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### Commentary on Gratton

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Battersby, Mark, "Commentary on Gratton" (2003). *OSSA Conference Archive*. 34.  
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Commentary on: C. Gratton's "Using Counterexamples to Estimate Degrees of Support"

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Claude Gratton's paper is a stimulating effort to provide a model of everyday reasoning that would give precision and clarity to the notion of argument sufficiency and "degree of support." His distinction between differing uses of the idea of counter examples is clear and useful.

Before assessing any model we need to ask what the model is supposed to do. Is the goal to develop a mathematical perhaps even algorithmic process that can replace informal reasoning? E.g. formal logic. Or are we developing a simplified model that can help in by illustrating a normative ideal? E.g. syllogisms. Is the model an empirical model which attempts to reveal how people actually reason? E.g. fuzzy logic. Or is it perhaps a kind of heuristic that while not being algorithmic can guide and improve our reasoning. The advice to consider counter examples and competing considerations generally when deliberating is perhaps just such a heuristic. I am not clear which of these goals (or others) Gratton is pursuing so it makes it difficult to make a fair assessment of his project.

I should confess to a general reservation about the role that formalism can play in helping us understand real world argumentation. I am mindful of Toulmin's observations of the danger of conflating reasoning to rationality or calculating. I believe that we are here at a conference on informal logic in part because we recognize the limits of formal logic as a working model of argumentation. To cite a few of the well known problems: the understanding of formal logic appears not to ensure more rational argumentation in practice, formal logic appears not to capture the complexity of counter balancing pro and con considerations, and attempting to use formal logic to adjudicate arguments tends to relocate issues concerning arguments to issues about translation. Of course, just because formal logic fails to provide a useful model for everyday argumentation we cannot exclude the possibility that some other formalism would be helpful. But my bias is to be suspicious of such approaches.

Gratton acknowledges that formal validity does not provide an appropriate model for everyday arguments since "the premises of most everyday arguments are not intended to provide conclusive support." Given that the arguments of everyday are not intended to be deductive, and regardless of what kind of model we are seeking, I have considerable reservations about Gratton approach of starting with deduction and then trying to adapt it to more accurately represent everyday argumentation. While we all know that theories can be "saved" with sufficient ad hoc modifications, at a certain point of awkwardness, the reasonable move is to bring in a different model. I am reminded of the effort to save the phlogiston theory of combustion in the light of Lavoisier's experiments by suggesting that perhaps phlogiston has negative mass.

That said probability theory does seem like a natural place to look for a formalized model for at least **some** non-deductive arguments. Though again what work

such a model would do is open to question. The benefit of using probability theory it that it appears to provide a means to express precise judgments about the likelihood that a proposition is true. But there are many problems with applying probability theory to everyday arguments. Starting with the logical positivists, numerous attempts have been made to utilize probability theory to provide a model of the logic of induction. I think that at this point, it is acknowledged that while probability theory might have some relevance to understanding, for example, scientific reasoning, it is certainly not a sufficient model. For one thing science and *a fortiori* everyday reasoning is too messy to be captured by such formalism. In addition there is a serious problem, not addressed by Gratton, of determining what probabilistic values to assign to premises. There is a notorious and surprisingly often acrimonious debate between those known as Bayesians who think probability can or should be thought of as statements about our state of knowledge or ignorance and frequentists or objectivists who believe that probability should be thought of as a way of expressing long run tendencies. This is hardly the place to engage this debate, but let me illustrate its significance.

If we are going to assign a probability to the claim that Santa Claus may not be studious enough to pass the course, we have to ask how we are going to establish that probability. Will it be from studies of rates of lack of studiousness among students generally? Or from a subjective judgment about Santa Claus in particular? There is likely to be quite a difference. Young students are often distracted by social and hormonal pressures that undermine their studiousness, whereas Santa Claus has reputation for on-time delivery that is quite impressive and that suggests maturity and diligence of the highest sort. Unless we have a credible basis for assigning probability, the numeric assignments that we use will create an illusory sense of precision.

Let me turn now to the details of Gratton's theory. Gratton invites us to suggest an alternative name for his approach and I am tempted to suggest it be called the "Murphy's' Law method of argument evaluation." His procedure is to take an argument for the likelihood of a claim and consider all the things that could go wrong and render the claim false despite the initial premise(s) being true.

One aspect of his approach that troubled me was the limited example types that he offered. I am reminded of Wittgenstein's admonition that philosophers don't use enough examples. An obvious problem is that many arguments, perhaps most everyday arguments, have "should" conclusions. It would appear to make no sense to assign probabilities to a person's right to privacy, or to the claim that regime change should not be the basis for the use of American military power. Take the following argument:

- P1 Marijuana is a relatively harmless recreational drug.
- P2 Marijuana use is widespread especially among young people.
- P3 Leaving marijuana criminalized brings the law into disrepute.
- P4 Prosecuting marijuana use uses scarce policing resources.

Therefore: marijuana use should be de-criminalized.

Counter considerations to such a conclusion involve such what-if claims that decriminalization would mean 1. increased use, 2. increased "stoned driving," 3. irritating the United States, 4. legalization, and 5. the legitimization of recreational drug use...

While counter claims 1- 4 are more or less factual, the amount of weight that should be given them as counter examples is a normative not factual or probability issue. Even if it was a 100% certain that the US government would be irritated by Canada de-criminalizing marijuana, many of us would give that fact little or no weight, while others might give it considerable weight. The problem with the model as a basis for expressing the sufficiency of non-factual arguments is that it fails to provide a means for quantifying the role of values and norms in such an argument. Which is not to say that any quantitative type of metaphor (e.g. weight) is not a useful way of talking about balancing pro and con considerations. Probability is simply not a sufficient and not an appropriate metaphor. In addition any quantitative metaphors need to be recognized as metaphoric and not be assigned illusorily precise numbers.

Turning to the application of Gratton's theory to specifically factual arguments. There is no question that when making predictions we are well advised to consider what can go wrong. We are also well advised to note that the probability that an event which is dependent on numerous other events, e.g. completing a course, writing a book, repairing a house, is subject to the conjunctive law of probability. But using only counter examples to assess sufficiency unduly limits what can be done with a probabilistic model of argumentation. Probability theory could also be used to provide an account of how additional information i.e. more facts about Santa Claus could be used to increase the likelihood of the conclusion. What if Santa Claus had already passed a very similar course, or had a strikingly high IQ? As mentioned, the fact that he is a mature student should increase his chance of success from the baseline of students generally. By only using probability theory for counter examples, Gratton ignores the role that it could play in modeling how increasing information changes the likelihood of a conclusion.

But there is a deeper problem. There is the question not only of how likely it is that a student will get sick, but also of how much getting sick makes it likely she will fail. There is the probability of the counter-example and then the conditional probability that the counter will defeat the conclusion. Gratton appears to avoid this problem by treating counter examples as assertions of the absence of necessary conditions. E.g. His first what if is "What if at least one student will be sick too often to do all the necessary work to pass" But not all his counter examples express the absence of necessary conditions. He uses the claim "what if at least one student has personal problems that very seriously interferes with his/her academic performance" as another counter example. Even if a student does experience such problems they may still be bright enough or lucky enough to pass. Avoiding serious personal problems does not seem to be a necessary condition for passing. If we are trying to model everyday inductive reasoning, we need to recognize that there are two probabilities involved in every assertion of a counter example or counter consideration. There is both likelihood of the (counter) event occurring and the likelihood, given the event occurring that the conclusion would be false. Taking an example with only one counter:

$$\Pr(-C) = \Pr(CE) * \Pr(-C/CE) \quad \text{only if } \Pr(-C/CE) \text{ is } 1 \text{ is } \Pr(-C) = \Pr(CE)$$

There is an obvious amendment that Gratton could make to his theory and simply make it a condition of any what-if statement of a counter example must assert the absence

of a necessary condition for the conclusion. But such an amendment would make the model less like a model of everyday reasoning.

Another difficulty, as Gratton admits is the assignment of probability values. If we wish to use this model to actually calculate degrees of support we need some real numbers. The research of Kahnman and Tversky and others suggests that people are notoriously bad at both subjective judgments of likelihood (e.g. getting SARS, having a fatal car accident) and equally bad at combining considerations to arrive at probabilistic conclusions. Kahnman and Tversky have found that the subjective impression of likelihood appears to be a function of either our ability to recall a similar event happening or our ability to create a story that makes the event seem possible. Assigning probabilistic values to counter claims appears likely to be quite inaccurate, but will create an air of precision.

I believe that the issue of illusory precision is important and in fact I am giving a paper in support of this claim at the conference. The problem is that numbers have the aura of precision that gives them, at least in this society, enormous rhetorical force. The misapplication of numeric precision presents great rhetorical danger to reasoned discourse. Use of numbers to describe what is not reliably measurable (e.g. subjective probability assignments) can create an air of such credibility where none is deserved.

Let me summarize.

1. Before assessing a model we need to know the purpose it is supposed to serve.
2. Everyday arguments are not well modeled by deductive arguments even deductive arguments amended to include probable counter examples.
3. Ethical arguments and practical reasoning cannot be modeled with probability assignments.
4. Using probability theory only for counter examples ignores the role that such a model could provide is modeling how additional information might increase the likelihood of a conclusion.
5. The probabilities assigned counter examples are only part of the story of degree of support. We need to ask also what the conditional probability that the conclusion will be false if the counter claim is true.  
and finally
6. The utility of a probabilistic model of argumentation is limited by the problem that the assignment of probabilities is complex and fraught with difficulties of subjectivity.

Clearly we can all agree with Gratton that considering counter examples or more generally counter considerations plays an important role reasoning and evaluating sufficiency of arguments. But whether probability theory can help us formalize this observation seems to me a very open question.