

# Precise Decision Language

## (Comment on Howard 2004)

James E. Smith

The Fuqua School of Business, Duke University, Durham, North Carolina 27708, jes9@mail.duke.edu

Howard (2004) proposes a “precise decision language” that aims to improve clarity of discussion and thought about decision making and decision modeling. While I applaud Howard’s goals, I think it is important that our language be consistent with the terminology currently used in the many fields related to decision analysis. On these grounds, I argue against some of Howard’s proposed changes.

*Key words:* clairvoyant; clarity; decision analysis; diagrams; distinctions; language; relevance; uncertainty

*History:* Received January 10, 2003. Accepted by Robert T. Clemen and Don N. Kleinmuntz on February 25, 2003, without revision. This comment was refereed.

---

Like Howard (2004), I believe it is important to use precise language in our field and that our language should be “plain speaking,” familiar, and fundamental. Precise language makes it easier for us to communicate with each other and easier for students, clients, and others to grasp the ideas of decision analysis. Howard proposes some “modest” changes to our language that he suggests “will make thinking and, therefore, teaching and consulting easier.”

While I agree that our language should be plain speaking, familiar, and fundamental, there is another desired feature of a language that Howard pays relatively little attention to: It is important for a language to be *shared*. If we, as decision analysts, are to communicate effectively with each other, it is important that we use a common language. Moreover, because decision analysis draws on and interacts with so many other fields—including economics, statistics, and engineering—that share many of the same concepts, it would be a mistake for us to use different terminology for these shared concepts. Students or clients exposed to teachers and/or consultants using different words for the same ideas are likely to be confused. As researchers, if we use unusual language for standard concepts, we are likely to isolate ourselves and reduce the impact of our ideas.

As one of Howard’s former students, I have watched his language develop and evolve over the last 18 years and I have tried elements of his language in the classroom from time to time. I must say that I do not find that Howard’s proposed changes to be modest. When reading a paper written by Howard or one of his recent students, I find the language quite distinctive and hard to follow without mentally translating to terms that are more familiar to me. I imagine that others in decision analysis or related fields who have followed these developments less closely would have an even harder time making the translation.

I will now turn to comments on some of Howard’s specific proposals; these comments are listed in order of appearance of the terms in Howard’s article. A few general concluding comments appear at the end.

**Personal Indifferent Selling/Buying Price (PISP).** I am surprised that Howard includes “personal” as a modifier for buying or selling prices. The argument that Howard makes for dropping the *subjective* in *subjective probability* seems to apply equally well here. Like probabilities, all indifference prices are personal and belong to the person who asserts indifference. This person may be working on behalf of a corporation, but as with probabilities, a person is making the judgment. I fully support omitting the *subjective*

from *subjective probability* but do not support adding *personal* to buying or selling prices.

**Distinction.** Howard's use of the term *distinction* strikes me as awkward. I think of a distinction as the difference(s) between two or more objects or categories, whereas Howard uses the term to describe a characteristic or set of categories. In Howard's terminology, the weight of a table is a distinction. I think of a distinction, for example, between a "heavy table" and "light table" as being whether it weighs more or less than 100 pounds.

Most places Howard uses the term *distinction* I would instead refer to an *uncertainty*. I think of and speak of *outcomes of an uncertainty* or *possibilities* rather than degrees of a distinction. I call a full path through a possibility tree a *scenario* rather than a *possibility*. I find this old language to be both more familiar and more descriptive.

**Measure.** Howard proposes using the term *measure* to replace *random variable*. I find this proposed change confusing because *measure* is already used for quite different things in closely related areas. I am most concerned about confusion with *measure theory*, which provides the mathematical underpinnings for modern probability theory. A probability distribution is a measure in this literature. In addition, there is *measurement theory* (see, e.g., Krantz et al. 1971) which relates to the measurement or assessment of preferences. The term *measure* fits these other contexts equally well and, given that the terminology is already established there, it would seem a mistake to replace *random variable* with *measure*.

I understand the confusion about the term *random variable*. If you think carefully about its formal definition, you find that a random variable is not random and not a variable—it is a real-valued function assigning numbers to elements of the sample space. However, for practical purposes, I think the term works pretty well: It describes a variable whose value is randomly determined. I sometimes refer to random variables as *uncertain quantities*, but *variable* suggests a placeholder (like a cell on a spreadsheet) whose value is randomly determined. The term *measure*, in addition to being overloaded already, does not capture this sense of uncertainty.

**Relevance vs. Dependence.** Like Howard, I have seen students struggle with the notion of dependence. However, I am not convinced that using the term *relevance* in its place helps. Yes, it sounds funny to say that the event *rain* depends on *people carrying umbrellas*, but it sounds just as funny to say *people carrying umbrellas* is relevant to *rain*.

When teaching the concept of dependence, I emphasize that the issue is whether the probabilities that you assign to rain would change if you knew whether people are carrying umbrellas or not. Thus it is the probabilities that depend, not the rain itself. With this interpretation, the causal association with the word *depend* is appropriate: If I knew people were carrying umbrellas, it would cause me to change my probabilities for rain. Relevance seems to work equally well, provided you think about the information being relevant to the probabilities associated with events. The key is to focus on the probabilities rather than the events. To emphasize the point that it is the probabilities that are dependent, we might call the concept *probabilistic dependence* rather than just *dependence*.

**Options.** Howard defines an option "as an alternative that provides a new decision situation after the revelation of information." I prefer to refer to the new decision situation itself (i.e., the downstream decision) as the option rather than the alternative that provides this situation. I believe this use of the term is more in keeping with conventional usage: We speak of option clauses in contracts, but we don't refer to the whole contract as an option. Similarly, we talk about "keeping our options open" and say "if this happens, you will have the option to . . ." This terminology seems quite natural and helpful, but is not consistent with Howard's definition.

**E-Values.** My strongest negative reactions are to the use of the terms *e-value* and *u-value*. While I understand the desire to move away from confusing terminology, this new terminology suggests nothing to the uninitiated listener. It seems very likely to be so "unfamiliar that it would interrupt the smooth flow of conversation." The initiated have the *e* and *u* as hooks to the old words—expected value and utility—but the uninitiated have nothing to help them remember what these words mean.

Howard dislikes the phrase *expected value* because it “has a misunderstanding built into it, a misunderstanding that analysts avoid only by their education.” A more plain-speaking term might be *probability-weighted average*. While *probability-weighted average*, like *e-value*, sounds technical, it describes exactly how these values are determined.

Personally, I don’t mind the term *expected value*. In everyday language, there is a sense of uncertainty associated with the term *expect*. For example, “I expect to be there at 6 PM” suggests some uncertainty about my arrival time, certainly more than “I will be there at 6 PM.” In everyday use, the *expected value* serves as a focal event or value when there is uncertainty. In some situations, the most likely outcome might be chosen for such a focal point but when beliefs are diffuse, the probability-weighted average—as the center of mass of beliefs—seems a more natural focal point for expectations. When talking with uninitiated audiences, I find myself defining *expected value* as the probability-weighted average the first time or two I use it. I’ve never encountered objections to using the term *expected value* in this way.

The long-run average interpretation of *expected values*—averages of repeated gambles tend towards their *expected value*—provides another reason to *expect* the *expected value* in the context of repeated gambles. This interpretation is helpful in some contexts, but I don’t think it is necessary to justify the use of the term *expected value* in the many other contexts where the idea is helpful.

**U-Value.** Howard’s concern with the word *utility* is the conflict with economists’ use of the term. I do not understand or share this concern. I find previous knowledge of the term helpful, even if the notion of utility applicable under uncertainty is more

restrictive than under certainty (i.e., utility functions under uncertainty are unique up to linear transformations rather than monotonic transformations). I do not understand what Howard means when he says that our notion of utility cannot be interpreted as a measure of happiness or satisfaction associated with money. To me, this is precisely what a *utility* is and the use of the term in economics is quite close to the use in decision analysis.

**Concluding Comments.** As I said at the beginning of my remarks, I agree that it is important to use precise language in our field and agree that our language should be plain speaking, familiar, and fundamental. In the cases discussed above, I disagree with some of Howard’s assessments of the effectiveness of the new language and/or the weakness of the old along these dimensions. For the reasons outlined earlier, I think we should be deferential to the established language; in each of the cases above I find myself preferring the old language to the new.

Even if I don’t agree with all of Howard’s proposed changes, considering them is helpful. As teachers, it is important to appreciate the potential misunderstandings associated with our language. Moreover, it is always helpful to have carefully thought out synonyms that we can use when introducing new terminology. For these reasons, I am grateful for Howard’s article and the opportunity to discuss these issues.

## References

- Howard, Ronald A. 2004. Speaking of decisions: Precise decision language. *Decision Anal.* 1(2) 71–78.
- Krantz, D. H., R. D. Luce, P. Suppes, A. Tversky. 1971. *Foundations of Measurement*. Academic Press, New York.