Value Maps in Applied Ethics

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Abstract. This paper describes the role in applied ethics of a new method of representing values using cognitive-affective maps. Value mapping has been used in two undergraduate courses in medical ethics and in environmental ethics. Students have found the method easy to use and also informative concerning the nature of ethical conflicts, and they often change their minds in the course of developing value maps.

Introduction

Crucial ethical issues arise in many applied fields, including medicine, business, law, and the environment. Such issues often involve conflicting values, for example concerning cost, effectiveness, and personal autonomy in medical treatments. Resolving ethical conflicts requires an understanding of alternative viewpoints, not just the set of values that seem obvious to one person. How can people comprehend systems of values possessed by themselves and by others?

This paper describes the role in applied ethics of a new method of representing values, using *cognitive-affective maps* (Thagard, 2010a). This method has already been used to illuminate issues in politics, culture, critical thinking, international relations, and values in science (Thagard, 2011a, 2011b, 2012a, 2012b; Thagard, forthcoming; Thagard and Findlay, in press; Homer-Dixon et al., forthcoming; Milkoreit, forthcoming). The relevance of value mapping to ethics is shown by its successful use in two undergraduate courses in medical ethics and in environmental ethics. Because "cognitive-affective" is a mouthful for undergraduates, I use the term "value maps" for the same method.

This paper begins by describing the method of value maps and its use in teaching courses in applied ethics. Students have found the method easy to use and also informative concerning the nature of ethical conflicts, and they often change their minds in the course of using value maps. I will provide illustrations of value maps produced by the students themselves, and discuss the uses of value maps for research in applied ethics as well as teaching.

Value Maps

Researchers in psychology, computer science, political science and other fields have long used the technique of *cognitive maps* (conceptual graphs, concept maps, or mind maps) to represent the conceptual structures that people use to represent important aspects of the world (e.g. Axelrod 1976, Novak 1998, Sowa 1999). Such maps fail, however, to indicate the values attached to concepts and other representations such as goals, and therefore are inadequate to capture the structure of ethical conflicts. Value maps are affective as well as cognitive, in that they included representations of emotional values associated with the represented concepts, goals, and propositions.

A cognitive-affective map (CAM) is a visual representation of the emotional values of a group of interconnected concepts. It employs the following conventions:

1. Ovals represent emotionally positive (pleasurable) elements.
2. Hexagons represent emotionally negative (painful) elements.
3. Rectangles represent elements that are neutral or carry both positive and negative aspects.
4. The thickness of the lines in the shape represents the relative strength of the positive or negative value associated with it.

5. Solid lines represent the relations between elements that are mutually supportive.
6. Dashed lines represent the relations between elements that are incompatible with each other.
7. The thickness of the lines in the connection represents the strength of the positive or negative relation.

When color is available, CAMs conventionally represent positive elements by green ovals (go), negative ones by red hexagons (stop) , and neutral ones by yellow rectangles. Figure 1 schematizes this kind of representation. A software program called Empathica is available that makes drawing CAMs efficient and fun: http://cogsci.uwaterloo.ca/empathica.html. The name of this program reflects the aim of increasing mutual empathy between conflicting parties through depiction of the value maps of the people involved.

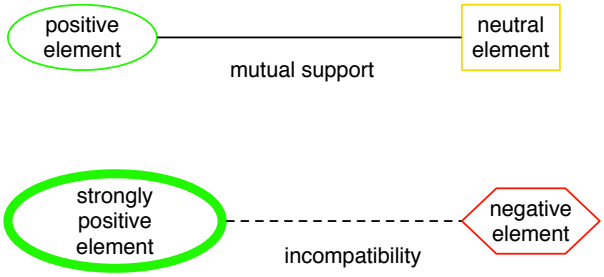

Figure 1. Schema for a cognitive-affective map. Use of color is optional depending on the medium used.

A CAM can be drawn by following these steps:

1. Identify the main concepts, beliefs, goals, and emotions of the person being modeled.
2. Identify these elements as emotionally positive or negative, and accordingly represent them by ovals or hexagons.

3. Identify relations between elements that are either complementary (solid lines) or conflicting (dashed lines).
4. Show the resulting map to other people to see if it captures their understandings of the person and situation.

We can now apply this technique to ethical conflicts.

Figures 2 and 3 are value maps of opposing views concerning whether people should be vegetarians. Figure 2 is my reconstruction of the system of values that lead some people to avoid eating meat, and figure 3 shows the more conventional view that eating meat is fine. These examples illustrate how value maps can serve to (1) display sets of values, (2) show the interconnections within sets of values, and (3) display the similarities and differences between different systems of values. The positive values (green ovals) that support being a vegetarian include sustainable environment, cost, health, and animal welfare. In contrast, the positive values opposing being a vegetarian include taste, time, freedom, and nutrients.

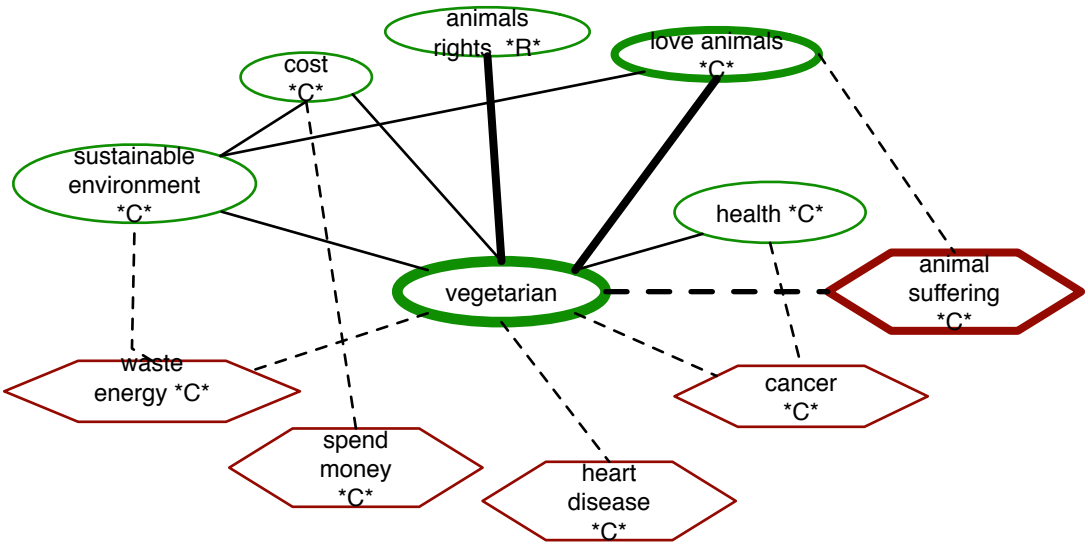

Figure 2. Value map of some vegetarians. In this and all succeeding maps, green ovals are positive values, red hexagons are negative values, solid lines are support links, and dotted lines are conflict links. The *C* indicates the value stated is a matter of consequences, and the *R* indicates that the value is a matter of rights or duties, in accord with standard ethical theories. Use of the C and R markers is not a feature of value maps, but was included for the student assignments described below.

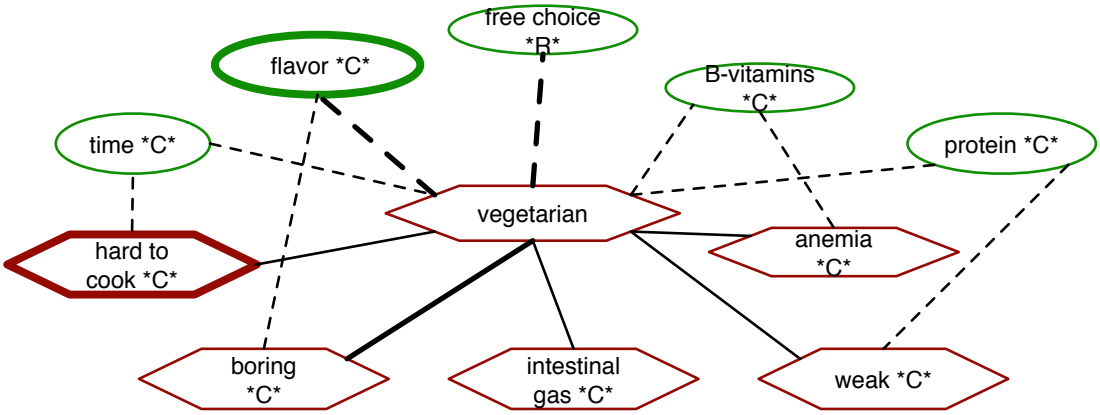

Figure 3. Value map of some non-vegetarians, in which vegetarian has a negative value.

Teaching

I have used value maps in two courses at the University of Waterloo: Environmental Ethics in 2011 and Biomedical Ethics in 2012. To evaluate their effectiveness, I asked students these questions:

A. How helpful did you find value maps (assignments 1-3) for increasing your understanding of ethical issues concerning the environment [medicine]?

1 (not at all) ___ 2 (not much) ___ 3 (somewhat) ___ 4 (a lot)___ 5 (very) ___

B. Did constructing value maps increase your understanding of views different from your own, and if so, to what extent?

1 (not at all) ___ 2 (little) ___ 3 (somewhat) ___ 4 (a lot)___ 5 (very much) ___

C. In the three assignments, how many times did you change your mind about the ethical issue as a result of doing the value maps?

0 ___ 1 ___ 2 ___ 3 ___

D. Should value maps be used in future classes in environmental [medical] ethics?

1 (strongly disagree) ___ 2 (moderately disagree) ___ 3 (neutral) ___

4 (moderately agree) ___ 5 (strongly agree) ___

The means of their responses are shown in table 1.

	A	B	C	D
Environmental (74 responses)	3.93	3.85	1.08	4.24
Medical (116 responses)	3.92	3.84	1.13	4.31

Table 1. Mean responses to questions A-D in two courses in environmental and medical ethics.

From their responses to questions A, B, and D, we can conclude that students think that CAMs are a valuable technique for teaching applied ethics. The responses to question C show that many students changed their minds while thinking through the issues using value maps, on the average of 1 time in the 3 mapping assignments. I was encouraged that more than 80% of the students said they changed their minds at least once during the course of the 3 assignments. Students were not required to use the Empathica program to produce value maps, which they could alternatively do by hand or by any computer

drawing program they liked. However, the number of Empathica users increased steadily during each course, with around 75% using it by the end of the 2012 course.

For the final assignment of the 2012 course, the students were given the following instructions, which I made more and more explicit as it became apparent what mistakes students were likely to make.

Each map (maximum 1/2 page) must include:

1. A node for the topic, e.g INJECTION SITES, ELECTRONIC RECORDS. This will be positive in the yes map and negative in the no map. Do not include an opposite of this node.
2. At least 5 positive concepts, represented by ovals.
3. At least 5 negative concepts, represented by hexagons.
4. Marker of *C* for consequences or *R* for rights for all positive and negative concepts.
5. At least one concept marked *C* and at least one marked *R*.
6. At least 3 positive support links between concepts, represented by straight lines.
7. At least 2 negative conflict links between concepts, represented by dotted lines.
8. Green circles and red hexagons, if you use colour (optional).
9. Support for a positive concept (oval) by complimenting it (solid line) with other positive elements.
10. Support for a positive concept (oval) by having it conflict (dotted line) with a negative concept (hexagon).
11. Counter-support against negative elements (hexagon) by solid lines to other negative elements or dotted lines to positive elements.

12. Indicate at least one very important support and one very important conflict by using THICK lines. Do not use all thick lines.
13. Indicate at least two nodes as very important by making the oval or hexagon thick. Do not use all thick lines.

To eliminate errors that students sometimes made, they were warned *not* to:

1. Have any nodes that include the following words: for, against, pro, con, right, wrong, no, non, morally.
2. Confuse emotionally positive and negative concepts, or complimentary and conflicting links.
3. Have the same node both positive and negative (ambivalent).
4. Have nodes that are completely unconnected to other nodes.
5. Have connections that don't make sense, e.g. having LOVE OF ANIMALS linked supportively with ANIMAL SUFFERING.
6. Present both the pro and con side in the same map.

The vast majority of students caught on quickly to these instructions, and the resulting marks were high. Now let us look at some of the examples that the students produced.

Medical Ethics

Over three assignments, the students were given the following topics from which to choose.

1. Is doctor-assisted suicide morally right? Yes or no.
2. Is male circumcision morally right? Yes or no.
3. Are publicly funded drug injection sites morally right? Yes or no.
4. Are electronic health records morally right? Yes or no.

5. Should grade 8 girls in Ontario be given the HPV vaccine? Yes or no.
6. Should doctors prescribe stimulant drugs such as Adderall to normal students to improve their academic performance? Yes or no.
7. Should it be mandatory that people in healthcare (doctors, nurses, paramedics) have influenza vaccinations? Yes or no.

Figures 4-7 provide medical examples of student-produced maps, all using Empathica.

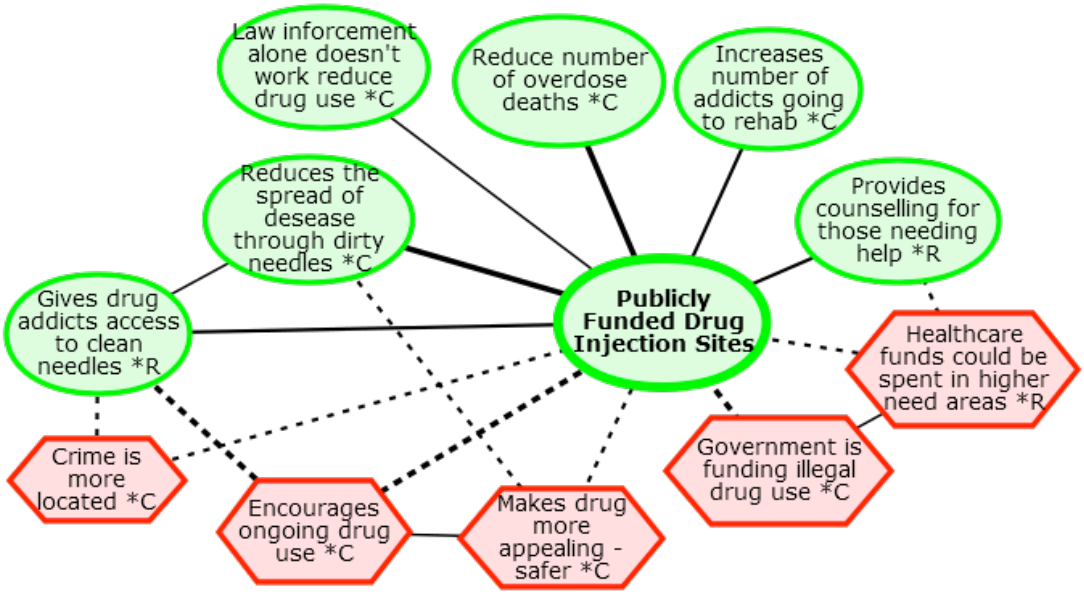

Figure 4. Student value map in favor of publicly funded drug injection sites. Courtesy of Samantha Ackman.

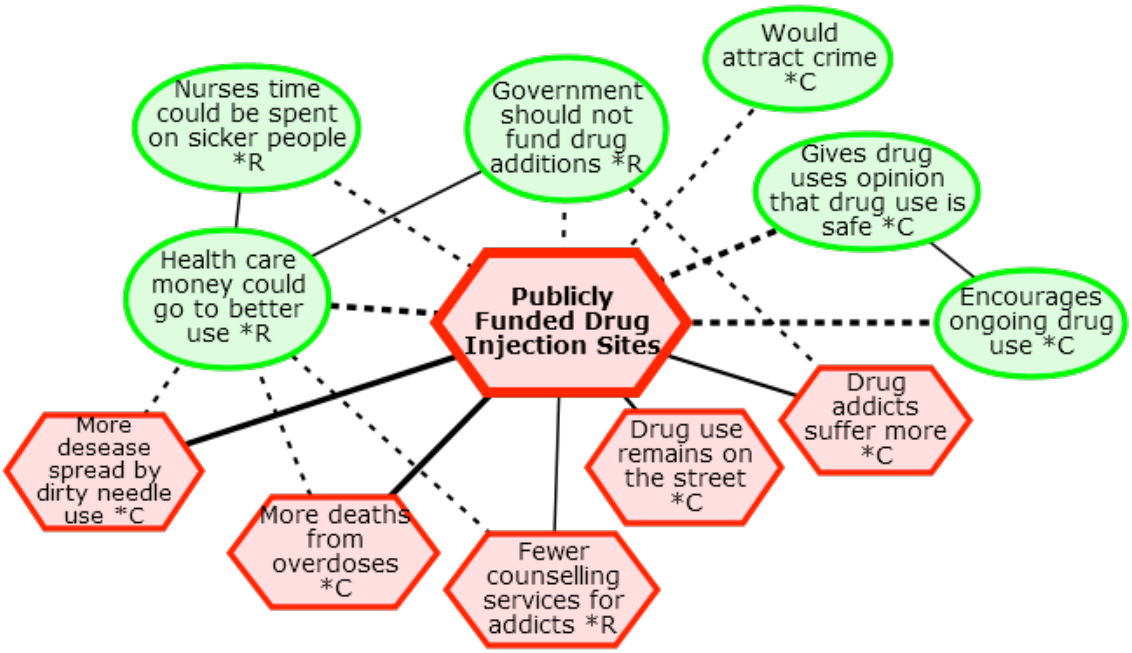

Figure 5. Student value map opposed to publicly funded drug injection sites. Courtesy of Samantha Ackman.

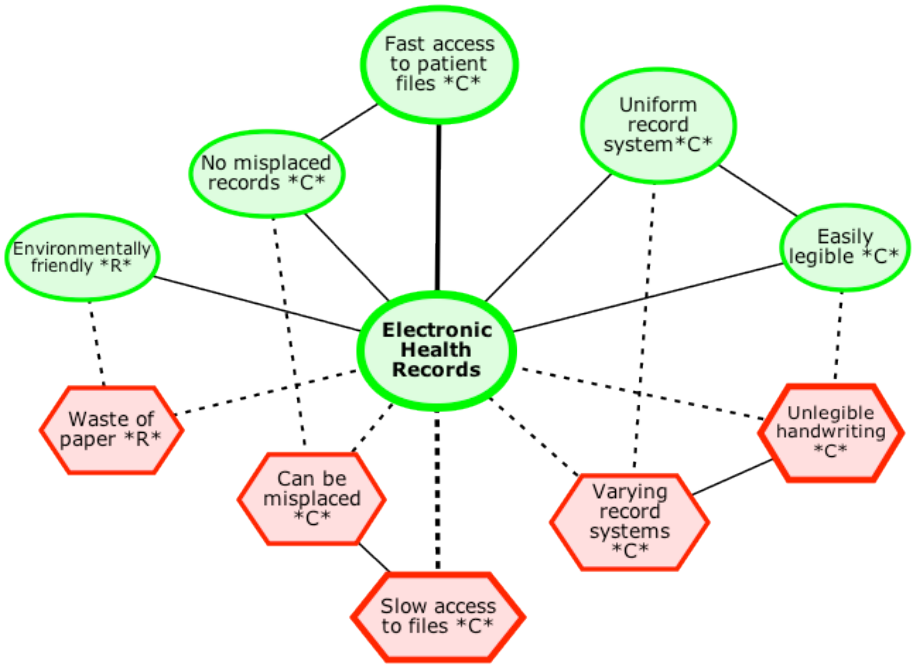

Figure 6. Student value map in favor of electronic health records. Courtesy of Linda Mackey.

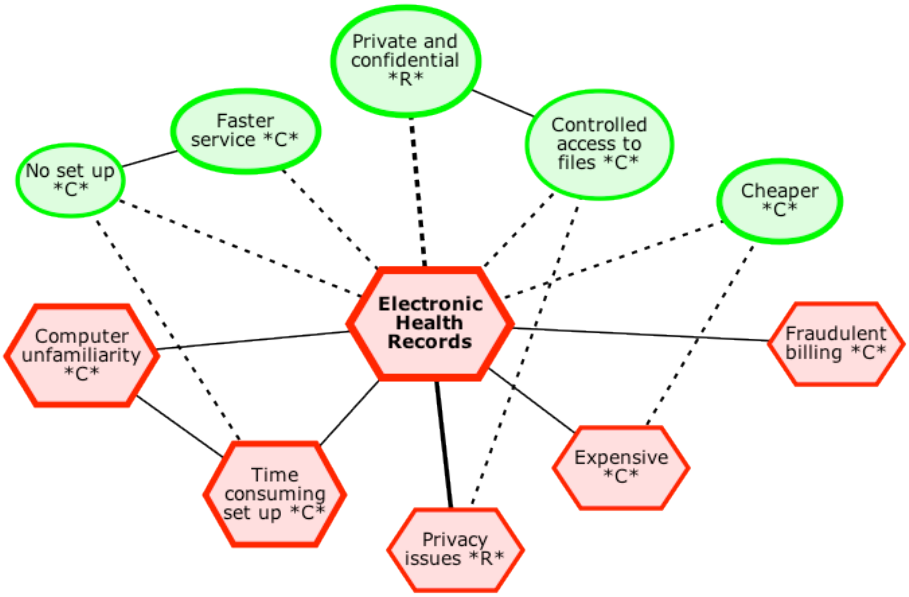

Figure 7. Student value map opposed to electronic health records. Courtesy of Linda Mackey.

Environmental Ethics

Over three assignments, students in environmental ethics were given the following topics from which to choose.

1. Is medical experimentation with non-human animals morally wrong? Yes or no?
2. Is the extinction of non-human animals morally wrong? Yes or no?
3. Is the use of genetically modified organisms morally wrong? Yes or no?
4. Is a carbon tax a morally right way to reduce the effects of climate change? Yes or no.
5. Is the Keystone XL pipeline a morally right way to export oil sands products? Yes or no.

6. Is hydraulic fracturing (fracking) a morally right way to increase energy production? Yes or no.
7. Are wind farms a morally right way to produce energy? Yes or no.

Figures 8-13 provide environmental examples of student-produced maps, all using Empathica. These were done in 2011 before I adopted the requirement that maps should mark all the values as involving consequences or rights.

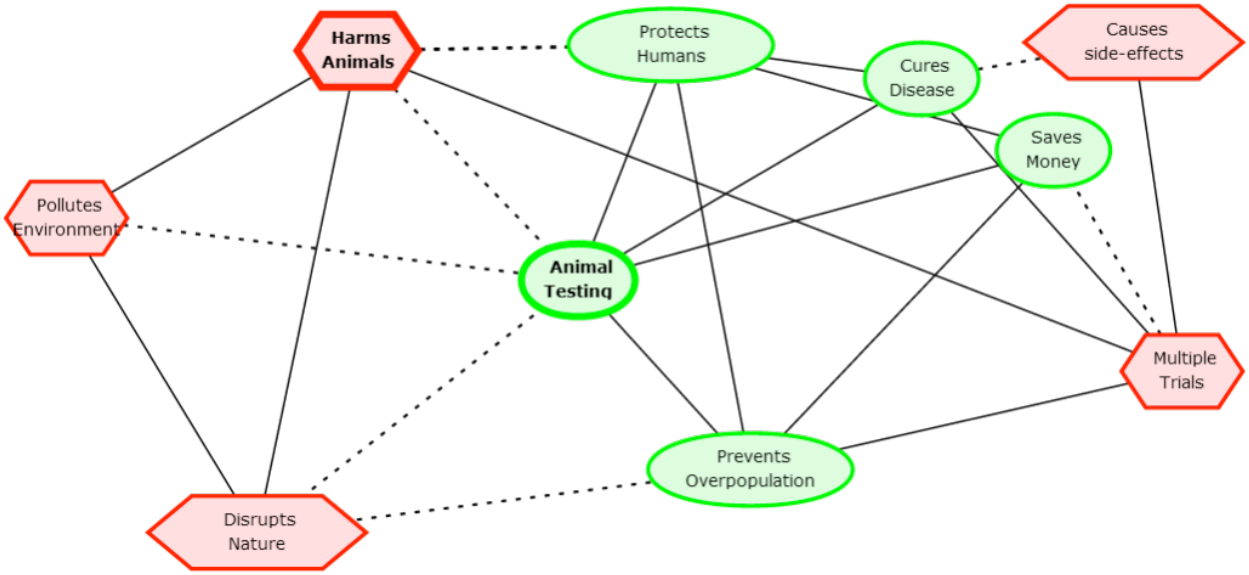

Figure 8. Student value map in favor of animal testing. Courtesy of Stephen Collins.

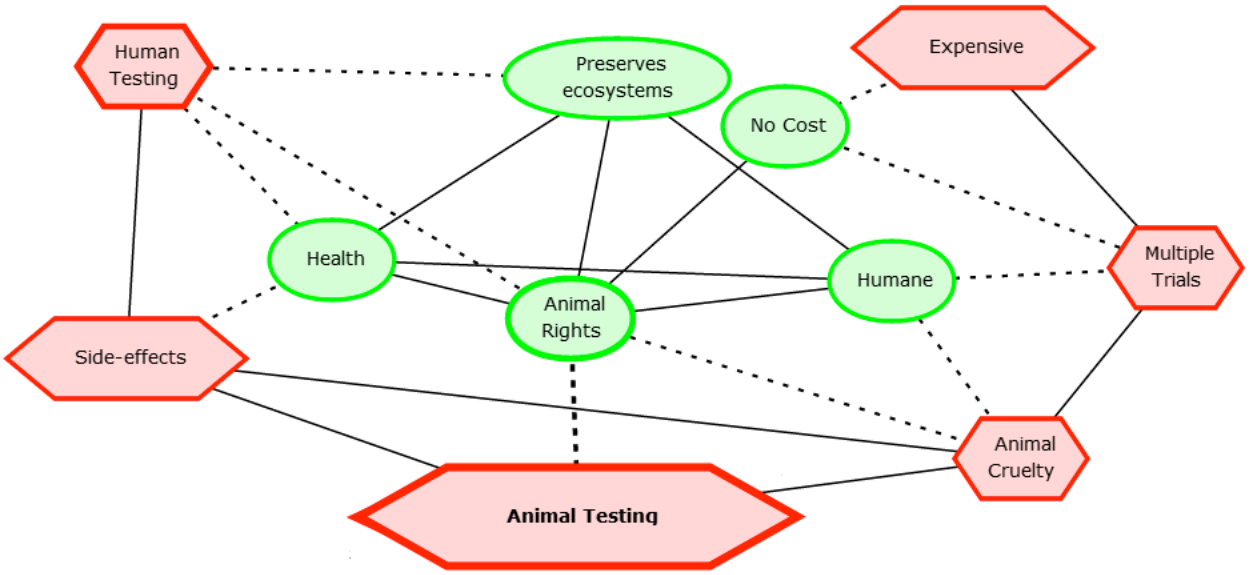

Figure 9. Student value opposed to animal testing. Courtesy of Stephen Collins.

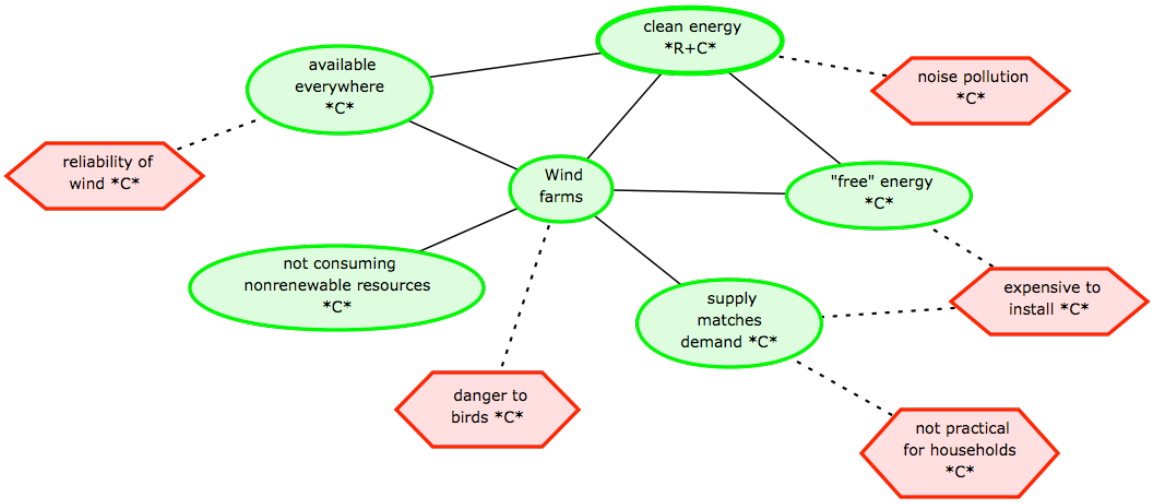

Figure 10. Student value map in favor of wind farms. Courtesy of Kaitlyn Vellenga.

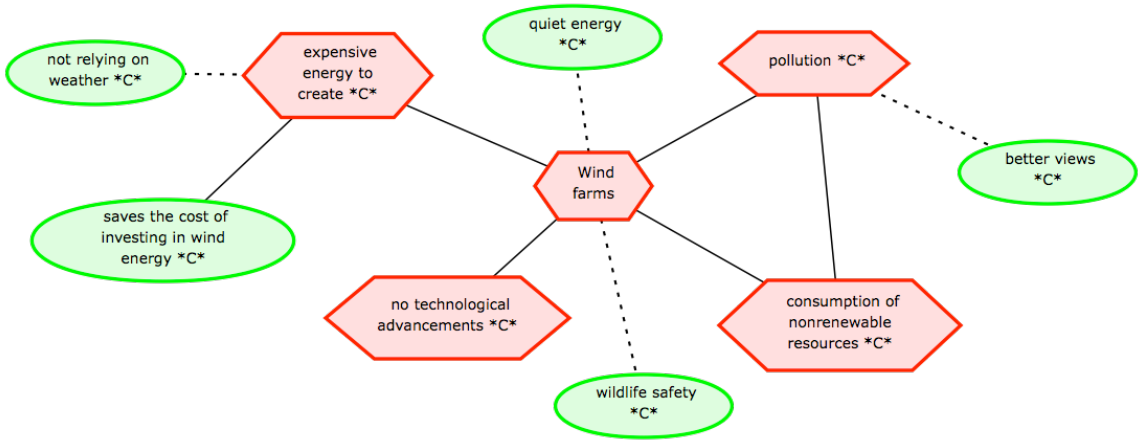

Figure 11. Student value map opposed to wind farms. Courtesy of Kaitlyn Vellenga.

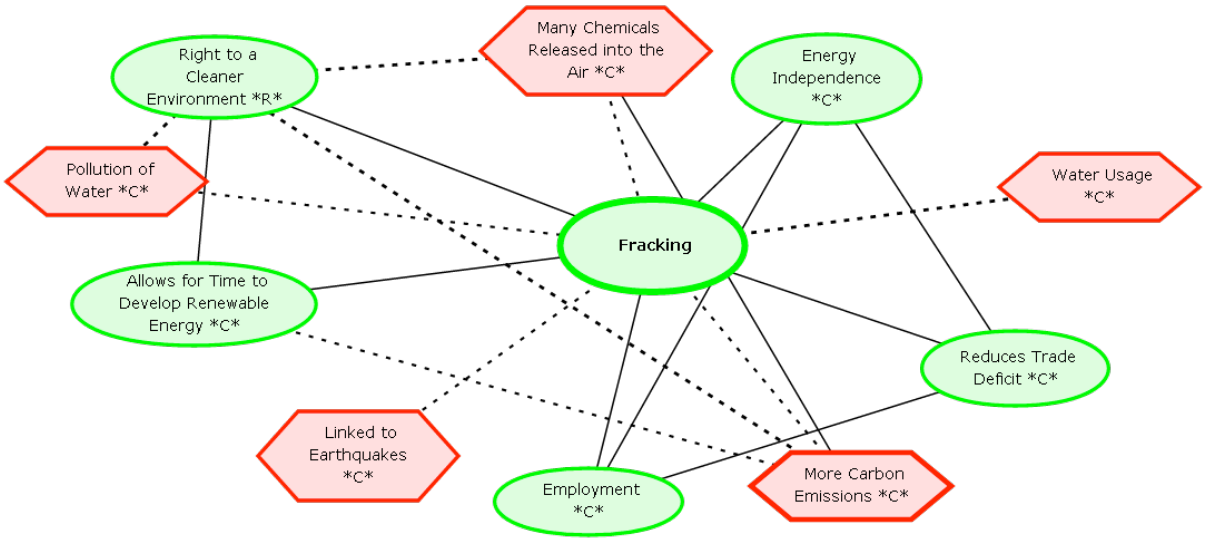

Figure 12. Student value map in favor of fracking (hydraulic fracturing). Courtesy of Savannah Ostrowski.

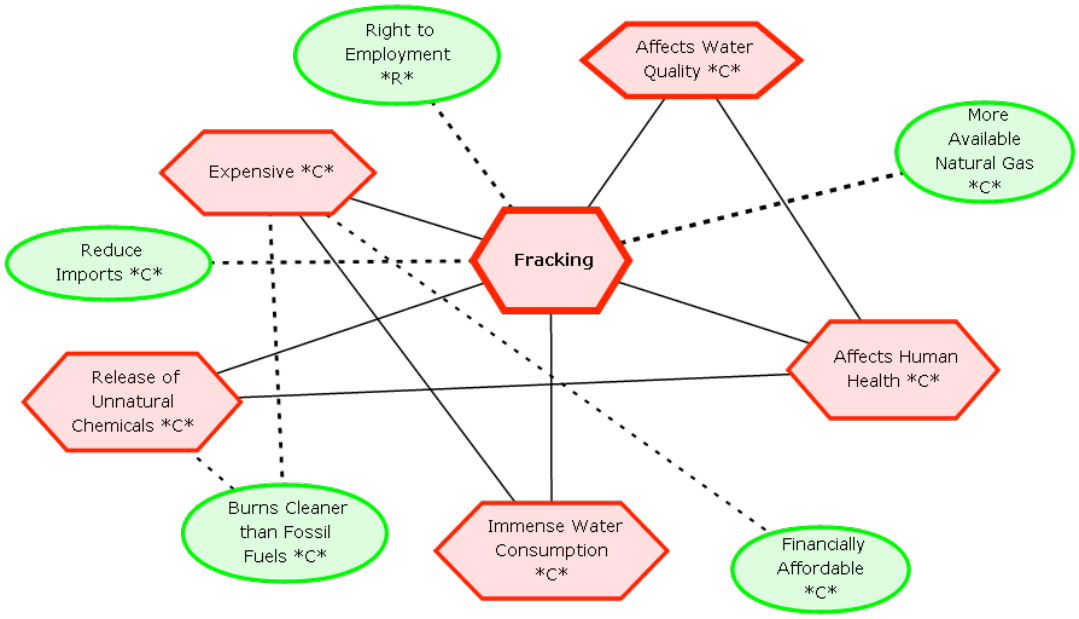

Figure 13. Student value map opposed to fracking (hydraulic fracturing). Courtesy of Savannah Ostrowski.

Discussion

Figures 4-13 illustrate the ability of undergraduate students to capture the key values involved in ethical disputes. From the students' perspective, the advantages of approaching ethical controversies using values maps are the following. First, value maps provide a convenient way to make sets of values explicit. Second, the maps provide a visual way of seeing the interconnections among values that are not so easily represented in a serial, verbal description. Values are an organized system, not just a set of isolated elements. Third, contrasting maps make it easy to see how pro and con positions differ systematically. Fourth, the process of producing the maps encourages students to think through the ethical issues and not just rely on their antecedent prejudices. Fifth, the value maps can be used as a starting point for finding common ground between opposing positions. If time allows, it would be a valuable exercise to have students produce value maps that they judge to provide a plausible synthesis of opposing sets of values. As table 1 showed, students often changed their minds while doing value maps, which suggests that the exercise does not simply entrench existing views. Further empirical research is needed to determine the extent to which the exercise of producing values maps encourages mutual empathy and convergence rather than polarization.

This article has emphasized the teaching uses of value maps, but they also have theoretical uses, providing explanations as well as descriptions. Cognitive-affective maps are based on a theory and computational model of emotional coherence that can explain many kinds of human decision making (Thagard, 2006). Although it is not essential for the pedagogic use, value maps translate directly into simulated neural networks that are capable of generating decisions based on the parallel interactions of all

the nodes. From this perspective, value maps provide a mechanistic explanation of why people reach the pro and con conclusions that they do based on the interactions among neural representations that include emotional as well as cognitive elements. Values are neural patterns, not mysterious Platonic entities.

If values are emotional mental representations, one might worry that they are not subject to rational evaluation. This worry neglects the fact that emotions can be evaluated according to whether they are rational or irrational because they include aspects of cognitive appraisal as well as physiological perception. All emotions involve reactions to bodily states, but they also involve appraisals of the extent to which a situation accomplishes or thwarts the goals of the person involved (Thagard and Aubie, 2008; Thagard, 2010b). Such appraisals can be objective in that they take into account the biological and psychological needs of the people involved. The philosophical positions of emotivism and expressivism (van Roojen, 2009) that take emotions to be contrary to ethical rationality ignore the way in which emotional reactions can incorporate rational appraisals in addition to physiological changes.

Independent of such theoretical issues, value maps provide a useful tool for teaching ethics in ways that students find enjoyable and illuminating. The free program Empathica makes it particularly easy for students, teachers, and researchers to draw their own value maps. I hope that these exercises will increase mutual understanding and foster the resolution of ethical conflicts.

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References

Axelrod, R. (Ed.). (1976). *Structure of decision: the cognitive maps of political elites*. Princeton: Princeton University Press.

Findlay, S. D., & Thagard, P. (forthcoming). Emotional change in international negotiation: Analyzing the Camp David accords using cognitive-affective maps. *Group Decision and Negotiation*.

Homer-Dixon, T., Milkoreit, M., Mock, S. J., Schröder, T., & Thagard, P. (forthcoming). The conceptual structure of social disputes: Cognitive-affective maps as a tool for conflict analysis and resolution. *Unpublished manuscript - University of Waterloo*.

Milkoreit, M. (in progress). *When the mind is an obstacle: The role of cognition in global climate change politics*. PhD thesis, University of Waterloo.

Novak, J. D. (1998). *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah, NJ: Lawrence Erlbaum Associates.

Sowa, J. F. (1999). *Knowledge representation: Logical, philosophical, and computational foundations*. Pacific Grove: Brooks Cole

Thagard, P. (2006). *Hot thought: Mechanisms and applications of emotional cognition*. Cambridge, MA: MIT Press.

Thagard, P. (2010a). EMPATHICA: A computer support system with visual representations for cognitive-affective mapping. In K. McGregor (Ed.), *Proceedings of the workshop on visual reasoning and representation* (pp. 79-81). Menlo Park, CA: AAAI Press.

Thagard, P. (2010b). *The brain and the meaning of life*. Princeton, NJ: Princeton University Press.

Thagard, P. (2011a). Critical thinking and informal logic: Neuropsychological perspectives. *Informal Logic, 31*, 152-170.

Thagard, P. (2011b). The brain is wider than the sky: Analogy, emotion, and allegory. *Metaphor and Symbol, 26*(2), 131-142.

Thagard, P. (2012a). Mapping minds across cultures. In R. Sun (Ed.), *Grounding social sciences in cognitive sciences* (pp. 35-62). Cambridge, MA: MIT Press.

Thagard, P. (2012b). *The cognitive science of science: Explanation, discovery, and conceptual change*. Cambridge, MA: MIT Press.

Thagard, P. (forthcoming). The cognitive-affective structure of political ideologies. In B. Martinovski (Ed.), *Emotion in group decision and negotiation*. Berlin: Springer.

Thagard, P., & Aubie, B. (2008). Emotional consciousness: A neural model of how cognitive appraisal and somatic perception interact to produce qualitative experience. *Consciousness and Cognition, 17*, 811-834.

van Roojen, M. (2009). Moral cognitivism vs. non-cognitivism. *Stanford Encyclopedia of Philosophy*. Retrieved from http://plato.stanford.edu/entries/moral-cognitivism/