the reader to accept; something not everyone will agree with) should be presented early in the essay and repeated at the end. Precision is more important in arguments than any other form of writing. When you write your main claim, use clear and exact terms to convey to your reader what topic you'll be exploring as well as the predicate you will take. For instance, if you want to convince a reader that speeding is harmful, then present it simply and directly. See the examples below:

- A. Speeding is harmful.
 - B. Speeding is immoral.
 - C. Speeding should be prohibited.
-

(continued)

Appendix B (continued)

Example A contains both the topic and the predicate, and you merely need evidence that people have been injured from speeding to support the claim, while in Example B, you need evidence that speeding is a moral issue and that it is wrong, and in C, you need evidence that it is so wrong that we should restrict people's behavior with penalties. When writing your claim, pick your words carefully and make sure not to switch what you are arguing throughout your essay.

In the essay you will be asked to write, you will be writing a government policy claim like C above. A government policy argument is an attempt to persuade readers that the government either should or should not take some restrictive action so that people will change their behaviors.

Example of a policy claim:

Young adults should not be able to get their driver's license until their 18th birthday.

2. Providing Elaborated and Supportive Reasons

An argument, by definition, is an attempt to persuade readers to change their attitudes, beliefs, or behaviors by providing one or more reasons to support the claim already made. When providing reasons, a common mistake is to merely list them. When writing a strong argument, select the most important 3 or 4 reasons and focus on these. Write a single paragraph for each reason and in that paragraph explain, elaborate, give examples, and provide evidence, if possible, that supports your predicate of the claim that you've made. Finally, make sure that the reasons you are providing support the exact claim that you have made and that you haven't accidentally switched claims simply because you've thought of a good reason.

The argument you will be asked to write involves a government policy claim. When providing support for policy claims, you can focus on two parts: problem existence and value of proposed solution. So, one way to support a policy claim is to show that a problem exists with the current situation. A second way is to show that the proposed policy is a good solution and will eliminate the problem. Of course, if you are arguing against the policy, you can, on the one hand, show that there is no problem with the current situation and, on the other hand, show that the solution is a bad one.

When reading the materials and later writing the essay, think about both parts. First, does the author convincingly establish that a problem exists? What evidence does he or she provide to support that? Make sure you completely understand this part before offering a solution. If no problem exists, then there is no reason to present a solution. Second, once you have shown that there is or is not a problem, next consider whether the proposed solution is a good one. A good solution should be fair to all, effective in solving the problem, no more restrictive than necessary, and something that the government can regulate.

Example of a supporting reason:

(continued)

Appendix B (continued)

According to the National Highway statistics, most accidents are caused by drivers between 16 and 17.5 years of age. Further, these accidents have been shown to result in more injuries and deaths than accidents caused by any other age group.

3. Presenting and Dismissing the Common Counterarguments

Readers usually think of at least one objection to your main claim and, often, their objection will preoccupy them to the extent that they won't be able to focus on the argument you are presenting no matter how brilliant. Address this immediately by posing the potential objections and arguing against them so that the readers can dismiss them and be convinced from the rest of your argument. Think of the most common counterargument and mention it. Then briefly argue against it. Further, your reader will be more convinced of your authority if you can dismiss something that the other side will say because it shows that you've given the matter critical thought.

Example of presenting and dismissing a counterargument:

While some may argue that these drivers simply need more safety instruction to better handle the potential dangers in the road, research shows that even those youths given intensive instruction over an additional 100 hours of driver's education cause statistically more accidents with more injuries than older drivers.

Keep in mind these three points when creating your argument:

1. Present a precise claim that includes your topic and your predicate.
2. Provide elaborated and supportive reasons related to the claim that you've made.
3. Present and dismiss the common counterarguments.

See if you can improve all three of these skills in your essay.

Pre-Writing Worksheet

Remember the three points from the tutorial for writing better arguments: clear claim, elaborated reasons, and acknowledging opposing side. This sheet walks you through each of these points. Please fill in each blank as preparation for the essay. You can keep this when writing the essay.

1. Claim: Present a precise main claim that takes a side (position) on this controversy.

State your claim here: _____

2. Elaborated reasons: Briefly list 3 or more reasons (in your essay, you will need to write a paragraph elaborating each, but for now just list them).

(continued)

Pre-Writing Worksheet

State your 1st reason here: _____

State your 2nd reason here: _____

State your 3rd reason here: _____

3. Opposing side: Present an obvious objection and rebut that argument.

State an opposing argument (obvious objection) you will present here: _____

State how you will rebut or dismiss it here: _____

References

- Ackerman, J. M. (1993). The promise of writing to learn. *Written Communication, 10*(3), 334-370.
- Anderson, R. C., & Pichert, J. W. (1978). Recall of previously unrecallable information following a shift in perspective. *Journal of Verbal Learning and Verbal Behavior, 17*, 1-12.
- Baron, J. (1991). Beliefs about thinking. In J. F. Voss, D. N. Perkins, & J. W. Segal (Eds.), *Informal reasoning and education* 169-186. Hillsdale, NJ: Lawrence Erlbaum.
- Baron, J. (1995). Myside bias in thinking about abortion. *Thinking and Reasoning, 1*, 221-235.
- Birnbaum, M. H. (1999). How to show that $9 > 211$: Collect judgments in a between-subjects design. *Psychological Methods, 4*, 243-249.
- Britt, M. A., Kurby, C. A., Dandotkar, S., & Wolfe, C. R. (2008). I agreed with what? Memory for simple argument claims. *Discourse Processes, 45*, 52-84.
- Britt, M. A., & Larson, A. A. (2003). Constructing representations of arguments. *Journal of Memory and Language, 48*, 794-810.
- Ericsson, K. A., & Kintsch, W. (1995). Long-term working memory. *Psychological Review, 102*, 211-245.
- Flower, L. S., & Hayes, J. R. (1981). A cognitive process theory of writing. *College Comprehension and Communication, 32*(4), 365-387.
- Gigerenzer, G., & Goldstein, D. G. (1996). Reasoning the fast and frugal way: Models of bounded rationality. *Psychological Review, 103*, 650-669.
- Hayes, J. R. (1996). A new framework for understanding cognition and affect in writing. In C. M. Levy & S. Randsdell (Eds.), *The science of writing* (pp. 1-27). Mahwah, NJ: Lawrence Erlbaum.
- Hayes, J. R., & Flower, L. S. (1980). Identifying the organization of writing processes. In L. W. Gregg & E. R. Steinberg (Eds.), *Cognitive processes in writing*, 3-30. Hillsdale, NJ: Lawrence Erlbaum.
- Hull, G. A. (1999). What's in a label? Complicating notions of the skills-poor worker. *Written Communication, 16*, 379-411.
- Hull, G., & Schultz, K. (2001). Literacy and learning out of school: A review of theory and research. *Review of Educational Research, 71*, 575-611.
- Macpherson, R., & Stanovich, K. E. (2007). Cognitive ability, thinking dispositions, and instructional set as predictors of critical thinking. *Learning and Individual Differences, 17*, 115-127.

- National Assessment of Educational Progress. (1996). *NAEP 1994 U.S. history report card: Findings from the National Assessment of Educational Progress*. Princeton, NJ: Educational Testing Service.
- National Assessment of Educational Progress. (1998). *NAEP 1998 writing report card: Findings from the National Assessment of Educational Progress*. Princeton, NJ: Educational Testing Service.
- National Center for History in the Schools. (1996). *National standards for United States history: Exploring the American experience*. Los Angeles: University of California, Los Angeles.
- O'Keefe, D. J. (1999). How to handle opposing arguments in persuasive messages: A meta-analytic review of the effects of one-sided and two-sided messages. In M. E. Roloff (Ed.), *Communication yearbook* (Vol. 22, pp. 209-249). Thousand Oaks, CA: Sage.
- Perkins, D. N. (1985). Postprimary education has little impact on informal reasoning. *Journal of Educational Psychology*, 77, 562-571.
- Perkins, D. N. (1989). Reasoning as it is and could be: An empirical perspective. In D. M. Topping, D. C. Crowell, & V. N. Kobayashi (Eds.), *Thinking across cultures: The third international conference on thinking*, 175-194. Hillsdale, NJ: Lawrence Erlbaum.
- Perkins, D. N., Allen, R., & Hafner, J. (1983). Difficulties in everyday reasoning. In W. Maxwell (Ed.), *Thinking: The expanding frontier*, 177-189. Philadelphia: Franklin Institute Press.
- Perkins, D. N., Bushey, B., & Farady, M. (1986). *Learning to reason*. Unpublished manuscript, Harvard Graduate School of Education, Cambridge, MA.
- Perkins, D. N., Farady, M., & Bushey, B. (1991). Everyday reasoning and the roots of intelligence. In J. Voss, D. N. Perkins, & J. Segal (Eds.), *Informal reasoning* (pp. 83-105). Hillsdale, NJ: Lawrence Erlbaum.
- Perkins, D. N., & Tishman, S. (2001). Dispositional aspects of intelligence. In S. Messick & J. M. Collis (Eds.), *Intelligence and personality: Bridging the gap in theory and measurement* (pp. 233-257). Mahwah, NJ: Lawrence Erlbaum. Retrieved May 17, 2006, from <http://learnweb.harvard.edu/alps/thinking/docs/Plymouth.pdf>
- Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals, and understanding: An inquiry into human knowledge structures*. Hillsdale, NJ: Lawrence Erlbaum.
- Simon, H. A. (1982). *Models of bounded rationality*. Cambridge, MA: MIT Press.
- Sweller, J., van Merriënboer, J.J.G., & Paas, F.G.W.C. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, 10, 251-296.
- Toplak, M. E., & Stanovich, K. E. (2003). Associations between myside bias on an informal reasoning task and amount of post-secondary education. *Applied Cognitive Psychology*, 17, 851-860.
- Toulmin, S. E. (1958). *The uses of argument*. Cambridge, UK: Cambridge University Press.
- van Merriënboer, J.J.G., & Sweller, J. (2005). Cognitive load theory and complex learning: Recent developments and further directions. *Educational Psychology Review*, 17, 147-177.
- Voss, J. F. (2005). Toulmin's model and the solving of ill-structured problems. *Argumentation*, 19, 321-329.
- Voss, J. F., Fincher-Kiefer, R., Wiley, J., & Silfes, L. N. (1993). On the processing of arguments. *Argumentation*, 7, 165-181.
- Wolfe, C. R., & Britt, M. A. (2005). *The use of other side information: Explaining the myside bias in argumentation*. Paper presented at the 46th annual meeting of the Psychonomic Society, Toronto, Canada.
- Wolfe, C. R., & Britt, M. A. (2008). Locus of the myside bias in written argumentation. *Thinking & Reasoning*, 14, 1-27.

Christopher R. Wolfe is a Professor of Psychology at Miami University. His research focuses on higher-order cognition, the way people think, reason, solve problems, make decisions, and develop arguments; and the relationship between learning, reasoning, and the representation of knowledge. He is especially interested in cognitive technologies and their potential for education and psychological interventions.

M. Anne Britt is an Associate Professor of Psychology at Northern Illinois University. Her research interests include argument comprehension and construction; integration of information from multiple sources; and enhancing learning and understanding through use of computer-aided instruction.

Jodie A. Butler is the Technology Specialist at the Northern Illinois University Writing Center.