Component Two: The Relational Circuit

The second component of the Earthscore Notation is a formal figure that organizes the three comprehensive categories. As mentioned in the prologue, I call this figure the relational circuit. The relational circuit is to the Earthscore System what the staff and bars are to standard music notation. The relational circuit itself is quite simple, less complex than a tic-tack-toe grid. I've taught it to six grade students in a half hour. I originated the relational circuit based a study of Peirce's work and my own experimentation with video feedback. One of the best ways to get to know the relational circuit and its characteristics is to experiment with it in different ways, just as in geometry we learn the characteristics of a triangle by performing various experiments upon it. The exercises at the end of this chapter are meant as a guide to such experimentation. In this book, the three dimensional relational circuit can only be presented in a two dimensional image. As with all such two dimensional presentations, you must project the third dimension into what you see in figure 1.

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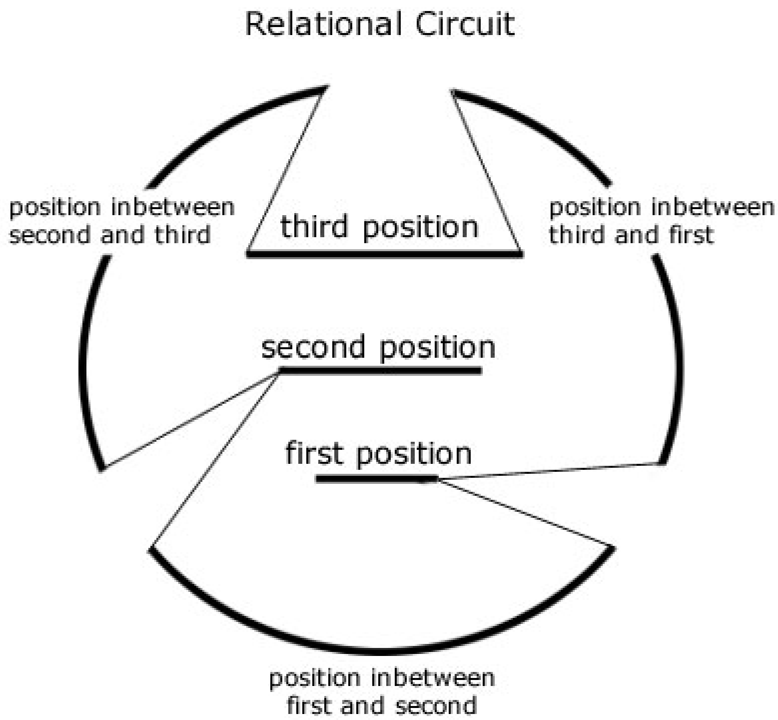

Figure 1: The Relational Circuit

The relational circuit has six positions. Three positions are neither contained nor containing (-=, = =, = -). One position is contained by two others (-). One position contains and is contained (=). One position that contains two positions (=). These three positions are called firstness (-), secondness (=), and thirdness (=). The naming of these positions is not arbitrary, but follows the definitions provided by Charles Peirce. Firstness is a compact, empty position,

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free of any other. Secondness has another part of the form passing through it—the position of firstness- some "other" it must interact with. Thirdness contains both secondness and firstness.

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Circuits and Sustainability

For the purposes of sustainability, it is important that Earthscore is based on a circuit. To explain the importance of circuitry for sustainability, I will draw on the work of Gregory Bateson, my mentor in thinking about, and with, circuits. Bateson was trained both as a biologist and an anthropologist and was part of the Macy conferences which took place after WWII. These conferences spawned an understanding of thinking in circuits called cybernetics. Cybernetics is generally defined as the study of communications and control in men and machines. Bateson considered cybernetics the biggest breakthrough we've had in our understanding of how the mind works in the last 2000 years. Many people agree with him. While allot of cybernetics has developed with a focus on machines in a mechanical way, Bateson articulated cybernetics in a human and biological way, appropriate for education about sustainability.

The Greek word “cyber” means a steersman on a ship. How a steersman uses information from the wind and the water to control and correct his course is understood cybernetically in terms of differences that make differences. Differences in the angle of the wind and currents in the water make differences

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in how the steersman sets the tiller, which, in turn, make differences in the direction of the boat. Differences in the direction of the boat make differences in the angle of the wind and currents encountered, which, again, make differences in how the steersman sets the tiller and so on round the circuit. These circuits of differences enable the steersman to identify and eliminate errors in the course of the ship. To say the same thing in another way, his understanding of differences enables him to guess, with better than random success, the optimal course to set for his ship.

One of the examples Bateson used to explain thinking in circuits was a man cutting down a tree with an ax. Without cybernetics, the conventional explanation is cause and effect. I used my ax to cause the tree to fall. Thinking in circuits, however, invites another explanation which goes as follows. Differences in the face of the tree make differences in how I see the tree. Differences in how I see the tree make differences in how I swing the ax, which makes differences in the face of the tree, which in turn makes differences in how I see the tree and so on round the circuit.

Another example Bateson used was a blind man walking. In the cybernetic explanation of a blind man walking, you don't cut the man off from the process

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of walking. Where would you cut? At the end of his stick? At his hand? Rather cybernetics sees the process in terms a circuit of differences that make differences. Differences in the pavement make differences in where the stick touches, differences in where the stick touches make differences in how the man balances, differences in balance make a difference in where he steps next. Differences in where he steps next make a difference in what his stick touches next and the explanation continues around the circuit. If the man sits down to eat his lunch, that process would require an explanation according to a different circuit.

Cybernetics applies this sort of understanding to any phenomena that involves self-correction and self-organization. Following the Macy conferences, Bateson used cybernetics to explicate a range of topics including learning, dolphin communication, family dynamics, schizophrenia, alcoholism, evolution and our ecological crisis.

Let's look at his work on the ecological crisis. Bateson argues that our unsustainable life results from a mistake in the way we think. We have misidentified the unit of survival. We have thought it was our individual selves, our own kin, or tribe or nation or even our own species. But a species that

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destroys its environment destroys itself. The real unit of survival is a flexible species in a flexible environment.

Bateson identifies the unit of survival with the unit of evolution. Essentially, he is saying that the plants and animals which have evolved successfully have been flexible groups of organisms in flexible environments, for example, redwood trees along the northwest coast or coral reefs off Florida, before modern humans abused them. In a sense, humans have tried to exempt themselves from this orthodoxy of evolution and thus have become a heretical species. We fail to recognize the patterns that connect us with the environment. We fail to live in terms of self regenerating circuits that would allow both us and our environment to thrive in a sustainable way.

Bateson goes on to identify the unit of evolution with the unit of mind. This is a very rigorous argument and he both establishes clear criteria from cybernetic theory for what a unit of mind is and shows its sameness with the unit of evolution. I'm summarizing here, but he lays all this out quite convincingly in *Steps to an Ecology of Mind* (1972) and *Mind and Nature* (1979).

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The Relational Circuit and Curriculum

In terms of a curriculum for sustainability, we need to evolve units of mind-evolution-survival for the students. That is to say, complete circuits of understanding that include the students and their ecosystems using literature, science, mathematics, art, social studies and whatever else we can find that will help track the circuits of differences that make differences for sustainability.

The relational circuit, on which Earthscore is based, satisfies Bateson's rigorous criteria for a unit of mind. (Ryan 1993) This circuit transforms the categories developed by Peirce into a cybernetic system for learning. In other words, the relational circuit can be used as a figure of regulation for organizing curriculum units that support survival and sustainability. Curriculum development according to the Earthscore Method becomes a process of deconstructing what is now being taught and then reconstructing knowledge in units of mind. Such units could begin to transform the fragmented curriculum of most contemporary schools. Clusters of sustainable curriculum units could evolve into an ecology of mind for youngsters. Schools could become learning environments as rich in their own way as unspoiled redwood forests. We can learn as a species to reconnect with the environment on which our species depends for its life.

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All this may seem abstracted from normal curriculum discussions. Bateson is abstract. At its foundation, the task of creating sustainable societies requires abstraction. The most abstract ideas, however, are often the most practical. Certainly this is true in the cybernetic tradition and the semiotic tradition that come from Peirce's Pragmatism. Educators familiar with John Dewey's theories about learning will be interested to know that like Dewey, Peirce's pragmatism included enormous respect for experience. Peirce, however, was much more formal that Dewey. For example, the task of collecting and publishing his mathematical writings required six volumes. This formality is part of what attracted me to Peirce. A notational system is a formal creation and creating the Earthscore notation required both the rigor of cybernetics and the rigor of Peirce's thinking. In the context of sustainability, such formal systems thinking makes it possible to maintain consistency of communication about the environment over generations. Of course, a formal system can be abused and needs to be combined with a living tradition. But, as I argued in the introduction, ordering relationships between generations, i.e., educating, is easier if you have an appropriate formal system based on a formal geometric figure.

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The Relational Circuit and the Comprehensive Categories

Thinking cybernetically with the relational circuit deepens our understanding of firstness, secondness and thirdness. Within the circuit, we identify each "ness" with a position. Once we have a common referent in the relational circuit for our three "nesses", however, we can drop the "nesses" and refer to the position of firstness as the first position, the position of secondness as the second position and the position of thirdness as the third position.

(See Figure 1.) We have gone from a noun on a pedestal back to adjectives accompanying a single noun, the noun being "position". In the relational circuit a difference in position makes a difference in relationships. All significant differences are differences of position. This complete understanding of relationship based on position alone enables us to avoid generating a set of nouns. We can think differences without nouns.

One cybernetic thinker, Anatol Holt, wanted to sell bumper stickers with the slogan "Stamp out nouns!" His complaint was that nouns reify, i.e., make qualities and process into things. Cybernetics, however, can understanding

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process and qualities as parts of a circuit, parts of a system. Once you reify a part, you automatically transform it into a thing, that is, you separate it from the system you are trying to understand and put it into a system of language that may work very differently from the observed system. Most languages, certainly the languages that come from Europe, bring with them a syntax that includes naming and classifying. Indeed, our logic of classification goes back to Aristotle. Interestingly enough, in the 1860's, Peirce announced that the logic of classes we had inherited from Aristotle was exhausted and that we needed a logic of relationships. The relational circuit, with six unambiguous positions for understanding differences, provides that logic of relationships.

It is, our course, difficult to imagine what a post Aristotelian culture based on a logic of relationships would be like. One way to look at it is to look at some of the specific differences between a logic of classes and the logic of relationships I am proposing.

One of the great mathematical achievements of this century regarding the implications of the logic of classes is Gödel’s proof regarding the axiomatic systems that derive from any logic of classification. Gödel’s proof exploits the possibility of generating an excludable contradictory proposition from an

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axiomatic system. If you decide not to generate the excludable proposition, the system is incomplete. If you decide to generate the contradictory proposition, the system is inconsistent. Therefore, any axiomatic system has inherent undecidability. It will either be incomplete or inconsistent. One way to see the "progress' in Western culture is to see it as an oscillating between these two poles of indeterminacy. Because we are caught in a contradiction, we must progress beyond that contradiction. Once we progress beyond the contradiction, we have a sense of being incomplete. We strive for completeness and thus create another contradiction. Much of the criticism of our modern culture as unsustainable is linked to a perception of this culture as addicted to progress. The addiction to progress, I think, is linked to this oscillation between complete and incomplete. As many people point out Western Progress has been accompanied by progressive stupidity about how we treat the natural environment. As we oscillate forward between incomplete and inconsistent. in a viscous cycle.

By contrast, the relational circuit is a non-axiomatic system that is both complete and consistent (Ryan 1993) Moreover, as indicated in the introduction, the relational circuit organizes a heterarchic circuitry of preference that maps onto the decision making process for art making.

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One culture Gregory Bateson studied as an anthropologist was the Balinese. In Bali, life is shaped in patterns of non-progressive changes. A complex tradition of ceremony, dance and music make it possible for people to live a rich life without "progress". Non progressive change does not mean static. Growth in complexity of fullness of feedback and not addictive oscillation that multiples ignorance of the natural world.

The Relational Circuit and Sustainability

There are a number of characteristics of the relational circuit that make it an appropriate figure of regulation for organizing a curriculum for sustainability. The characteristics themselves are evident when one examines the circuit itself very closely. Exercises attached to this chapter invite the reader to discover these characteristics by examining the relational circuit in detail. In other writing (Ryan 1993), I have presented these characteristics in a technical way. Here I will state these characteristics and indicate how they make the relational circuit suitable for sustainability.

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The relationships that obtain in the circuit are complete and consistent. Because they are complete and consistent, they enable us to organize a consistent understanding of ecological systems over generations. The claim that the relational circuit is complete and consistent appears to contradict one of the great mathematical proofs of the twentieth century, Gödel's Proof. To show how the relational circuit evades Gödel's Proof is a somewhat technical discussion, the specifics of which it is not necessary to understand in order to use the Earthscore Notation for creating curriculum. I have presented this technical discussion elsewhere (Ryan 1993).

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Questions for Component Two

1. What is cybernetics?

2. How would you explain eating your lunch in a cybernetic way?

3. How would you explain reading this question in a cybernetic way?

4. What does cybernetics have to do with sustainability?

5. What does it mean to say that "humans are an heretical species"?

6. How can cybernetics be used in curriculum design?

7. What do you think the phrase "ecology of mind" means?

8. Why do some cybernetic thinkers not like nouns?

9. How would you differentiate between a logic of classes and a logic of relationships?

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10. Why does information transmitted over generations according to a geometric figure promise more consistency than information transmitted by language alone?

For answers refer to text.

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Exercises for Component Two

These exercises are designed to give you a familiarity with the relational circuit. Examine the form of the relational circuit in figure one and circle the correct answer in italics based on your examination.

1. There is (are) *one two more than two* circuits.

2. The form is *empty full two thirds full.*

3. Is it possible to move from any position in the circuit to any other position without crossing a boundary. *No Yes can't tell.*

4. The form is *bounded unbounded can't tell.*

5. You could travel within the form of the circuit without stopping or leaving the form *forever once six times.*

6. On the continuum of the circuit there are *five six seven* positions.

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7. Basic differentiation in the form happens due to: *the direction one moves in the names given to the different parts differences in position.*

8. How many positions of secondness are there:
   one two three.

9. How many positions in-between firstness and thirdness are there:
   one two three.

10. How many in-between positions are there:
    one two three.

11. How many positions in-between thirdness and secondness are there: *one two three.*

12. Are any two positions in the form identical to each other?
    yes no can't tell.

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13. Suppose you start in the position of firstness and move through the form starting off to your left instead of to your right. Does this make a difference in the positions of the form itself?

    yes no can't tell

14. Can you explain the positions in the form without going outside the form itself?

    yes no can't tell

15. If you answered *yes* to 14 please write out the explanation of each of the six positions in terms of the remaining positions.

16. Is the form itself incomplete in the sense that natural numbers are incomplete? That is to say, with natural numbers, 1, 2, 3, etc. You can always add another number in the sequence. Is this true of the positions in the relational circuit?

    yes no can't tell

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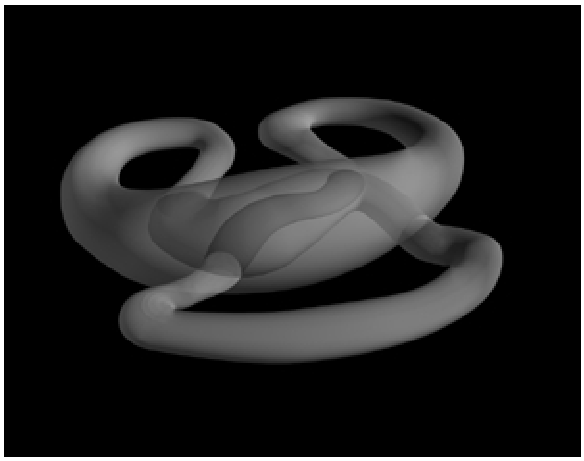
17. Examine Figure 2 presented below (Four part figure) Is this figure consistent in the sense that there is no ambiguity of internal parts that can't be explained unambiguously by other internal parts?

    yes no can't tell.

Figure 2



18. Examine the relational circuit in Figure 1. Is this figure consistent in the sense that there is no ambiguity of internal parts that can be explained by other internal parts?

    yes no can't tell.

19. Could you reduce the relational circuit to less than six positions, like in figure 2, and still maintain its characteristics?

    yes no can't tell.

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20. The follow statement about the relational circuit is

    true false indeterminate.

    A difference in position makes a difference in relationship to all other positions in the form.

21. Can you move through the positions in the form sequentially?

    yes no can't tell.

22. Are the positions in the form structured sequentially?

    yes no can't tell

23. Could you compact the relational circuit into a ball and have it retain its integrity?

    yes no can't tell.

24. If you are in any position in the form and want to move to another position without crossing a boundary, how many choices do you have?

    one two three.

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25. Below are the six cybernetic criteria Gregory Bateson articulates in order for something to be a circuit or unit of mind. Explain how the relational circuit fulfills these criteria.

    i) A mind is an aggregate of interacting parts or components.
    ii) The interaction between parts is triggered by difference.
    iii) Mental process require collateral energy.
    iv) Mental processes require circular (or more complex) chains of determination.
    v) In mental process, the effects of differences are to be regarded as transformations (i.e., coded versions) of the difference which preceded them.
    vi) The description and classification of these processes of transformation disclose a hierarchy of logical types immanent in the phenomena. Logical types is a ordering in which "higher" levels include "lower" levels and no level of classification can be a member of itself.

Answers 1-25

Answers for Exercises Component Two.

1. *one*
2. *empty*

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3. *yes*
4. *bounded*
5. *forever*
6. *six*
7. *differences in position.*
8. *one*
9. *one*
10. *three*
11. *one*
12. *no*
13. *no*
14. *yes*
15. It is possible to understand each position in the continuum without going outside the bounds of the continuum. Each position in turn is explained by two other positions. The position of firstness is the position contained by secondness and thirdness. The position of secondness is contained by thirdness and contains firstness. Thirdness contains both secondness and firstness. Each of the "in between" positions on the handles is explained by reference to two of the three positions of firstness, secondness, and thirdness.

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16. *no*

17. *no*

18. *no*

19. *no*

20. *true*

21. *yes*

22. *no*

23. *no*

24. *two*

25.

i) A mind is an aggregate of interacting parts or components.

The form has six parts or components.

ii) The interaction between parts is triggered by difference.

The form is relative. A difference in position makes a difference in relationship. Any interaction between parts takes place in terms of these positional differences. Hence interaction between parts is triggered by difference.

iii) Mental process require collateral energy.

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The form is empty. The form can be likened to a six part zero. It is empty of energy. Processing of differences in the form requires collateral energy.

iv) Mental processes require circular (or more complex) chains of determination.

The form is a continuum. The continuum is a circular chain determining unambiguous differences.

v) In mental process, the effects of differences are to be regarded as transformations (i.e., coded versions) of the difference which preceded them.

Each difference in position is, in effect, a transform from the preceding position or positions. This can be made clear by using the television ecochannel cited above as an example. If we map Peirce's semiotic understanding onto the positions in the relational circuit we get the following: the sign maps onto firstness, the object onto secondness and the interpretant onto thirdness. The television ecochannel provides programming (sign) about the ecology (object) for the people who live in that ecology (interpretants) so they will

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not destroy it (ground of the sign). Differences in the ecology (object, position of secondness) make differences in the programming (sign, position of firstness), which make differences in the interpretation of the ecology interpretant, position of thirdness), which in turn make differences in the ecology itself, (object, position of secondness). Each difference in position is, in effect, a transform from the preceding position.

vi) The description and classification of these processes of transformation disclose a hierarchy of logical types immanent in the phenomena.

While the heterarchic form itself cannot be subsumed by a hierarchy, transformations in the form can be described so as to disclose a logical typing immanent in the form. Firstness is at a “lower level” of logical typing than secondness. Secondness is at a “lower level” then thirdness. Moving from “level” to “level” is a transformation of relationships.

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