Forward to the Insight Assessment Posting: Dr. Gittens and I are delighted that Insight Assessment is making this paper available as a resource to its clients. The development of the mapping techniques described here has occurred over a period of fifteen years. Dr. Gittens and I wish to acknowledge the substantial intellectual and analytical contributions to this effort made by Dr. Noreen Facione.

This paper describes a powerful new tool for examining decision making. Whether in business, government, healthcare, education, or daily life, group and individual decision making determines financial, military, policy, legal, healthcare, learning, and personal outcomes. But too often the decision making which impacts our lives and our businesses so heavily can seem opaque. Diagramming as presented in this paper holds the potential of making human decision making, particularly in contexts of risk and uncertainty, much more transparent.

Diagramming the reasoning used in individual or group decision making enables that reasoning to be externalized, objectified, and evaluated. As such, diagramming is a powerful aid to critical reflection for understanding and improving individual or group decision making.

- As an analytical tool by which to display reasoning, diagramming has the potential to aid in improved professional decision making in business, law, military, governmental, and healthcare.
- As a research tool, diagramming enables the identification of similarities when many individuals make decisions regarding the same issue. Cognitive interventions can then be based on these analyses.
- As a learning tool, argument and decision maps enable students to hone their interpretive and analytical skills.

This paper offers an extensive introduction to a diagramming system that is more fully developed than the usual textbook presentation of argument diagramming. The twenty example maps included begin with a configuration illustrating one reason offered in support of a conclusion, and build to highly complex maps illustrating the analyses of real world decisions as recorded in interviews and official documents. Using their interpretive and analytical skills, and the simple conventions taught and illustrated here, professionals, researchers, and students are able to build and to refine maps that show simple arguments, lines of reasoning, unspoken but implicit assumptions, pro and con argumentation, individual and group decision making, the influences of reactive cognitive heuristics on decision making, the use of various familiar valid and fallacious inference patterns, and the bolstering phenomenon associated with the use of multiple arguments in support of a given option.
Mapping Decisions and Arguments

by Peter A. Facione, Measured Reasons, Hermosa Beach, CA
Carol Ann Gittens, Santa Clara University, Santa Clara, CA

Abstract
As a learning tool, argument and decision maps enable students to hone their interpretive and analytical skills. This paper illustrates one effective approach to teaching the diagrammatic conventions used in a powerful decision and argument mapping methodology. The twenty example maps included begin with a configuration illustrating one reason offered in support of a conclusion, and build to highly complex maps illustrating the analyses of real world decisions as recorded in interviews and official documents. Using their interpretive and analytical skills, and the simple conventions taught and illustrated here, students and researchers are able to build and to refine maps that show simple arguments, lines of reasoning, unspoken but implicit assumptions, pro and con argumentation, individual and group decision making, the influences of reactive cognitive heuristics on decision making, the use of various familiar valid and fallacious inference patterns, and the bolstering phenomenon associated with the use of multiple arguments in support of a given option.

Keywords: argument mapping, argument maps, argument analysis, decision mapping, decision diagrams, human decision making

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I. Introduction – Beginning from Decision Making
The initial research challenge was to design a methodology by which to externalize the reasoning people actually used when making high stakes personal health care decisions, specifically whether to seek a medical diagnosis of a worrisome self-discovered breast cancer symptom (Facione & Facione, 2006). Cognitive intervention to mitigate debilitating and life-threatening patient delay depended upon understanding at a deep level exactly why a significant number people who were well-informed and well-educated choose not to seek a timely diagnosis.

The methodology eventually developed turned out to be powerful enough to enable decision researchers to analyze and to present objectively all the essential features of individual and group decision making in a very wide range of real world contexts. (Facione & Facione, 2007). In management, for example, the method enables mapping the thinking of leadership teams as they reason through decisions that are typical for a given kind of organization – e.g. setting enrollment targets for academic departments and schools, deciding how to respond to a legal problem, determining an optimal resource and staffing levels, etc. The decision and argument maps produced, and hence the interpretations and analyses which they depict, thus become open for review, further analysis, and improvement. Once completed, these maps provide empirical data on the basis of which to describe and to predict with statistical confidence how large
numbers of similarly situated individuals will make comparable decisions.

Using only a handful of simple diagrammatic conventions, the methodology begins from that watershed moment when a person or group of people first realize that they must make a decision about what to believe or what to do. Using this method the analyst can capture all of the considerations for or against the various perceived alternatives, including the articulation of individual arguments, chains of argument, objections and counterarguments, and the abandoning of lines of reasoning, should that occur. Our approach is to use mapping in order to make evident the key elements and their relationships as we analyze human judgment in the process of deciding what to believe or what to do.

Unlike mapping techniques designed to address only the syntactical or semantic features of individual arguments, the approach described here was developed to enable the analyst to reveal the interpersonal pragmatics of naturalistic human decision making. This approach calls on one’s interpretive skills as well as one’s analytical skills in order to map as accurately as possible the argument maker’s meaning and intent when using a given expression in a given real world context.

No longer the domain of naturalistic decision-making research only, mapping has become an important component in critical thinking instruction. Through articles published in *INQUIRY* and elsewhere, the case for including argument mapping is well understood these days. But less has been written about how to teach mapping. So, in addition to sharing a comprehensive, broadly applicable, and highly accessible methodology, this essay illustrates the presentation of decision and argument mapping to undergraduates.

We acknowledge the divergent instructional imperatives of teaching a challenging mapping method using examples and exercises that maximize for students its real world applicability versus teaching a more simplistic mapping approach that focuses only on clean, classroom-groomed micro-arguments insulated from the ambiguities and general messiness actual human decision making. It is a classic problem in education – the tension between what students can conveniently dissect in a controlled environment (the lab or classroom) versus what must be done to make anything students learn there actually become relevant, that is, have external validity, in the real world. Even knowing that teaching for real world application is the more difficult path for students and for instructors, we, like so very many of you reading this, willingly embrace that challenge. It is why we teach.

When teaching decision and argument mapping we begin with five questions intended to motivate as well as to organize students’ learning. The numbered sections of this essay correspond to these five questions:

- How can we use our analytical skills to discover the reasons people advance on behalf of the claims they are making?
- How can we use mapping to represent the relationships between reasons and claims?
- How do unspoken assumptions, context, irony, sarcasm, wit, and humor factor into making complete and accurate argument maps?
- How can we extend mapping techniques to represent complex pro-and-con decision making?
- How can we further augment the method to include multi-option decisions and to reveal the different kinds of arguments being made, the use of statistical analyses, and the influences of cognitive heuristics, and more?
This essay borrows very heavily from the third edition of our book *Think Critically* (Facione & Gittens, 2016) which is written for beginning level undergraduates – hence the selection of examples and the writing style of this essay. We are deeply grateful to senior editor, Debora Coniglio, and to Pearson Education for permitting us to use this material. As in the Revel digital version of *Think Critically*, here we present the various shapes used to create the maps in black-and-white; the paper version shows the shapes in color.

Effective instruction builds incrementally, adding complexity layer by layer. Like most instructors, we begin with simple arguments considered statement by statement. However, our instructional endpoint, even for beginning students, remains the same as our methodological goal, namely the analysis and mapping of full-blown real life decision making, those conversations, for example, wherein people discuss with one another what to believe or what to do. In addition to extended examples drawn from two easily accessed high quality dramas, *12 Angry Men* and *Apollo 13*, this essay includes three extended analyses and maps based real world disagreements and decisions: guns for kids, spring trip, and quitting smoking someday.

Even before analyzing and mapping the first simple examples, we find it helpful to students to set the context. We explain that the practices of making arguments and of giving reasons to communicate the basis for our beliefs and decisions are universal in our species. There is some way or other for people to ask to answer the question “Why?” in every natural language. For example, if we ask the National Shooting Sports Foundation (NSSF) to explain why it supports the sale of guns made for children, like the Cricket, a spokesperson may reply, “Because we are trying to develop the next generation of gun users.” And, if we pursue that rationale a bit further, the representative may offer a further explanation, perhaps like this: “The NSSF is a trade association for the American fire arms industry.”

We can think of the explanations people give one another as arguments. To the question “Why did you order a moratorium on Illinois death penalty executions in January 2000?” former Illinois governor George Ryan might have responded with an argument like this: “Because our state’s criminal justice system has made mistakes, and innocent people have been wrongly executed. There is no way to undo that kind of a mistake.” In episode 19 of season 10 of the *Law and Order Special Victims Unit*, detectives go after a mother whose measles infected son transmitted the illness to another child who subsequently died. The mother had knowingly refused to have her son vaccinated. In her own defense the mother argues that it was her right to make that decision about her own child’s health. She asserts that she is not accountable for the consequences of her decision. And she says that for her child the outcome was exactly as she had hoped. Without incurring the risk she associated with a vaccination, her son got sick with measles and then recovered. In the final analysis, her reason is this: “Measles vaccinations have dangerous side effects. Those risks worry me a lot.” Apart from the TV drama, we know that those risks are exceedingly rare and that the disease itself is a far greater risk to her child and to other children (CDC, 2015a). And so, although we can identify with a mother’s concern for the welfare of her child, we may want to evaluate this decision negatively, particularly because in the TV drama her child infected other children and one died.

Whether we agree with NSSF, or with Governor Ryan, or with the mother whose decision resulted in the death of another mother’s child, will become important later, when we work on the skill of evaluation. For the present, however, our goal is to analyze
exactly what people’s claims are and what reasons they are using to establish that those claims are worthy of acceptance. In some ways applying our core critical thinking skill of analysis can be more difficult than offering an evaluative opinion. Analysis, like interpretation, is about understanding at a deep level. Often we are too quick to react positively or negatively to someone’s decision, only to discover later that we did not even understand the person’s decision or their reasons for it.

The goal for now is to strengthen our analytical skills. We will use a technique called *mapping* to help clarify how a person’s reasoning flows from initial statements taken as true to the conclusion or decision the person regards as being supported by those statements. Like a Google map showing how to get from point A to point B, the maps we will draw show how people reason from their beliefs and assumptions to reach a particular opinion or decision. The criteria for successful analyses are accuracy, completeness, and fair-minded objectivity.

II. Analyzing Reasons and Claims

Consistent with common usage, we will use the expression *make an argument* to refer to the process of giving one or more reasons in support of a claim. Here are some examples of arguments:

1. **[Reason]** Student journalists should have the same rights as professional journalists. **[Claim it is intended to support]** So, laws that shield professional journalists from imprisonment will apply to student journalists, too.

2. **[Reason]** Confidential sources of information would be in danger if they were publicly identified. To legally require journalists to reveal confidential sources to the police will have the effect of publicly identifying those confidential sources. **[Claim]** Therefore, the law should not require journalists to reveal their confidential sources.

3. **[Claim]** Encephalitis (swelling of the brain) cannot be said to be a side effect of measles vaccination. **[Reason]** Here’s why: “This happens so rarely—less than once in a million shots—that experts can’t be sure whether the vaccine is the cause or not” (CDC, 2015b).

The term *claim* refers to the statement that the maker of the argument is seeking to show to be true or probably true. We will often refer to an argument’s claim as the argument’s conclusion. The other sentences in the argument, namely those that are used to show that the conclusion is true or that it is probably true, constitute the reason or reasons. Remaining faithful to the variety of ways we have of talking about thinking in everyday language, we can refer to reasons using synonyms, like *considerations* or *rationale*. We can use the term argument to refer to the combination of a person’s claim and the reason or reasons a person presents in support of that claim. To argue, in this sense, is to invite others to draw the inference from the reason(s) offered to the conclusion intended (Pinto, 2009).

Accuracy Depends on Context and Purpose

In conversation people may give more than one reason in support of the same conclusion. Example #4 illustrates that practice:

4. **[Claim]** I need to get a better job! **[Reasons]** My boss is an unappreciative moron. And my commute is brutal.

Without knowing more about the speaker and about the context, we cannot determine whether the person thinks of (1) the brutal commute, (2) the boss’ moronic behavior, and (3) the boss’ lack of appreciation as three
independent reasons each of them sufficient to lead the speaker to look for a better job, or, if the speaker thinks of the three reasons as small in themselves, but when linked together as being enough to tip the balance in favor of looking for a new job. Why does that matter? Because if the three considerations are separate reasons in the mind of the speaker, then showing that two of them are mistaken will still leave one reason standing. If tomorrow the boss was replaced with a wonderfully appreciative, sophisticated and brilliant new boss, the brutal commute would still be an independent reason why the speaker would want to find a new job. However, if the speaker regards the three reasons as mutually reinforcing, then the arrival of the new boss might lead the speaker to tolerate the commute to stick with the job and the new boss. To be fair to the speaker and to make a full and accurate analysis, we would want to ask the speaker to explain those reasons more fully. We might ask, “What if you transferred to a different unit at your workplace so you would have a different boss? Would you still want to find a new job?”

The takeaway from this example is that context and purpose will again be vitally important as we apply our analytical and interpretive skills to arguments and decisions. The more we know about the events and circumstances within which the argument is made, and the more we know about the people involved, the more likely we are to develop an objective, complete, and accurate analysis. As analysts, just going from the words on a page only, we are at a disadvantage.

Let’s practice with another short scenario: Joel says to his friend Mike, “Hey, let’s get a pizza.” Mike says, “Great, what kind.” Joel replies, “Thin crust. Costs less and tastes better.” In this example, is Joel giving two independent reasons or are the two considerations he offers (cost and taste) linked in his mind? If Joel intends the two considerations to be separate reasons, then Joel is making two independent arguments. And, if he can be persuaded that thin crust pizza does not always taste better, he will still hold on to the cost argument. Or, vice versa, if we tell him he does not have to pay for the pizza, he will still hold out for thin crust because of the taste argument.

5a. [Reason] Thin crust pizza costs less. [Claim/Conclusion] We should buy thin crust.

5b. [Reason] Thin crust pizza tastes better. [Claim/Conclusion] We should buy thin crust.

But, if in Joel’s mind the two reasons are mutually reinforcing such that taken together they tip the balance in favor of thin crust, then, to be fair to Joel, our analysis should reflect that he is making one argument, not two. And, if he discovers that either of the two mutually supporting reasons should be mistaken, he might decide that the pizza does not have to be thin crust.

6. [Reason] “Thin crust pizzas are less expensive and better tasting. [Claim/Conclusion] We should buy thin crust.

The accuracy of our analysis depends on knowing which is which. And, from the words in the dialogue so far, we cannot tell. So let’s supply more context. Mike says, “What? Remember the last time we had thin crust? You called it cardboard.” Joel replies, “Yeah, I remember. But I didn’t say ‘cardboard’ I said it tasted like sunbaked Wyoming roadkill.” “Okay,” says Mike, “Then I’m going to order us a Chicago style deep dish.” “Go for it,” says Joel. If the conversation ended as described here, then we would analyze Joel’s two considerations (taste and cost) as constituting a set of mutually reinforcing reasons. Our evidence is that, in context, when Mike
defeated one of the considerations (taste), Joel agreed with the conclusion to order deep dish instead. So, from the context we can infer that Joel probably intended to be making one argument. Not two.

We need to do our best to make accurate analyses; it will pay off in deepening our understanding of what other people are saying. And it will pay off when the time comes to evaluate or to make cogent counterarguments.

For the purposes of making an accurate, objective and complete analysis, we can use this rule of thumb: The number of arguments depends on the number of independent reasons the argument maker intends. But, if the context or circumstances of the communication do not reveal what the speaker intends, what should we do? When it is important to interpret reasons and conclusions in circumstances where the intent of the author is difficult or impossible to determine, it is reasonable to interpret those arguments in ways that are consistent with the general pattern of the author’s words and deeds.

*Over-Simplification Masks Reality*

Our analytical and interpretive work would be easier if speakers would always be clear about their reasons, if speakers always knew their own minds, and if people never withheld their reasons, lied, or concealed their reasons behind political correctness. But that is not the way the world is. And critical thinking, if it is of any value at all, must be applicable to the world as it is, and not as we might wish it were.

In reality, the rationale people offer for what they believe or what they decide is often murky, even in their own minds. We humans often make snap judgments, and we are not always fully reflective and thoughtful as we make decisions. One of the major benefits of asking why, and of pursuing that question beyond the first or second quick response, is to open up the structure of the reasoning behind a given claim or decision. Obviously, asking why helps us with our analysis. But there is another benefit too. Asking “why” can help the speaker. Being pushed to explain our thinking leads truth-seeking critical thinkers to a clearer understanding of their own beliefs and decisions.

Ask “why.” And then ask for clarification. Analysis is an active skill. Analysis includes digging below what people first say. We should not be afraid of asking ourselves or others why we think what we think. Like good investigators, analytical people probe. Getting people to explain their own reasons provides the analyst with the material necessary for a fair-minded, complete and accurate analysis. Guessing at another person’s reasons, or worse mistaking our own reasons for the other person’s reasons, only leads to misunderstanding. Guesswork and misattribution are marks of weak critical thinking.

*“Reason” and “Premise”*

In example arguments #1, #5a, and #5b above, the reason is expressed in a single statement. In #2 two statements are used together to express the reason. However, in example #3,

> [Claim] Encephalitis (swelling of the brain) cannot be said to be a side effect of measles vaccination. [Reason] Here’s why: “This happens so rarely—less than once in a million shots—that experts can’t be sure whether the vaccine is the cause or not.”

One can see that grammatically only one sentence is used, but when we analyze what that sentence tells us, we see that it expresses two distinct statements:
• For every 1 million measles vaccinations administered, 1 case of encephalitis occurs.
• The rate of 1 in 1 million is so rare that experts cannot be sure if the vaccine was the cause or not. Similarly, in example #4 the expression “I work for an unappreciative moron” contains two potentially separate considerations: one is that the boss is unappreciative, the other is that the boss is a moron.

The takeaway is that our interpretation can be guided by grammatical structure, but grammar is not the whole story. Context and purpose must be considered as well if we are to make a correct analysis. Again, analysis is not an easy skill to execute correctly. Oversimplification, for example, trying to reduce everything to grammatical structure in this case, will lead to mistakes.

Because many students know the term “premise,” we want to clarify one point. A single reason may have component parts, to which we can apply that word, “premise.” For example, look at argument #2. There one reason is given. But that reason has two component premises. By extension, we can speak of the two premises seen there as “premises of the argument.” Like a bicycle, tricycle, or car requires two, three or four wheels to be complete, some reasons require two, three or four (or more) premises to be complete.

In normal everyday conversations, if we give a reason at all, we seldom articulate every premise. The context and our shared understanding of the topic enable us to communicate much more efficiently. We put into words only what we believe is needed to communicate our thinking. Of course, if the speaker believes that the listener is not aware of information that is essential for correctly interpreting what is being said, then it would not be sensible for the speaker to expect that the listener should understand the message (Facione, 1973).

Here are two examples. In their proper contexts, the makers of these arguments correctly believe that they can afford to leave a premise unexpressed.

7. Optimus Prime and Bumblebee are Transformers. So, obviously they are made of metal.
8. Salerno is south of Napoli. So, it is south of Roma.

The premise missing from #7 is “All Transformers are metal,” which is a true statement within the fictional universe of the many Transformers action adventure movies. If you know that fictional universe, then it is unnecessary, redundant, and even a little insulting to provide a reminder of such an obvious fact. But if one does not know that fictional universe, argument #7 may not even make sense. Too much information is missing. The implicit premise of #8 is about the relative location of two cities in Italy. Specifically, “Napoli (Naples) is south of Roma (Rome).” It is unnecessary to remind anyone who knows Italy about the location of Naples. But, if the speaker thought that he or she was making argument #8 to someone who did not know the locations of major cities in Italy, then the speaker would be wise to voice the unspoken premise about Naples being south of Rome.

Our point here is that a speaker’s reasons often have components which are implicit when making arguments or justifying decisions within a given context.

Distinguishing Reasons from Conclusions
Our language is rich with words we can use to communicate our intentions when it comes to expressing arguments. Some words signal our conclusion, and others signal our reason. The table lists some of the most common words and phrases used when we...
want to be sure people know we are making an argument. Naturally, it would be an error to think that we always are so clear and obvious about our argument making. Grammar and vocabulary are important but not the whole story. Even when we know the context and the purpose, miscommunication can happen. Ask “What is the conclusion that the speaker is trying to establish as true?” Or, “What is the decision that the speaker is trying to explain or justify?” And ask “What considerations does the speaker present to establish the truth of that claim or the basis of that decision?”

Let’s map a few simple examples to get started. We will use a rectangle to represent the argument’s conclusion. Let’s use an oval to represent the reason. And we will simply draw an arrow from the reason to the conclusion to show that the person who made the argument intends to support that claim with that reason. Remember, just because the speaker intends that a given reason should support a given claim, it does not follow that the reason actually does support that claim. Some reasons fail. But, evaluation comes later. For now focus on analyzing the arguments, that is digging out the elements (reasons and claims) and figuring out how those elements relate to each other.

Map 1 illustrates the most basic case: A person gives one reason in support of a
conclusion. The conclusion in Map 1 is “Pot should be legalized.” The reason, according to Map 1, is “The state can get sales tax when people buy pot, just like with alcohol.” The maker of this argument is making a simple comparison of pot to alcohol.

Map 1

The state can get sales tax when people buy pot, just like with alcohol. → Pot should be legalized.

Let’s put the argument illustrated by Map 1 in context. A local news reporter is asking a resident of the community, Karen, for her views on the decriminalization of marijuana. Karen says, “I think pot should be legalized because, just like alcohol, the state could get sales tax revenues, and because people over 21 could buy pot legally. Oh, and another thing, then we could regulate pot to ensure consumers get consistent quality.” The argument in Map 2 shows Karen as having offered three separate reasons in support of her claim that pot should be legalized, and notice that we have used language in brackets to clarify what Karen meant by what she said:

When the topic of an argument is important to us we may be tempted to “repair,” “reword,” or “supplement” what the original argument maker is saying. For example, we might want to build an argument concerning legalizing pot by using public opinion polls or the outcomes of recent ballot initiative. Or we may want to editorialize about the economic impact of farming the cash crop, cannabis. Or we may be tempted to polish the speaker’s argument just a bit by pointing to examples of where pot is legal. But, fixing arguments is not the analyst’s job. We must resist the temptation to improve, to diminish, or to editorialize. As analysts, our responsibility is to unearth and to describe the speaker’s arguments, not to bolster or to undercut them. Intellectual honesty demands we be rigorously objective about the speaker’s claims, reasons, and unspoken assumptions. Our aim is to display with accuracy the arguments as the speaker made.

Map 2

The state can get sales tax [when people buy pot], just like with alcohol. → Pot should be legalized.

People over 21 could buy pot legally, just like with alcohol. → Pot should be legalized.

The state could regulate it [pot production] to assure the pot-buying public gets consistent quality. → Pot should be legalized.
them.

**Mapping a Line of Reasoning**

There are times when a claim becomes a reason for another claim, thus forming a *chain of reasoning*. For example, say a person named Sara was to share her reasoning for having rented an apartment on State Street this way: “I wanted a place near the library because I love to study there. It was the closest rental available.” Were we to ask Sara why she loves to study in the library, she might give as her reason, “Because it’s quiet there.” And if we push her to say why quiet is important to her, especially in a world where background music seems to assault us all the time, she might say, “I like music, but I need quiet when I study. Music, or anything that disturbs the quiet, distracts me from my work.”

Sara’s line of reasoning begins with a fundamental thing she knows about herself (“anything that disturbs the quiet causes me to be distracted”) and concludes with the idea that she should rent an apartment on State Street. If she learns that any of the links along that chain of reasoning are not well connected, then she may well decide to reconsider and rent someplace else. The analysis of Sara’s reasoning would map out this way (in **Map 3**)

**Using a Cloud Shape for Mapping Implicit Ideas**

In natural conversational contexts when people give their reasons for a claim, they typically offer a specific fact, opinion, observation, or belief. “Thin crust pizza costs less.” “It’s quiet in the library.” “The state can get sales tax.” “Optimus Prime and Bumblebee are Transformers.” The speaker typically believes that he or she has said enough, given the context, the purpose of the communication, and the understandings shared with the others in the conversation. That is, unless someone asks for a clarification. In the case of argument #7 about the Transformers, if we did not know the movie reference, we might well ask how the person jumped all the way to “So, Optimus Prime and Bumblebee are made of metal.” The response would be to articulate the implicit but

![Map 3](image-url)
unspoken premise, “All Transformers are made of metal.” But for the most part, most days, in most contexts, we get it. Argument making and reason giving are highly efficient processes.

So, cutting to the chase, recall example argument #7:

Optimus Prime and Bumblebee are Transformers. So, obviously they are made of metal.

How should we map argument #7 if we want to show both the expressed premise and the implied premise? We can simply put both statements in the oval. To note that the speaker implicitly relied on an idea, but did not actually express that thought, we can use a cloud shape, like in a comic strip. The cloud shape is one of the devices we can use to keep track of things we have added to the analysis beyond what the speaker actually said. Looking at the cloud shapes, we will know exactly which ideas we have attributed to the speaker, and we can double-check to see whether our interpretations are reasonable or need to be refined. Map 4 describes argument #7 about the two Transformers characters.

Interpreting Unspoken Reasons and Claims in Context

Teammates are talking about next Saturday’s softball game. One says, “Look, we shut out State last week, and the week before State last week, and the week before that State buried Western. So, Saturday should be easy.” Before we can map this argument, we need to interpret it so that the reasoning is more fully expressed, and we may have to restate it for the sake of clarity.

- Our team defeated State’s team last week. (“shut out” = defeated)
- State’s team defeated Western’s team the week before that. (“buried” = defeated)
- [Our team is scheduled to play Western’s team on Saturday.]
- [So, our team will probably defeat Western’s team on Saturday.]
- So, Saturday should be easy.

How many reasons does the speaker use to support the claim? Only one. The context permitted the speaker to communicate successfully by offering only two facts. Our interpretation of what she said revealed that the team’s shared knowledge of their game schedule enabled the speaker to omit the third fact. Map 5 shows that this argument includes both of the elements not spoken in the original: a premise and an intermediate conclusion.

When we give reasons, we naturally assume that the others in our conversation
understand us. Much is left unsaid because it very often does not need to be said, given factors like context, shared experiences, common knowledge, and similarities of cultural backgrounds. But, obviously, what we leave unspoken can cause problems. From time to time, we all have experienced such a situation. Either we get someone else’s unspoken assumptions wrong, or they are mistaken about our unspoken assumptions. Fortunately, these problems are easy to spot and easy to fix. Going back to the pot example, clarification could go like this: “Karen, are you saying that the state should raise the sales tax?” “No, I’m saying that an entirely new source of revenue, namely a tax on the sale of pot, will be beneficial to the state budget.”

A Caution About Interpreting the Use of Irony, Humor, Sarcasm, and More

It would be a naïve to always take what people say literally. If we were unable to interpret irony, wit, humor, and sarcasm, then Stephen Colbert, Sarah Silverman, Dennis Miller, Seth Meyers, Jimmy Fallon, Amy Schumer, and most other comedians would be out of work. Unlike computers, we humans enjoy spicing up our conversations with smack talk, innuendo, double entendre, exaggerations, understatement, slang, imagery, emotion, provocation, and much more. These language tools can give an expression many different meanings. For example, the words “Nice tat!” can mean that a person thinks your tattoo is awesome, thinks your tattoo is silly, thinks your tattoo should not be showing, thinks your tattoo makes a poignant statement, and so on. As we did with the softball team example above, interpretation and restatement are vital preliminary activities to analysis and mapping. Unfortunately, our explicit analysis may take the fun out of the comedian’s shtick. Often the conclusion is left to the audience to figure out and then enjoy. If we have to explain a joke, it isn’t nearly as funny. But this realization only reinforces the realization that human communication, and particularly the reasoning woven into it, is wonderfully, and often joyfully, complex.

Before mapping an ironic or sarcastic comment, switch the statement from the positive that was spoken to the negative that was intended (or from the negative spoken to the positive that was intended). For example, in one context “He was wonderfully diplomatic” can be meant as sincere praise. In this context it supports the claim “Let him represent us.” But in another context it can be intended sarcastically. There the speaker would be using it to support the opposite claim: “Don’t
let him represent us.” In the latter case, since the correct analysis must reflect the speaker’s intent, and since we know the speaker was making a negative comment, we would restate the reason as, “He was [not at all] wonderfully diplomatic.”

As we have already done a couple of times above, we can use words in brackets to clarify a statement so that it can be read in the argument map the way the speaker intended it to be understood. We can also use bracketed text to describe the impact on the reasoning process of nonverbal cues. For example, people frown, scoff, cross their arms, or roll their eyes to show that they disagree. Such nonverbal cues can be represented in an argument map in this way: “[Arms are crossed and he’s shaking his head—John strongly disagrees with Karen about legalizing pot].”

**IV. Analyzing Arguments in Context**

Asking someone about their reasons and having them share their thinking honestly and fully are complex human social interactions. A gesture, a look, a facial expression, the past history between people, unspoken assumptions, and all kinds of other things can enter into how we interpret what people really mean. As we mature, we gain the skills, knowledge, and experience to understand others and to express ourselves better. As our skills advance, we can handle more challenging arguments.

*The El Train Argument*

Our first example of an extended argument is drawn from the 1957 movie *12 Angry Men* that was based on a play of the same name by Reginald Rose (Rose, 1955). The movie was selected for preservation in the United State National Film Registry by the Library of Congress, and the famous El Train scene from it offers examples of sarcasm, irony, expressive body language, and raw emotion, all of which may or may not be influencing the thinking of the various members of the jury as they deliberate. Let’s apply our argument-mapping techniques to the argument offered in support of the claim that the old man was lying when he testified that he actually heard the defendant threaten to kill the victim. In the classic 1957 film version, the scene runs from 39:30 [minute: second] to 43:00.

One of the responsibilities of any jury is to determine the facts of a case. Using testimony and their good judgment, the jurors must decide whom to believe. In the El Train scene the jury is trying to determine whether to believe the testimony of an older gentleman who lives in the apartment building where the murder had taken place. The old man testified under oath that he heard the accused shout that he was going to kill the victim just one second before he heard the victim’s body hit the floor. The jury wonders whether the old man could have heard the accused make such a threat. Is it possible for a person in one apartment to hear what someone in another apartment is shouting? Well, yes, under ordinary circumstances it might be possible, the jury reasons, particularly if the apartment windows are open. And they were open, according to the witnesses. So perhaps the old man heard the threat through his open window.

But the jury has vital information about the moments during which the threat was supposed to have been heard. Another witness has testified that the murder occurred just as a noisy elevated train went shrieking past the window of the apartment where the victim was killed. Several members of the jury comment about how incredibly noisy an elevated train can be, and this train passed so close to the side of the apartment building that the clatter of its passing might have been unbearably loud. So the question becomes: Could the old man have heard the killer shout a threat over
the racket made by the passing train? The jury determines that it took the train roughly ten seconds to pass the apartment window. According to the testimony of the other witness the killing happened just as the last part of the train passed by the window. Putting the testimony of the old man together with what the other witness said implies that the threat was shouted while the train was roaring past the window. But now we have a major conflict in the testimony of these two witnesses. Either we believe the eyewitness who said that the murder occurred just as the train went past the window, or we believe that the old man heard the threat being shouted over the roar of a passing train. No, the jury decides, because of the noise of the train the old man could not possibly have heard anything people in another apartment were saying, even if they were shouting threats.

The summary of the scene we have provided here leaves out things that the playwright has the characters doing while the argument was unfolding. For example, two of them start playing tic-tac-toe instead of paying attention. The summary also omits the snide comments and exasperation some of the jurors express, which also interrupts the flow of the reasoning. But even with these distractions not present in our summary, many of us would still have a difficult time following the twists and turns of a complicated argument like this one when all we have is a long paragraph of text. We need some way to organize the ideas, to diagram the flow of the reasoning, to clarify and to display for ourselves and others our analyses of relationships between reasons and claims. Argument maps provide the solution. And, because the reasoning is presented using simple shapes and arrows, the flow of the thinking quickly becomes apparent. It is easier to collaborate on the analysis of complicated arguments using visuals, which can spread across a page in all directions, versus a text-based approach, which can only move from left to right and from top to bottom line by line.

Of course, to appreciate the advantages of visual mapping when analyzing more complicated passages, one must understand the mapping process. Practice. That’s the ticket. So, let us map the argument for not believing the testimony of the old man. Here are a few tips. It often works best to begin an argument map by identifying the speaker’s final conclusion. In this case, it is easy because the whole scene builds up to the claim the old man did not hear the accused make the threatening statement. Let’s put that down first, and then, working backward from that conclusion, let’s add the two strands of reasoning, which collide at the point where the old man’s testimony about what he says he heard conflicts with the fact of how noisy it is when an El Train roars by. The dilemma for the jury is that they either have to reject the facts about noisy trains or reject the old man’s testimony. Map 6 shows that dilemma.

Map 6 is a start, but it needs work. The scene includes arguments that lead to the two ovals with “The train was roaring by . . .” and “When an elevated train . . .” We find it helpful at this point to remind students that it will likely take more than one or two drafts before they feel satisfied with their analysis. Mapping is like writing. The key to quality comes from drafting and redrafting.

The “Guns for Kids” Conversation

Our second example of an extended argument involves a topic that some will find abhorrent. Teaching critical thinking requires that we venture into topics that are discomforting now and then. Political correctness notwithstanding, we do our students no service if we permit people simply to opt out of thinking about topics or questions that they may find disturbing or unsettling. (For more on this see “Distressed Reasoning” posted on academia.com by author Peter Facione.) One of us authors abhors guns and
would never permit one in the house where the kids might find it. For the other of us a favorite summer camp activity was visiting the shooting range where we used bolt-action rifles and .22-long ammunition to bang away at the paper targets. But we campers did not own the guns; and there were always adults supervising our use of the rifles at the range. We share this with you because the next example is as difficult for us as it is for others who have an initial positive or negative reaction to the idea of children using guns. But, reminding ourselves that our task here is to analyze, and not to evaluate, we push forward. Difficult topics that have emotional overtones are exactly what call most for purposeful reflective judgment.

Is six years old too young to own a gun? Is eleven years old too young to buy a gun? In state houses throughout the nation gun industry lobbyists are urging that state laws be liberalized. They argue that it should be legal for children and adolescents to own guns, buy guns, and participate in shooting sports provided there is adult supervision and that the child has completed a course in gun safety. The National Shooting Sports Foundation is one of the driving forces behind the concerted effort to put more guns in the hands of America’s children. An Internet search of “guns for children” produces ads for firearms designed and marketed to appeal to children and news stories about the issue of guns for kids run
Imagine the following conversation between two friends, Josh and Nick. They are sitting in the stands watching their twelve-year-old sons play Little League baseball. Nick has just told Josh that he is buying his son a hunting rifle for his next birthday.

**Josh:** Why on earth would you give your boy a gun? Think of the risks. An accident and, God forbid, the boy hurts himself or another kid. Look, these days we parents do everything we can to protect our kids. I don’t get it. Why do you want to give your boy a gun?

**Nick:** If you don’t want guns in your house, that’s fine. But the laws allow kids to have guns for hunting. I want to take my boy hunting and I want him to have the right equipment. Really, it’s not so different than any other sport, when you think of it. You bought your boy his own aluminum baseball bat. If he misuses it to hurt other people, well that would not be the bat’s fault. A lot more kids are hurt playing high school football each year than are hurt in hunting accidents.

**Josh:** I get it, you’re his dad. You can buy your boy whatever you want. But I don’t like the idea that your son will have a gun. I’m sure he’ll tell the other boys and they will want guns too. Next thing you know some messed up middle school kid skateboards off to a gun show to buy an AR-15. That’s legal, you know. We have laws against minors buying beer, cigarettes, pornography, and lottery tickets. But any kid can buy a gun! That’s crazy. Guns are no different, they are dangerous. The law should protect kids from buying dangerous products including guns.

**Nick:** No argument there. Selling guns to kids should be illegal.

**Josh:** So, we agree on that. But what about a thirteen year old possessing an AR-15? You’re not going to tell me an AR-15 is designed for hunting rabbits. It’s a military assault weapon. In fact, isn’t an AR-15 the kind of gun that boy used to kill all those children in Newtown, Connecticut?

**Nick:** That guy was 20 years old.

**Josh:** Yeah, and he was around guns all his life.

**Nick:** He was unstable. And that incident, tragic as it was, is the exception, not the rule.

**Josh:** Our country is averaging one incident a month where some child takes a gun to school to shoot other kids. Where are the so-called responsible adults? What happened to all that wonderful gun safety training?

**Nick:** Look, Josh, I know you don’t like guns. But there are nearly 2 million kids ages six to fifteen years old who have hunting rifles and use them safely. Look at the numbers.

**Josh:** No, you look at the numbers. Two million is terrifying. It only takes one troubled kid with a gun to kill my son! And I wish I could give you more stats on suicides, sibling killings, and the other terrible things that easy access to guns causes. But the NRA
lobbied Congress in 1996 to prevent the Centers for Disease Control from funding research on gun violence and public health.

Nick: Those laws were changed.

Josh: But there is no funding yet to gather the kinds of numbers that will put this in perspective.

Nick: Look, what exactly is your point? Are you opposed to kids having guns, or buying guns, or guns in general, or what?

Josh: I don’t have problems with gun ownership. In fact, I own one myself. But kids should not own guns and the manufacturers should be barred from targeting kids, just like cigarette companies are barred from advertising to children.

Nick: Wait a minute. Guns are legal to manufacture and to sell. It’s legal for kids to have guns. Every business has the right to explore new markets.

Josh: I do not know if it is insane or just immoral to market weapons to children.

Nick: Neither, Josh. Look, I was brought up in a family where we all hunted. There were hunting rifles in our house and all of us children were taught how to handle them safely. Learning to hunt was as natural as learning to ride a bike. So, again, what’s the problem here?

Josh: Look, the problem is ownership. Ownership implies control over when and how the gun is used. Kids just are not mature enough to be given that kind of control. The whole thing just puts the kid, the family and the community at greater risk unnecessarily. You mix the emotional ups and downs of a middle school or high school kid with easy access to a lethal weapon and you are just begging for something tragic to happen.

To initiate mapping the arguments woven into the fabric of this complex conversation, we begin with two key questions: What is the fundamental conclusion Josh is trying to establish, and what is the conclusion Nick is arguing for? What reasons do each of them present in support of their respective conclusions? Map 7 illustrates our analysis of each father’s basic position. These positions are articulated early in the conversation. After Map 7, we will explore the second part of the conversation, where Josh and Nick talk about the AR-15 and the issue of marketing guns to children.

Map 7 presents the conclusion Josh is arguing for and the conclusion Nick is trying to establish as two separate rectangles. Note that both could be true in this particular situation. Josh presents two reasons for his more general conclusion. Nick presents three considerations to justify his decision regarding his son specifically. Map 7 shows “Laws permit children to have guns” as one of Nick’s reasons. Nick seems to be thinking that if giving a gun to a child was unreasonable, it would probably be illegal. We may or may not agree with that. But it seems fair to attribute that belief to Nick, otherwise it is difficult to imagine why Nick thought it was relevant to mention what the law permits at all.

Map 7 omits the part of the conversation where Josh and Nick agree that it should be illegal for children to buy guns. The rationale for that point of agreement is the principle that one of the purposes of the law is to protect children from harming themselves with dangerous, but otherwise legal, products.
Map 7

Laws permit children to have guns.
If it were unreasonable, it would probably be illegal.

A gun is like a baseball bat, just another piece of sports equipment. It’s not the gun’s fault if it is misused.

Map 8

We have laws against minor buying beer, cigarettes, pornography, and lottery tickets. Guns are no different.

They [guns] are dangerous. The law should protect kids from buying dangerous products including guns.

Selling guns to kids should be illegal.
like cigarettes, alcoholic beverages, gambling, and pornography. Josh and Nick appear to agree that guns fall into the category of dangerous products. Map 8 captures this moment of agreement.

As often happens in a conversation, a word or mental image triggers another idea by association. The mental image of the troubled boy on a skateboard with an AR-15, and the simple mention of the AR-15 prompted two thoughts in Josh. One was the realization that an AR-15 was not designed as a sport hunting rifle, and the second was a vivid memory of the tragic shooting in Newtown, CT where so many innocent young children died. These ideas are relevant to Josh’s main conclusion. The image of killing defenseless children with an AR-15 is repulsive. Josh evokes that image as part of his effort to persuade Nick that it is not a good idea to give a gun to a child. To further bolster his position Josh notes the rate of school shooting incidents that do involve children. Our analysis of Josh’s position requires that we represent these three considerations in our map. It appears from the context that Josh intends that this particular set of reasons should function as mutually supporting considerations, rather than as entirely independent.

Nick reminds Josh that the shooter in the Newtown tragedy was an adult, not a child, and that he was an unstable individual. Nick does not dispute the characterization of the AR-15 as an assault weapon. But Nick does challenge the numbers. In contrast to the two million children who have guns but do not take them to school to do violence, the Newtown case and the other incidents Josh mentions are extremely rare exceptions.

Josh counters Nick by bringing up the restrictions, which had been in place for many years that prohibited the CDC from using public funds to study gun violence and its impact on public health. Josh’s point is that the NRA lobbied successfully to prevent us from knowing all the relevant facts. Map 9 expands Map 7 by adding this segment of the conversation.

Map 9 introduces two new mapping conventions. The first new element is a way of depicting the push back that comes when a speaker presents a counterargument or an objection to something the other speaker said. Although we could use ovals to represent objections and counter-arguments, an oval undersells the intended inferential force of these elements. Objections and counterarguments are intended to show that something the other person said is seriously flawed. Objections and counterarguments are used to defend one’s position by metaphorically reversing the flow of the reasoning. We offer objections and make counterarguments by giving reasons to disprove, refute, invalidate, or otherwise show that a given claim is not true. Let’s use a wide arrow with words inside to depict objections and counterarguments. Map 9 incorporates the arrow device in its analysis to show how Josh and Nick are both pushing back at what the other is saying.

The second new mapping convention is the positioning of the shapes. Map 9 shows ovals overlapping other ovals and an oval overlapping a wide arrow. The overlap convention suggests visually that the analyst has interpreted the speaker’s reasons as mutually supportive and not as independent considerations. (Recall the example of the unappreciative boss and the long commute earlier.) The oval that begins “[We need the] stats on suicide …” overlaps the wide arrow that begins “Two million kids….” We are interpreting Josh as intending that these two considerations should work together as an objection. Josh thinks Nick is trivializing the risks and that with good data this would become obvious.

After the flurry of objections and counterarguments, Nick, is becoming irritated
and exasperated. As often happens in this kind of a conversation, one party of the other decides that it is time to step back and begin again. In this case Nick does that by asking Josh, “What exactly is your point?” Josh then presents a claim that is broader and stronger...
than his first conclusion. Map 10 completes the analysis of the conversation by representing the final set of arguments.

Before moving on, we do want to acknowledge that it was tough for us, and

Map 10

Cigarette companies are barred from advertising to children.

Guns are dangerous, just like cigarettes. The law should treat gun manufacturers the same as cigarette manufacturers.

Kids should not own guns and manufacturers should be barred from targeting kids.

It is either insane or immoral to market guns to children.

The problem is ownership. Ownership implies control over when and how the gun is used. Kids just are not mature enough to be given that kind of control. You mix the emotional ups and downs of a middle school or high school kid with easy access to a lethal weapon and you are just begging for something tragic to happen.

The whole thing just puts the kid, the family and the community at greater risk unnecessarily.

A business [that is operating within the law] has the right to explore new markets.

Guns are legal to manufacture and to sell.

It is legal for kids to own guns.

It is neither [insane nor immoral].

In my family we all hunted. I learned gun safety. Learning to hunt was as natural in my family as learning to ride a bike.
probably for some readers too, to go through the “Guns for Kids” conversation in such detail without evaluating the case each side was making. So many ideas cried out for clarification, so many distinctions should have been made; so many strong emotions were evoked. Emotionally provocative examples, such as this one, will certainly challenge many students as well. One lesson, reinforced again and again over the years, is that those with whom we disagree are almost never as evil or as ignorant as we are tempted to imagine.

Table 2 - Expressions that Often Signal Objections or Counterarguments

<table>
<thead>
<tr>
<th>Expression</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>But</td>
<td>As in Map 9, “But there is no funding yet to gather the numbers that will put this problem in perspective”</td>
</tr>
<tr>
<td>However</td>
<td>You say you heard the body hit the floor, however the El Train was roaring by your open apartment window at precisely that moment.</td>
</tr>
<tr>
<td>Yet</td>
<td>The body hit the floor just as the El Train was roaring by the open window. All that noise and yet the old man heard the body hit the floor? No, I don’t think so.</td>
</tr>
<tr>
<td>On the other hand</td>
<td>Public polls do support legalizing medical marijuana. On the other hand the majority of people in our state do not support total legalization of all uses of pot.</td>
</tr>
<tr>
<td>Nevertheless</td>
<td>Public polls support legalizing medical marijuana. Nevertheless it remains a dangerous drug.</td>
</tr>
<tr>
<td>Notwithstanding</td>
<td>“Notwithstanding the importance of respect for free choice, the life of the fetus is the central consideration.”</td>
</tr>
<tr>
<td>Regardless of</td>
<td>“Regardless of the risks to other children, I have to put the safety of my children first.”</td>
</tr>
<tr>
<td>Still</td>
<td>As in Map 13, “No he doesn’t. We still have the problem about . . .”</td>
</tr>
<tr>
<td>Despite</td>
<td>“Despite what the esteemed ambassador is saying, according to reports from independent journalists the facts on the ground are quite different.”</td>
</tr>
<tr>
<td>If we were to accept the view that . . . , then . . .</td>
<td>If we accept the view that an embryo has all the rights of a fully developed human person, then abortion at any time during a pregnancy is unethical.</td>
</tr>
<tr>
<td>. . . , all the same . . .</td>
<td>An option may be unethical, all the same it can still be legal.</td>
</tr>
<tr>
<td>Be that as it may . . .</td>
<td>The Fukushima Daiichi nuclear power plant passed all inspections. Be that as it may, the plant was not prepared for the 2011 tsunami.</td>
</tr>
<tr>
<td>That being said, . . .</td>
<td>The international community generously responded with millions of dollars in relief after the Haiti hurricane disaster. That being said, the international response to the Haitian cholera epidemic that followed was far from impressive.</td>
</tr>
</tbody>
</table>
Strong critical thinkers know that it is never wise to demonize, underestimate, or disrespect those arguing for a different conclusion.

IV. Analyzing and Mapping Decisions

When people are interviewed about difficult decisions they have made, they often talk about how they considered various options and, for various reasons, came to select one rather than any of the others. In effect, they are describing a series of arguments. A decision map depicts all the arguments, pro or con, which are used in the decision-making process during the consideration of various options and the selection of the final choice. Decision maps can be thought of as argument maps used to analyze and depict the deliberations involved in individual or group decision making. To show how to build decision maps, and for more practice mapping critical thinking, consider the following extended example about a spring trip.

“We Should Cancel the Spring Trip”--Round 1

The planning committee of a student club called the High Sierra Hikers is talking about a camping trip the club hopes to take during spring break. Eve is the chairperson of the group, Melissa is the treasurer, and James and Felix are the trip coordinators.

Meeting Transcript:

Eve: How are the plans coming for the spring camping trip?

Felix: Bad news. The room rates at the Base Camp Lodge have doubled since last year.

Melissa: Yes, and the money we’ve set aside for the trip won’t cover the difference. Our budget is already a problem because of the all other events we have planned.

Felix: Even if we could get the money, the Lodge has no available rooms during spring break. The only available rooms are during finals week.

James: But wait. We’ve been planning this trip for almost a year. People are all excited about going. It’s going to be a lot of fun.

Eve: So, Felix, you’re saying we have to cancel the trip. What about other places we can stay?

Felix: Yes, I am. There aren’t enough rooms in any one other place. We’d have to split up our group.

Melissa: It would be a hassle to organize transportation from different sites. And we could use the money for the other events this year.

Eve: OK, we’ll cancel. I agree with Melissa, let’s use the money we would’ve spent on the camping trip some other way.

An analysis of this transcript reveals that the planning committee is making a decision between canceling and not canceling the trip that the club had planned for spring break. They are alerted to the need to make a decision when Felix responds with, “Bad news” to Eve’s question. We can interpret the expression “Bad news” in this context to mean, “There’s a problem about our spring trip.” At this early point in the conversation, though, we would not know what that problem might be. We could use an oval to represent that idea. But, as before, an oval does not seem to suggest enough about the impact of this realization on the reasoning process. Recall the line from Apollo 13 when the pilot calls down to Mission Control in Houston to say there is a problem. The rather commonplace assertion that
there was a problem was actually a stunning realization. That declaration alerted everyone that they needed to be thinking about what could possibly be happening.

The realization that a decision is needed can be thought of as a watershed moment in a conversation. To capture the sense that some assertions put us on notice that we have to start thinking—although we may not yet know which direction our thinking will go, or what the nature of the problem really is—we want a more dramatic shape than the humble oval. As illustrated in Map 11, we use a diamond to represent the realization that a decision needs to be made or the realization that deliberation is needed. The content is typically a statement that is neutral relative to the various options and draws attention to the opportunity, need, or appropriateness of engaging in decision making with regard to the issue at hand.

Map 11

Don’t cancel the spring break trip.  

Bad news. [There’s a problem about our spring trip.]  

Cancel the spring break trip.

In the final map of a decision there will be lines of reasoning flowing toward each of the options considered. One of them will end up being the choice that is made, and the others will be options not selected. We already have the rectangle shape for the final conclusion of an argument map, so let’s continue to use that shape for each of the options. This gives us the fundamental structure of the decision at hand. Since we know that the group decided to cancel the trip, we can represent the rejected option by a shaded rectangle. If the group had considered a couple of other options, we would have put them in as rectangles. The only one we would not have shaded would be the option that the group actually chose.

After we have this, we can add the argument for and against the options. When the reasoning to be mapped is more complex, as it is here, it takes a couple of drafts to design an effective decision map. Redrafting helps refine the analysis and clarify exactly what is being said. Redrafting allows one to move the shapes around on the page so that the flow of the reasoning, as it has been analyzed, can be seen more readily.

Decision Map 12 emerged after producing two or three earlier versions. Same for the El Train scene map and the maps of the guns and kids issue; in each case there were two or three preliminary drafts. “We Should

Cancel the Spring Trip”—Round 2

Surely, we could make a plausible case not to cancel the trip. Maybe the logistical problems could be overcome, and it might not be so bad if the whole group wasn’t able to be in the same hotel. Perhaps some money could be shifted from those other events toward this spring trip. But, as decision analysts, it’s not our job to solve the problems, but rather to uncover the reasoning process behind them.

Suppose that James, still wanting to go, pushes
the group to reconsider.

Meeting Transcript Continued:

JAMES: I know we have to think about the budget. But we could pay for this year’s trip using next year’s funds.

MELISSA: That would be great. Let’s just raid the coffers for next year.
Felix: Spoken like a true graduating senior, James!

Eve: Calm down, you guys. Maybe James has a point.

Felix: No, Eve, he doesn’t. We can’t take the trip during finals week. And we still have problems with where to stay if we go during spring break. It just doesn’t make sense.

James: Forget it.

James begins by acknowledging there’s a budget problem. From this point of consensus, arguments could flow in either direction, so we can treat it as another invitation to the

Map 13

---

We can pay for this year’s trip out of next year’s funds.

Forget it.

Don’t cancel the spring break trip. [Rejected]

{Silence}

Maybe James has a point.

We have to think about our budget.

It’s just like a senior not to care about our club’s needs after you’re gone.

Cancel the spring break trip. [Chosen]

No he doesn’t. We still have the problem about where we’re going to stay during spring break.

James’ proposal just doesn’t make sense.

No he doesn’t. We can’t take the trip during finals week.

That would [not] be good. It would raid next year’s budget.
group to engage in deliberation. We will use the diamond shape for this when we map the group’s decision-making process. It opens up the possibility that a new decision can be made. But James’s invitation to reconsider is immediately met with a flurry of objections and counterarguments. From the context we can interpret Melissa’s “That would be great” as something not meant to be taken literally. Using irony and the slanted and emotionally charged word *raid*, she rejects James’ proposal. Felix joins in with his contemptuous “graduating senior” remark. Felix is implying that James doesn’t care about what future problems he might be making for the club because he will have graduated and left. Eve tries to keep things civil and to reopen the deliberation with a respectfully neutral observation, “Maybe James has a point.” But Felix counters by reminding everyone about the issues James’s proposal simply ignored. In the end James abandons the effort to salvage the trip. He’s so frustrated he says, “Forget it.”

How should we map that remark? “Forget it” is a powerful signal that James is abandoning the effort to salvage the trip. Discontinuing a line of reasoning can be a very important turning point in the decision-making process. We could map it with an oval, but that would not fully convey the force of this element in the group’s critical thinking about the trip. Another shape would be better. We will use a *hexagon* to convey that a line of reasoning has been abandoned. A hexagon marks an ending point of a line of reasoning in that direction, toward not canceling the trip, after Eve’s suggestion that James might have a point.

The map of a human decision can display the realization that a decision or deliberation is needed. It can show the lines of reasoning pursued, the implicit but unspoken ideas relied upon, the choice selected and those not selected, the objections or counterarguments advanced, and lines of reasoning that may have been abandoned. Thus, by providing good analyses, argument and decision maps position us individually and working collaboratively to make informed and comprehensive evaluations.

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**Decision and Argument Mapping Conventions**

<table>
<thead>
<tr>
<th>Shape</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Rectangle" /></td>
<td>Conclusion or Decision</td>
</tr>
<tr>
<td><img src="image" alt="Shaded Rectangle" /></td>
<td>Alternative Not Selected</td>
</tr>
<tr>
<td><img src="image" alt="Oval" /></td>
<td>Reason Supporting a Claim</td>
</tr>
<tr>
<td><img src="image" alt="Dashed connecting Line with Arrowhead" /></td>
<td>Intended Flow of Reasoning From Reason to Claim</td>
</tr>
<tr>
<td><img src="image" alt="Brackets" /></td>
<td>Clarification of Speaker’s Intended Meaning</td>
</tr>
<tr>
<td><img src="image" alt="Cloud" /></td>
<td>Implicit but Unspoken Element</td>
</tr>
<tr>
<td><img src="image" alt="Wide Arrow" /></td>
<td>Objection or Counterargument</td>
</tr>
<tr>
<td><img src="image" alt="Diamond" /></td>
<td>Recognition of the Need to Decide / Invitation to Deliberate</td>
</tr>
<tr>
<td><img src="image" alt="Hexagon" /></td>
<td>Abandonment of a Line of Reasoning</td>
</tr>
<tr>
<td><img src="image" alt="Braces" /></td>
<td>Analyst’s Note or Interpretive Comment</td>
</tr>
<tr>
<td><img src="image" alt="Oval Overlap" /></td>
<td>Mutually Reinforcing Reasons</td>
</tr>
</tbody>
</table>
of reasoning that otherwise would have eventually connected to a conclusion. See Map 13. Be sure to position the hexagons indicating abandoned lines of reasoning near the shaded rectangle that represents the conclusion not chosen. The best maps, when viewed holistically, show immediately which lines of reasoning were abandoned before they reached their potential conclusion.

To separate any notes or interpretive comments added by the analyst from what the speakers themselves said, simply put the analyst’s notations inside \{braces\}. The hexagon with the word silence inside the braces is the analyst’s way of showing that the group abandoned the possibility of moving in that direction, toward not canceling the trip, after Eve’s suggestion that James might have a point.

The map of a human decision can display the realization that a decision or deliberation is needed. It can show the lines of reasoning pursued, the implicit but unspoken ideas relied upon, the choice selected and those not selected, the objections or counterarguments advanced, and lines of reasoning that may have been abandoned. Thus, by providing good analyses, argument and decision maps position us individually and working collaboratively to make informed and comprehensive evaluations.

V. Extended Mapping Strategies

Argument and decision maps can be applied in many practical ways. More than only providing a tool by which to express an analysis of the relationships of claims and reasons, argument and decision mapping can be augmented to enable students and researchers alike to take note of the kinds of arguments being made, to express their evaluation of arguments, and to expose the reasoning strengths and weaknesses of important and complex multi-option decisions.

Mapping the Sequence of Arguments and the Use of Heuristics

Cognitive heuristics are human decision-making short cuts people rely on to expedite their judgments about what to believe or what to do. One example is the Temporizing Heuristic which is the natural human tendency to regard a given option, while not optimal, as good enough for the moment.

Map 14  This map displays an interviewee’s explanation of why she cannot quit smoking at this time. As can be seen, the map displays two possible conclusions and three watershed realizations that a decision was called for. One argument strand leading from one of the watershed ideas is abandoned. The interviewee who is providing this account of her ongoing decision offered five more arguments supporting quitting smoking now and four arguments for quitting later. This shows that she is seriously entertaining the idea of quitting and in fact is using the Temporizing Heuristic to sustain the ongoing, but shaky, decision to continue with smoking for the time being. We might conjecture from this that the cognitive fortifications supporting “continuing to smoke [for now]” option may not be weakening.

The sequencing of a person’s thoughts can often be a clue that a person is on the verge of a new decision or realization. To capture the data about the order in which this interviewee presented her arguments we can add numbers inside the shapes. The numbers represent the order of the interviewee’s claims and reasons. This technique preserves the chronology of the interview, revealing how the interviewee first argues for quitting smoking (phrase 2: “Smoking is going to kill me”). Although the person never declares that she must stop smoking, it is an implicit statement in the first things she says (1: “I want to live, 3: “I can’t
believe I started smoking again,” and 4: “I’m an idiot” [for doing so.]. But then the person’s defenses begin to build. The temporizing starts rather early in the interview, as the person explains why this was not the time to try quitting (phrase 5). The interviewee’s arguments also reveal unwarranted beliefs that there are beneficial effects of the nicotine
addiction (phrase 13 “To function, I’ve gotta smoke”). If our purpose were to evaluate the reasoning, and not simply to analyze it, we could further augment the argument map by inserting “(True)” and “(False)” by each statement that we were sure was true or false.

Mapping Additional Forms of Inference

Look closely at Map 14 and you’ll spot another enhancement. On two of the arrow lines we’ve indicated the name of the reasoning used to move from one oval to the next. “Simulation of repeating past failure” indicates that the Simulation Heuristic operated as the person’s thinking moved from phrase 8 to phrase 7. The Simulation Heuristic is the name for the natural human tendency to estimate the likelihood of a given outcome based on how easy or how difficult it is to imagine that outcome – the easier to imagine, the more likely. The person spoke phrase 7 first, then explained how she came to that idea with phrase 8, but without much self-confidence, having already revealed her relapse in phrase 3.

Introducing information on the arrow lines is a way of displaying how the analyst is interpreting what the interviewee is saying. You’ll see another interpretive insertion on the arrow line between phrase 20 and phrase 21. Thus as the memory is fresh in her mind and close to her life, there the analyst suggests that the interviewee is using the Representativeness Heuristic. The Representativeness Heuristic is the name for

**Map 15 - “We Need Groceries”**

Hey, babe, remember that we need to get toothpaste and we could use some fresh vegetables too.

Categorizing items as “groceries”

[Unspoken] We need groceries.

If we need groceries, we need to go to the store.

Affirming the Antecedent (Modus Ponens)

That means we need to go to the store.
the natural human tendency to make the snap judgment that X is like Y in every way upon noticing that X is like Y in any given way.

Heuristics are not the only forms of inference that we can add by name to the arrow lines of an argument or decision map. We can insert the names of any fallacies, valid argument templates, or statistical tests that the argument maker uses to draw his or her inferences.

**Map 15** This map indicates the critical thinking skills used. In Map 15 one of the valid rules for drawing inferences we discussed in an earlier chapter, Affirming the Antecedent (also called “Modus Ponens”), is noted on the arrow line leading directly to the conclusion. The argument maker logically infers the conclusion without needing to speak aloud the two implicit statements in the intermediate claim. The argument maker reaches the first of those, “We need groceries,” by applying one of the basic critical thinking sub-skills of interpretation, viz. categorization. Reference the logic used by the argument maker to infer the conclusion by inserting its name on arrow line. Whether the argument maker used a logical argument pattern or a fallacious reasoning, if it has a name we can display it on the arrow line.

**Mapping Supporting Explanatory Information**

**Map 16** This map uses overlapping ovals, creating something that looks like an upside-down “Mickey Mouse” hat. The overlapping ovals on the left show that the data in the large central oval are supported by good methodology – specifically that the sample was representative. The right side’s overlapping oval indicates that the claim in the center is based upon the application of a measurement instrument which the argument maker believes to have been valid and reliable. Argument makers often rely on well-established research methodologies or decision-critical factors in making a key claim. We can best interpret these elements as parts of a complex claim itself, rather than as separate reasons for the claim. To display a complex claim that includes explicit justification and explanations of that claim itself use overlapping ovals.

**Map 16 - “Which Students Value Truth-Seeking?”**

In a survey of the beliefs and values of students at a given university it was found that 25.5 percent of the first year and second year students endorsed truth-seeking, whereas 40.4 percent of the juniors and seniors surveyed endorsed truth-seeking.

The students surveyed are a representative sample of the students at the university.

The survey of beliefs and values used was a valid and reliable instrument for measuring truth-seeking.

Chi-Square Test for Statistical Significance

\[ \chi^2 = 30.648, \quad p < .000 \]

At this university juniors and seniors are statistically significantly more likely to endorse truth-seeking than are first and second year students.
oval on the left shows that the data in the large central oval are supported by good methodology—specifically that the sample was representative. The right side’s overlapping oval indicates that the claim in the center is based upon the application of a measurement instrument which the argument maker believes to have been valid and reliable. Argument makers often rely on well-established research methodologies or decision-critical factors in making a key claim. We can best interpret these elements as parts of a complex claim itself, rather than as separate reasons for the claim. *To display a complex claim that includes explicit justifications and explanations of that claim itself use overlapping ovals.*

Map 16 also notes on the arrow line leading to the conclusion that the argument maker applied a commonly used analysis for statistical significance called a Chi-Square Test. As indicated with Map 15, we can show this on the arrow line. The label on the arrow line in Map 16 is shorthand for saying “The argument maker applied a Chi-Square statistical test to determine the likelihood that the observed results happened to come about merely by random chance is less than one chance in 1,000.” Another option would have been to put this same information into a third oval that overlapped the larger oval above. Either way works to communicate the basis for the statistical analysis that, itself, then justifies our confidence in the conclusion. Breaking out each element and displaying it offers a map that better displays the complexity of the thinking yet keeps that reasoning easy to understand and interpret correctly. This

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**Map 17 - “Buying a Car”**

- **This car gets great mileage, it is within my price range, it has an MP3 player, and it has all the other accessories I’m looking for,...**
- **This car meets the criteria that I had in mind when I first went looking for a car to buy.**
- **Yuck! I hate green.**
- **... but it’s green.**
- **I should buy this car. [Alternative Not Selected]**
- **I’m not buying this car. [Decision]**

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*System 2*

Substitution Rule of Inference:

I should buy X if X meets conditions C1...Cn.

*System – 1*

Heuristic Influences:

Affect & Elimination by Aspect
is particularly helpful when the reasoning involves several complex steps.

Mapping the Decision System

Map 17 This augmented decision map identifies the reactive System-1 response that turned out to be decisive in this case, as well as the person’s attempt at being more deliberative. The application of the rule called substitution is the more reflective System-2 inference that would have led the person to buy the car, but the System-1 negative affective response to its color gave the buyer pause. Ergo, this car was not purchased by this decision maker!

Less Is More

Map 18 We can increase the information on a map or, if it helps in a given context, we can strip out information. In Map 18 we stripped out the arguments so that the map reveals the overall pattern of the decision making divorced from the specific content of the argument. The numbered “P” ovals are the reasons the speaker gave in favor of (“pro”) attending a given college, and the “C” ovals are (“con”) arguments the speaker made concerning attending that college. And we’ve added evaluations of each of those arguments as “sound” or “unsound” based on the truthfulness of the premises and the logical strength of the speaker’s original arguments. In the end, this person decided to attend Michigan State University (MSU). What was particularly interesting was that a few of the arguments

Map 18 - “Which College Should I Attend?”
the person considered both for and against attending MSU were not sound.

Mapping Group Decision Making

Map 19. One of the best depictions of group critical thinking is the memorable scene from Apollo 13 where the crew and the people at the Houston Mission Control are trying to figure out what kind of problem the spacecraft was having. Map 19 begins with the realization that there is a problem on the spacecraft. This realization is communicated to Houston and then backed up by all the people on the spacecraft and in Mission Control who report what their instruments are reading. Map 19 illustrates that we need not confine our argument analysis and mapping strategies to displaying the thinking of a single individual. We can map group decisions too.

Map 19 “Instrumentation or Real Power Loss”

VI. Post Script

Mapping a group decision can be useful, but challenging too. As many college students and instructors know, figuring out how to best care for older parents and grandparents can be challenging for their children. About a year ago a family we know was working through the question of how best to help Grandpa Stanley relocate from Arizona to a new home closer to one of his adult children back in Chicago. He wanted to move because his wife had passed away as had many of his retirement friends. Over several weeks his four adult children discussed by phone and e-mail the various options. The decision was complex because Grandpa Stanley’s needs and preferences were important, but so were the needs and abilities of the various adult children and their families. To sort out all the options and relevant considerations, a couple of huge decisions maps were drawn up and circulated. In the spirit of “let the chips fall where they may” the maps were accurate to a fault. All the options and reasons, weak and strong, were displayed, along with all the abandoned lines of reasoning. Which child was too busy with work, which had medical problems of his own to deal with, etc. all made it into the map. Given how families can be, all this truthfulness risked reopening old conflicts because the map exposed an unverifiable assumption and an occasional fallacy in the reasoning of one or another adult sibling. Eventually it was all happily resolved. Grandpa Stanley is resettled near two of his sons on the north side of Chicago. He occasionally rides the Red Line to Cubs games. With millions of other Cubs fans, Stanley yearns to cheer his team as World Series victors—someday. The adult siblings are all still close friends. The decision maps have been put away, perhaps someday to be shared with the great-grandchildren, but maybe not. There are things that are important, and then there are other things that are more important. Strong critical thinkers make judgments.

References


**Author Information**

Carol Ann Gittens, Ph.D., is currently the Interim Dean for the School of Education and Counseling Psychology (SECP) at Santa Clara University, where previously she had served as Associate Dean of Arts and Sciences and before that as Director of University Assessment. Dr. Gittens is an educational assessment mentor and accreditation evaluator for the WASC Senior College and University Commission (WSCUC), a Board of Institutional Reviewers member of the California Commission on Teacher Credentialing (CTC), and a senior research associate with Insight Assessment, LLC. The central focus of Dr. Gittens’ research is on the interface of critical thinking, motivation, mathematical reasoning, and academic achievement of adolescents and young adults from diverse cultural and ethnic backgrounds. She is an author or co-author on numerous articles, assessment instruments, and teaching tools focusing on critical thinking skills, numeracy, and dispositions in children and adults. Since 2014 Dr. Gittens, a tenured associate professor in Liberal Studies, has worked as an external program evaluator for a local non-profit that is committed to empowering families of the San Jose to break the cycle of poverty through earning basic necessities while skill building, contributing to their community, and strengthening family bonds. This project has provided research opportunities for a dozen undergraduate and graduate students over the past year. Her most frequently downloaded paper from academia.com is her 2015 paper “Assessing numeracy in the upper elementary and middle school years” Numeracy, Vol. 8: Issue. 1, Article 3.

Peter Facione, Ph.D., is a senior research associate with Insight Assessment and a principal at Measured Reasons LLC, a Los Angeles based research and consulting firm supporting excellence in strategic thinking and leadership decision making. In academia he served as Provost of Loyola University Chicago, Dean of the College of Arts and Sciences at Santa Clara University, and Dean of the School of Human Development and Community Service at California State University Fullerton, and chair of Philosophy at Bowling Green State University. In private business Dr. Facione was a strategic consultant with Stratus-Heery International and is a managing partner and CFO of the California Academic Press. Dr. Facione’s consulting work has included long term and short term projects for several branches of the US military, various NGOs and government agencies, professional associations, national labs, and public and private universities and colleges throughout the US and around the world. With Carol Gittens he is coauthor of THINK Critically, published by Pearson Education. His book, Thinking and Reasoning in Human Decision Making, coauthored with Dr. Noreen Facione, addresses human decision making in contexts of risk and uncertainty by offering a cross-disciplinary method of argument and decision analysis. Their book, Critical Thinking and Clinical Reasoning in the Health Sciences, is an international teaching anthology presenting effective strategies for training critical thinking and clinical judgment. Dr. Facione maintains an active speaking, writing, consulting and research agenda, with well over 200 publications including essays, books, articles,
case studies, and educational testing tools which are used around the world. These include the California Critical Thinking Skills Test, the California Critical Thinking Disposition Inventory, the Health Sciences Reasoning Test, the Business Critical Thinking Skills Test, the Legal Studies Reasoning Profile, the Military & Defense Critical Thinking Inventory, and the Holistic Critical Thinking Scoring Rubric.

As published in Inquiry, this article included 19 of the original 20 maps. We have added the twentieth here. It appears on the following two pages.

Map 20 is an analysis of the written explanation presented by former California Governor Schwarzenegger for his decision not to commute the death penalty sentence of Mr. Stanley Williams. The array of counter-arguments and abandoned lines of reasoning in that explanation are evident in the map, as are the many arguments and assumptions the governor relied upon.

Maps 19 and 20 use colors in addition to shapes. Orange for claims and intermediate conclusions, green for final conclusions, red for abandoned lines of reasoning, etc. The shapes are sufficient, but the colors can be useful in complex maps when seeking an overview of the reasoning.
Map 20 - Governor Schwarzenegger's Decision to Deny Clemency
Appeal of Stanley Williams

IMPLIES: Innocent men should not be executed.

He says that he is innocent.

Eyewitnesses say that he was the shooter.

But he is guilty.

He won't apologize for the murders.

Without an apology and atonement there can be no redemption.

Abandoned Argument

He says that his reasons for why he won't apologize is because he is innocent.

Abandoned Argument

He says that he is redeemed.

At least one of these books celebrates a violent man (George Jackson) who killed law enforcement officers.

For ten years he has tried to preach a message of gang avoidance and peacemaking.

He's written books. He's been nominated for the Nobel Peace Prize. He has an award from the president.

It's hard to see the effects of this effort because gangs are still pervasive.

He has argued that his trial was not fair.

There were a lot of these appeals, all of which support the claim that his trial was fair.

Grant Clemency

IMPLIES: Maybe he should be granted clemency.

If he had an unfair trial or appeal process, this would be a reason for clemency.
He has been allowed to include new evidence in his appeals.

No court reversed his guilty verdict.

The jury found him guilty.

An innocent man would not have tried to escape.

He told others (prisoners and codefendants) that he had done the murders.

But I cannot separate an evaluation of redemption from the issue of innocence.

So he is not redeemed.

His appeal for clemency is not based on a claim of innocence.

So this is no basis for clemency.

The inclusion of George Jackson’s name in the dedication of his book is a significant indicator that he still sees violence and lawlessness as legitimate.

He has had the full rightful appeal process, and in each case the verdict was upheld.

So he is guilty.

He cofounded the Crips and this gang continues to do violence.

He planned an escape where there would have been likely deaths of law enforcement officers.

The murders were brutal (IMPLIED: and seem to warrant the death penalty).

DENY CLEMENCY
Stanley Williams was executed in December 2005 at San Quentin Prison in California.