

# *The “Reality” of the Classroom: Epistemological Errors in Teaching*

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Arguing against the “homeostasis” model of family systems therapy—a dualistic model that assumes social systems resist change—Paul Dell (1982) uses the systems theories of Gregory Bateson (1972) and Humberto Maturana (1978, 1988; Maturana & Varela, 1980, 1987) to suggest that social systems, like other complex living systems, actually embrace change. As Dell (1982) puts it, “when a system is perturbed, as all systems are, it tends to seek a steady state that is *always* slightly different from the preceding steady state” (p. 27, italics his). Just as we can’t step into the same river twice, Dell tells us, social systems are constantly adjusting, constantly fluctuating, constantly evolving—constantly learning.

According to Dell (1982), when therapists work with a social system such as a family, they need to discern the system’s “coherence,” its “congruent interdependence in functioning whereby all the aspects of the system fit together” (p. 31). They need to view the system as a whole and recognize that, far from resisting change and seeking some sort of dysfunctional equilibrium, the system continuously interacts with its environment—effects “structural coupling” (Maturana & Varela, 1980, 1987)—according to its particular organization, what Dell (1982) calls “the unalterable reality with which the therapist must contend” (p. 30). In family systems therapy, the most healing interventions consist of “*going with the reality*” (p. 31; italics his): discovering

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how the system is organized and interacting with it in such a way as to use its own "reality," its own essential behaviors, to change it.

The "it" here is not the system's organization, which is, in fact, unalterable, but rather its structure. According to Capra (1996), the organization of a living system cannot be changed without either destroying the system or reconfiguring it into a different system. The *organization* of a living system is the set of relationships among the system's components that characterize it as a particular system. The *structure* of the system is the actual embodiment of those relationships (Capra, 1996). In any family, then, the basic *organization* consists of relatives who play certain expected roles in relation to one other (in Western societies, for example, parents care for children and, sometimes, elderly parents; children obey their parents; etc.). The *structure* of a particular family is the *actual* components (lesbian parents of two biological children and one adopted child, etc.) and the *actual* roles and relationships they enact together. Changes can be facilitated in the ways the actual members of a family interact within the basic form of a family, but changes that affect the pattern of relationships—who cares for whom, who obeys whom—could result in the dissolution of the "family" and the creation of a new type of system.

It strikes me that Dell's (1980, 1981, 1982, 1985) understanding of family systems applies to classroom systems as well. Classrooms, like families, are complex living social systems in which interactions—between teacher and students, among students, between teacher and subject matter, between students and subject matter, etc.—determine the effectiveness, or health, of that system. Just as with families, classroom systems can be seen as "pathological" in the sense that they can exhibit "'rigid homeostatic redundancies'" (Dell, 1982, p. 35)—that is, their members can repeat behaviors that prevent healthy growth, or learning. "Negative attention getting" is an easy example to imagine. When a student who has a felt need for attention repeatedly acts out in ways that attract disapproval and anger from her teacher, she is helping to enact a reality that not only fails to satisfy her original need but reinforces a self-perception that leads to continued bids for negative attention. She has achieved "coherence" within the classroom social system: she participates, consciously or unconsciously, in a behavioral cycle that is potentially endless because it is consistently reinforced. This behavioral cycle is "pathological" because it depends on a flawed perception of reality. Specifically, the child is either denying reality (that her teacher cannot or does not want to attend to her, for whatever reason) or trying to control reality (by forcing the teacher to attend to her, no matter what type of attention it is). Either way, she is making what Dell (1982) calls an "epistemological error."

Epistemological errors are "the misunderstanding of, or the outright refusal to accept, reality" (Dell, 1982, p. 31). "Passive" epistemological errors

are the failure to acknowledge reality; a popular term for this type of error is "denial." "Active" epistemological errors are efforts to control other people to make them conform to one's own expectations or needs (Dell, 1982). The notions of "denial" and "control" are certainly familiar; what is different about Dell's application of these notions is his understanding of "reality."

Reality, far from being a fixed entity independent from us, is, simply put, the coupled nature of human interaction. That is, from a systems perspective, the fundamental reality of human existence is its biological nature, and that nature, according to Maturana (Maturana & Varela, 1980, 1987) is "structurally determined." I interact with my environment (including other human beings) in ways that are constrained both by my "bodyhood" (my physiology) and my behavioral history; and, while my fate is not predetermined, the options I exercise in a particular situation are limited by these physical and behavioral factors (which are inextricably connected within me) (Maturana, 1988). Less simply put, my interactions consist of "perceptually guided action" (Varela, Thompson, & Rosch, 1991), where perception is neither indirect (dependent on internal representations of a reality separate from us) nor direct (based on the "affordances" and "constraints" inherent in the environment, which is separate from us [Gibson, 1979]) but is "mutually specified" (Varela et al., 1991), "codetermined" (Varela et al., 1991), or "brought forth" through interaction (Maturana, 1988; Maturana & Varela, 1987). That is, I perceive in collaboration with the environment around me using the perceptual mechanisms available to me; an independent "reality" does not exist outside of that collaboration.

At the same time that all living systems function within the parameters of the reality of structure determinism, human beings are privileged to experience a second, separate level of reality: that created in language (Maturana, 1978, 1988). Whatever unconscious, systems-level forces are at work in my daily interactions, I am constantly interpreting my experience, thereby creating a language-based reality, a story, that is not necessarily correlated to the reality of structure determinism.

For example, the common Western narrative of reality is Aristotelian (Dell, 1980), or objectivist, what Maturana (1988) calls "objectivity-without-parenthesis." According to this narrative, or "explanatory path" (Maturana, 1988), we perceive through internal representation objects that exist independently in a world outside of us. In such a world, cause and effect rule, and control is believed to be possible. In contrast, the systems view of reality, what Maturana (1988) calls "objectivity-in-parenthesis," recognizes the contingent, co-created nature of every moment; it focuses on process rather than fixedness (Dell, 1980). Our every move, according to this explanatory path, is creative in that we "bring forth" the world through our interactions with it (Maturana, 1988; Maturana & Varela, 1987). I may perceive a table in

front of me, but, were I structured differently or feeling a little tired, I might perceive instead open space (at the atomic level) or a hard but serviceable bed. While both of these worldviews—objectivism and what Dell (and Bateson, 1972) calls “cybernetic epistemology”—are equally valid stories about reality, it appears that only the latter aligns with our emerging understanding of how complex living systems work (Axelrod & Cohen, 1999; Checkland, 1999; Johnson, 2001; Kauffman, 1995; Laszlo, 1996; Margulis & Sagan, 1986; Marion, 1999; Maruyama, 1963; Mingers, 1995; Prigogine & Stengers, 1984; von Bertalanffy, 1968; Waldrop, 1992).

The reality Dell refers to in his definition of epistemological error, then, seems to be the reality of structure determinism. Passive epistemological errors are refusals to acknowledge the organization of a particular living system; active errors are efforts to control other systems. Our student in need of attention has certainly constructed a narrative about reality (however unconscious that may be), but the error she makes is in her “choice” of explanatory path—that is, in her (culturally inherited) objectivist worldview. Put plainly, she is wrong to think that she can unilaterally control anyone in her environment. She is wrong because she and everyone she interacts with are structure determined living systems who participate actively and autonomously in co-regulating (Fogel, 1993) their existence and hence have no control over anyone but themselves.

But this is true only to a degree. Although some highly trained individuals (such as Buddhist monks) can control physiological phenomena such as body heat, most of us cannot control the basic functioning of our organs (though we sure can influence it). The control we can exert is in the realm of “languaging” (Maturana, 1988), where we tell our stories about reality, make conscious decisions about our thoughts and actions, reflect, and behave ethically.

What could happen differently for our attention-seeking student, then? Were she working with a teacher steeped in systems theory, she could develop self-awareness and other-awareness through modeling. That is, she could be encouraged to identify her feelings and the associated needs and speculate as to the possible repercussions of the various actions she could take to get those needs met. At the same time, her teacher could provide commentary on her own feelings and needs, helping the student to arrive at a mutually satisfactory set of behaviors that reflect sensitivity to herself (the student) and to those around her. Through repeated, guided experience (combined with her own natural development), the student would begin to understand her instincts and flexibility—her organization—as well as the necessity of bringing her own conscious attention to bear on everyday, social interaction so as to infer the organization of others and enact healthy relationships with them. Such a “social curriculum” would have no

set standards or benchmarks, no content; it would be a co-constructed, consciously enacted learning experience that would unfold differently depending on the actors involved at any given time.

To commit epistemological errors in a classroom, then, means to function under the explanatory path of "objectivity-without-parenthesis." It means that teachers and students believe that control is possible, that each of them exists as a separate, isolated entity, that learning is a matter of "will" and "hard work" (Smith, 1998), that teaching is a matter of "causing" learning, primarily through exposure to information. In committing errors based on these assumptions, teachers demonstrate a fundamental misunderstanding of how complex living systems work and, in the worst classroom cases, can set themselves (and their students) up for failure in the learning enterprise. By considering two types of epistemological errors typically made in classrooms, as this paper does, we can open the way to viewing classrooms more realistically—that is, as complex living social systems—and to consider ways to use this perspective to nudge them in a direction that better affords the type of learning we hope they can inspire.

### Epistemological errors in the classroom

Given the predominance of the objectivist paradigm in mainstream American society and the difficulty of viewing the world consistently through a systems lens, epistemological errors undoubtedly run rampant in classrooms. For the purposes of this paper, I have chosen two types of errors that are common enough to qualify as almost universal: the "passive" error of emphasizing content over relationship in teaching and the "active" error of expecting teachers to "control" students through unilateral classroom management techniques<sup>1</sup>.

#### *Content over relationship*

It is not difficult to see that a content emphasis—one that defines learning as the acquisition of information and skills relevant to a particular academic discipline—rests on an objectivist epistemology. The content emphasis relies on the assumption that learning and knowing consist of information processing, which is the *reception* of information, the intelligent *storage* of that information (in "schemata," for example [Rumelhart, 1977; Schank & Abelson, 1977]), and the competent *retrieval* of the information on demand. Crucial to this approach is acceptance of at least the following assumptions:

- that information has its own independent existence outside of the student;
- that knowing is solely brain-based;

- that knowing is an individual experience and learning is social insofar as information is passed from one individual to another;
- that teaching is the provision of information and learning is the absorption of that information.

These assumptions are so prevalent in Western culture that they seem almost intuitive. But, as might be expected, the systems approach contradicts every one of them.

For one thing, living systems do not “use” information. In fact, “there is no such thing as information” (Dell, 1985, p. 6) for a living system. This is because living systems are “organizationally closed” (Dell, 1985; Maturana & Varela, 1980, 1987), meaning that, while they require energy to survive, their functioning is “autopoietic,” or “self-organizing”: they both create and sustain the very components that keep them alive (Maturana & Varela, 1980, 1987). As autonomous, autopoietic organisms, living systems select what they will perceive and how they will interact with what they have selected, thus co-creating the world around them. Like “reality,” “information” can have no absolute, objective existence apart from the system that specifies it.

A flaw of the content emphasis is that it mistakes facts and information for reality. From the systems perspective, content merely symbolizes a *take* on “reality”; it helps to tell a story of how the world works, a story whose deconstruction and reconstruction (at the linguistic level) yields much more insight and understanding—useful “information”—than regurgitation of facts or received wisdom ever can.

But that doesn't render the term “information” useless. Fortunately, Fogel (1993) provides a definition of “information” that reflects the systems perspective: “Information is *created* out of the dynamics of action in an environment. Information is *in formation*, always being created out of itself and always changing with respect to action” (Fogel, 1993, p. 69; italics his). In other words, information is not an absolute value; it is offered and detected through action, and its meaning varies depending on the actors in the situation. When I (think I) see you smile, I *do* something based on my interpretation of that act: I smile in return; I blush; I worry, without moving a muscle, that you are secretly making fun of me. Or I do nothing at all, physically, emotionally, or mentally, which indicates that the information of your smile was lost on me. “The information is not ‘in’ your body,” Fogel (1993) tells us, “nor is it ‘in’ my body. The information is what happens to me when I perceive your smile” (p. 56). Maturana & Varela (1987), in arguing against the “tube” metaphor of communication (in which “information” is “transmitted” along a figurative tube from a sender to a receiver), put it this way:

[E]ach person says what he says or hears what he hears according to his own structural determination; saying does not ensure listening. From the

perspective of an observer, there is always ambiguity in a communicative interaction. The phenomenon of communication depends not on what is transmitted, but on what happens to the person who receives it. And this is a very different matter from "transmitting information." (p. 196)

"Information," then, is, on the one hand, "what happens to me when I perceive your smile" (Fogel, 1993, p. 56) and, on the other, what I *call* that experience, the language I use to index what I recurrently perceive through mutual specification and structural coupling.

How might we think of textbooks, the foundational source of classroom information, from the systems perspective? Reader response theory (Fish, 1980) has made popular the notion that, far from residing in the authoritative text, meaning is created by the reader—and the meaning any reader creates can be quite different from that intended by the original author. Fish's (1980) characterization of meaning sounds especially systems-influenced: "It [the meaning of a sentence] is an experience; it occurs; it does something; it makes us do something. Indeed,...what it [the sentence] does is what it means" (p. 32). Textual meaning, then, occurs when we interact with a text—an array of symbols we perceive visually that represent a story about reality that we comprehend (or not) based on our own history of co-regulation and linguistic labeling—and do things (think, act, disagree, laugh, experience a surge of recognition, write a paper, etc.) that embody our interpretation of what we have perceived.

We create meaning from text through interaction: we forge some sort of relationship with it through acting on it, and our interpretive actions allow us to take further actions as the meanings we have co-created with the text become more familiar and embodied. We do not simply "receive" a text wholesale in order to know it; we must interact with it, *do* something on or with it, establish a relationship with it, all acts that demand attention and energetic commitment from the reader. It might be fair to say that, just as we cannot expect a friendship to bloom from standing face-to-face with someone, we cannot expect to learn from a text by simply looking at it. We must do what our attention-getting student needed to do in the early section of this paper: be mindful of our own organization and probe that of the text to better establish a fit, an understanding, a relationship that allows for further understanding and knowledge.

Not only do we change as we read or write, but the information necessarily changes as we interact with it and as others interact with us; it is dynamic. From a systems perspective, then, textbooks are as valid a source of "information" as they are from an objectivist perspective; but they are not fixed and absolute sources, nor are they any more authoritative than the student is who makes sense of them.

In stark contrast to the next two assumptions of the content approach,

- that knowing is solely brain-based
- that knowing is an individual experience and learning is social insofar as information is passed from one individual to another

cognition in living systems is fully embodied and enacted, or relational. That is, living systems learn and know through interaction—through structural coupling—which involves the entire body and, obviously, requires others (both living and non-living) to enact.

While the brain is a crucial component in the human living system, it functions within a network of equally crucial components (the nervous system, the cardiovascular system, etc.), all of which contribute to “embodied action” (Varela et al., 1991), or cognition. Because of this ecology, it is perhaps more helpful to talk of “mind” than “brain” when we discuss cognition, as “mind” (for Maturana & Varela, 1987, and Bateson, 1972, at least) encompasses the behavioral, physiological level of our functioning as well as the linguistic level of our interpreting—all equal elements in the “knowing-in-action” (Schön, 1983) that we do. Obviously, this definition of mind completely subverts the “mind-body” problem of philosophers. Whereas objectivism (one of whose founding fathers was René Descartes) reifies the split between the body (the physical mechanism) and the mind (the thinking mechanism), systems theory collapses it, recognizing that abstractions such as thought and language take place in, are inextricably anchored in, the concrete reality of the body.

As thinkers from a variety of fields have pointed out, linguistic communication, our ability to “language,” is not a purely cerebral affair; it depends wholly on our embodiment (Gendlin, 1962; Hanks, 1996; Johnson, 1987; Lakoff & Johnson, 1980; Maturana, 1978; Maturana & Varela, 1980, 1987). As most of us recognize (and some, such as Damasio, 1994, have confirmed through research), emotions play an integral role in our thinking and communicating, as do intuition (Burris, 1998; Noddings & Shore, 1984), tacit knowing (Polanyi, 1958), awareness (Burris, 1998; Tremmel, 1993), love (Burris, 1998; Goldstein, 1998), “maternal thinking” (Burris, 1998; Ruddick, 1989), and even faith (Burris, 1998). The very language we use is metaphorical, belying our necessarily physical relationships in the world (Johnson, 1987; Lakoff & Johnson, 1980). By moving beyond the brain and acknowledging the fully embodied nature of human cognition, systems theory embraces all of the non-rational aspects of knowing, allowing us a broader picture of what happens in classrooms.

Learning, then, is not as simple as receiving information into our brains and capturing it for posterity in a flesh-and-blood computer. More accurately, learning happens through interaction—that is, we (and “we” includes

the brain) constantly change as we co-regulate with the world around us (which we also specify through our structure-determined perception). It is in *relating* to people and texts and ideas that we learn, and we can know that we have learned by noticing change in ourselves—in our attitudes, our ideas, our values, our bodily configurations. But, while learning depends on relationship, there is not necessarily a one-to-one correspondence between interaction and learning. Change can be a highly complex process for humans. At one level, that of structural coupling, change can be automatic: we adapt instantly and largely unconsciously to new situations, always, as Dell (1982) tells us, seeking a new steady state. But to *know* that we have learned, to make that learning conscious and accessible to language (and hence to reflection and further co-regulation), it seems to me, requires awareness, an uncluttered receptivity to experience. Seen this way, learning (that is, consciousness of how we have changed) might be considered an *emergent property* of daily living; perhaps it arises out of our interactions in unpredictable, virtually untraceable ways, the way order can arise out of chaos (Gleick, 1988; Waldrop, 1992) or the way children can suddenly "break the code" of print and find themselves reading.

What we need in order to learn is room to relate, to engage with people and "information," to let them "do something to us" (to paraphrase Fogel, 1993, and Fish, 1980) so that, out of the chaos of classroom interaction, we can establish our own relationship with content (and, importantly, with the world it symbolizes) that changes us. In addition, we need time and encouragement to cultivate our awareness of our experiences so we can label them, connect them, innovate with them, all actions that entail further change and intellectual growth.

What, then, should teaching look like in a complex living system such as a classroom? The question is impossible to answer definitively, as teaching (and learning) will always look different depending on the teacher, the students, the day, the moment. What is certain is that the systems approach provides an answer that is very different from that assumed by the content approach (that teaching is the provision of information and learning is the absorption of that information). At the very least, the systems perspective suggests that a teacher's focus should be on facilitating *relationships*—with students, between students, with the subject matter and the world it represents.

If a teacher is to co-create a "safe" environment, she must know her students (more on this in the next section). This means she must be willing to recognize who they seem to be at every moment, for better or for worse, and to see and hear them as clearly as she can. She must be willing to reflect all this back to her students (acknowledging her "partial perspective" [Haraway, 1991]) while simultaneously facilitating the co-creation of a consensual frame<sup>2</sup> that allows for the type of academic learning that must take

place in a classroom (see Burris, 1998, for a discussion of a teacher who describes herself as a “mirror” for her students). At the same time, she must enact more private relationships: she must have a healthy, even passionate, relationship with the content she is teaching; she must know herself—her psychological and social inclinations, the buttons students can push, etc.; and she must be both aware of herself in the moment and able to reflect on her actions productively after the fact (what Rodgers, 2002, calls, respectively, “reflecting-in-” and “reflecting-on-action” [after Schön, 1983]). A teacher who focuses on cultivating these relationships can better push students, for by intuiting their organization (both individually and collectively), she can structurally couple with them in more informed and possibly effective—that is, life-changing—ways.

Besides facilitating effective pushing, knowing one’s students can also mean knowing where the “edge of chaos” is for a particular class. If learning is in fact an emergent property of a living system, the edge of chaos is the best place for emergence to occur. As opposed to equilibrium, where communication within a system has achieved stasis, or stagnation, and chaos, where communication is frenetic and ineffectual, the “edge of chaos” allows for energetic communication that encourages creativity (Waldrop, 1992). If classroom systems, like family systems (Dell, 1981), work the same way other dissipative structures<sup>3</sup> do (Prigogine & Stengers, 1984), teachers may benefit from cultivating both a sense of and a tolerance for the edge of chaos in their classrooms.

For the students, a focus on relationship with subject matter rather than exclusively on specific content amounts to a focus on thinking. It matters less *what* students think about<sup>4</sup> than *how* they think, what they *make* of the content, how they organize it into their own worldviews, their own stories about reality. Ironically, it seems likely that such a focus, far from diminishing the role of content in students’ lives, will highlight the content, making it more memorable precisely because students have made sense of it for themselves. It also seems likely that a focus on thinking, or relationships between ideas, will only strengthen students’ understanding of varied subjects. If the emphasis is on sense-making, on connecting ideas, on knowing content the way we know a friend (figuring out how we fit with it, how the two of us can coexist as comfortably as possible) then the intellectual skills students use to enact these relationships should be transferable—they should be just as useful in math class as they are in social studies (and on the playground, for that matter). In short, the systems emphasis on relationship over content amounts to helping students actually navigate unknown waters, not just read a map.

Such a focus is also, however, fraught with risk for both the teacher and the student. Establishing relationships takes time, repeated exposure, and

freedom to try out different behaviors as we feel our way to structural coupling. While hitting it off instantly is as possible with content as it is with people, making mistakes, taking missteps, misinterpreting are also part of the relationship dance. And, just as with people, teachers cannot expect themselves or their students to "like" everything they meet. But an emphasis on relationship permits teachers and students to reflect on this dislike, to dwell in it, to understand it and to let it transform, possibly, into at least a healthy tolerance. Indeed, the learning process is an emotional one: students resist certain content or skills; stress, fear, and insecurity color their actions. Or students accept new experiences or "information" too willingly, too uncritically, enacting a need to avoid conflict or discomfort in relationships. While most teachers confront variations on these and other types of behavior every day, they are not necessarily prepared to work with the behaviors to support learning. Rather, such behaviors, and the emotions they betray, are often seen as insurmountable obstacles. A focus on relationship legitimizes the emotional lives of classroom participants and points to the necessity of providing opportunities for teachers to develop the skills they need to make these natural responses to school fertile ground for learning.

To emphasize content over relationship, then—to apply pressure to "cover" content in a specific period of time, to insist on testing content knowledge through standardized tests, to count short-term memorization of facts as knowing, to define learning as the acquisition of bits of information or the practice of isolated skills—is to commit a "passive" epistemological error. It is to deny a very complex reality: that cognition is a biological phenomenon, enacted through interactions, or relationships, with others whose existence arises out of that very interaction. It is to deny that "information" is what happens in interaction, that meaning is ascribed to experience (not inherent in it) by language-users, that language use itself is participation in elaborate games (Wittgenstein, 1965) in which we tell and retell stories about reality, that the fundamental reality is our proclivity to couple in structurally determined ways with others, living and non-living, so as to maintain our own organization and existence. It is to deny that learning is change (and awareness of change) and that teaching is the extraordinarily difficult and delicate task of facilitating that change through full-bodied commitment to relationship—to fear, anger, love, disappointment, and, at best, exultation.

### *Classroom control*

Alfie Kohn (1996) claims in *Beyond Discipline* that classroom management programs are exercises in forced compliance, in dehumanizing control. He presents a common assertion that influences most classroom discipline regi-

mens: "If the teacher isn't in control of the classroom, the most likely result is chaos" (Kohn, 1996, p. 2). This fear, which is familiar to all teachers, students, and parents, suggests two important questions: What is classroom "control"? What is classroom "chaos"?

From the perspective of objectivism-without-parenthesis, control of any sort is the exertion of power by one party over another. Power is exercised through the linear workings of cause and effect: I punish you if you do something I do not want you to do; that punishment prevents you from doing it again (or the threat of it acts as a disincentive for you to do it in the first place). Punishment (or any other appropriate unilateral act) is the *cause* of the desired *effect*. Classroom control, then, means the exertion of power (usually in the form of punishments and rewards) by the teacher over students to cause the students to do what the teacher wants them to do. Chaos in a classroom is simply the absence of teacher control. It is, presumably, a state in which students' true nature—lack of discipline, carelessness, disobedience, possibly even cruelty—prevails.

The assumptions underlying Kohn's common assertion above stem from a mainstream objectivist stance:

- that cause and effect make control possible
- that teachers can cause students to behave in a certain way
- that teachers can cause students to learn certain things
- that chaos, or lack/loss of control, is a bad thing

From the systems perspective, these assumptions are erroneous. As has been discussed, the fundamental reality of human systems is their structure-determined nature. The co-regulation that humans enact is mutually accomplished, minutely sensitive to nuance, extremely creative, and, importantly, non-linear—it cannot be described accurately using linear terms such as cause and effect<sup>5</sup>. The terms we can use emphasize the cooperative, collaborative nature of human interaction, terms like "co-creation," "co-regulation," "structural coupling," "consensual frame," and "coherence," and allude, once again, to the structure-determined nature of human beings. As Dell (1982) puts it,

[I]ndividuals always behave out of their coherence; they can behave in no other way. Control is impossible. Their coherence determines how they will behave, and no amount of determined attempts to control them can ever change that fact. Moreover, an individual's coherence specifies his reaction to the other's attempts to control him. The coherence will, in most cases, 'respond' in a different way than was intended by the attempt to control. You can lead a horse to water, but you cannot make it drink. (p. 37)

Because we are structurally determined and interact with our environment autonomously (our complicated biology determines the nature of our in-

teractions), unilateral control by another is not possible. Again, Dell (1982) states it baldly:

Every system (person, family, institution, etc.) has its own organization, its own coherent identity..., that fully specifies how the system will behave in *any* and *every* situation. The system has no choice; it always functions in the way that it is organized to function. It *never* functions in a way that it is not organized to function. The system is what it is. Period. (p. 30)

It follows, then, that teachers cannot independently cause students to behave in a certain way or to learn certain things (the second and third assumptions in our list above). While Kohn (1996) bemoans teachers' attempts to force compliance because of the implicit disrespect to students, systems theory states that teachers are actually *unable* to force compliance—it is "ontologically impossible" (Dell, 1982, p. 11).

But how are we to explain the distinct experience of being able to control outcomes? When I tell a student to sit down and he sits down, is that not a matter of cause and effect, of control? When I teach my third graders how to make a bar chart and they succeed at making bar charts, am I not controlling their learning? No, says Dell (1982). What I am doing is perturbing the system with which I am interacting (in the first case, a student; in the second, the entire class) in such a way that the system itself selects an action that corresponds with my initial desires, thus causing in me the "psychological experience of 'causality'" (Dell, 1982, p. 9). I have *influenced* the system; I have not controlled it. In a living system, all components, or actors, constantly respond to and influence the others in an ongoing, historically reinforced dance. My actions can invite actions in others, but the nature of the others' actions is never determined by my action, only by the structure of the actor who responds. Anyone who has ever unintentionally offended someone else knows this: Even the most benevolent statement can be taken the wrong way. I have learned not to call my four-year-old daughter "silly," for she understands the term as insulting even though I use it with the most intense fondness. Much as I would like to, I cannot control her response to anything I say or do; I can only attempt to influence it (while, in turn, being influenced myself).

And the influence that I have on my daughter or that a teacher has on her students is embodied in the relationships we enact. We are not billiard balls; we do not simply impinge on each other and select our responses to the perceived force. We *know* each other. We have gathered "information" on each other (reputations, addresses, home living situations, previous academic work, perceived patterns of behavior over time) and have formed impressions (sometimes accurate, sometimes not) of each other based on the meaning we have made of that information. At the same time that we

enact that meaning (reveal and reinforce it through our actions), we are, ideally, constantly changing it, shifting our impressions, deepening our knowledge of each other through moment-to-moment interactions. A control orientation—one that emphasizes unilateral exertion of power instead of collaboration—can permit teachers to halt this process of knowing students; it can aim at “rigid homeostatic redundancies” that encourage students’ behaviors to hover around equilibrium, where creative learning (change) is less likely to happen. The systems perspective urges us to live in the process of knowing students, to leave it open-ended, to recognize that every action we perceive is embedded in an inescapably complex reality that must be acknowledged if we are to avoid pathology. Teachers and students are awash in emotions; they are attuned to subtleties in attitude and intention; they are constantly constructing themselves, their authority, their confidence, their perceived rights and responsibilities, their openness to others; they have a history of experiences that incline them to trust or not, to have faith or not. At any given moment, people behave precisely as they are organized to behave (Dell, 1982); by relating to each other, by knowing each other, they have a chance of uncovering signs of that organization and of helping each other to become more fully who they are<sup>6</sup>.

All of this should not discredit the need in most of us, and certainly in teachers (and even in students), for the “psychological experience” of control. Teachers *do* sometimes want students to sit down; many of them *do* want their students to understand how to make, or at least read, bar graphs. The error is not in seeking this cooperation; it is in assuming that a teacher’s unilateral actions can *force* this cooperation. A classroom management technique can only work if the entire class agrees that it will, and this agreement, even if it is made verbally, holds fundamentally at the level of enactment, of relationship. Of course, teacher-student cooperation can rest on relationships of fear, indifference, or contempt just as easily as they can on enthusiasm, trust, and respect. The systems view urges us to consider just how we are accomplishing our sense of control in our classrooms and to confront the hidden messages that accompany our chosen methods.

If, from a systems perspective, teachers can neither cause students to behave in a certain way nor cause them to learn certain things, what can they do? They can enact relationships with students that influence their learning. These educative relationships involve, as has been mentioned, self-knowledge, knowledge of the students, knowledge of the subject matter, and, importantly, a feel for how to put all this knowledge together into effective “pushing”—that is, as Dewey (1932/1990) puts it, “taking hold of [the students’] activities,...[and] giving them direction” so those activities are not “left to merely impulsive expression” (p. 36). Students, if they are to learn, must engage in such educative relationships. It is out of these rela-

tionships that the sense of classroom control emerges; students and teacher "co-accomplish" this sense through co-regulation, which is based on the relationships all members of the class are constantly enacting (Burris, 1998). The systems focus on relationship gives teachers a way to "control" classrooms that corresponds to classroom "reality": a commitment to engaging with the students and with the topics under study in such a way that cooperation—and learning—can organically emerge.

Such engagement is not necessarily easy, nor can it be prescribed. For one thing, the large student loads shouldered by most public high school teachers makes the notion of cultivating educative relationships with every single student appear ridiculous. The assembly line approach to education precludes the relational one. For another, the scope of the relationships teachers can enact in a classroom is necessarily limited by the structure of each actor in the system, and the structure is heavily influenced by experience over time. That is to say, the prejudices I enter a classroom with will not necessarily go away just because I am now behaving as a "teacher"; if a student reminds me of my abusive father, I am in danger of experiencing—and treating—that student in the ways I learned through interaction with my father. The students' prejudices won't easily go away, either: A teacher who expects to engage in supportive relationship with a student who prefers an impersonal lecture mode will probably find herself frustrated, even mystified, by her inability to "reach" him. Mismatches and sheer failures can and will occur, whether they are due to cultural differences, personality clashes, blind spots, or just plain inability or unwillingness to relate. The lesson of systems theory is not to impose a norm on classroom relationships but to recognize the complex influences that constitute successful (or unsuccessful) teaching and learning *in a particular classroom* and to contemplate ways to understand and alter those influences.

It must be said that students, too, commonly "project" onto their teachers. While the term belies the objectivist paradigm (in connoting the projection of an internal reality onto an external object), the phenomenon is undeniable: that is, that students interact with their teachers in ways they have learned through a history of structural coupling with other similar personages in their lives. Depending on their level of self-awareness and self-control, students simply cannot help *not* repeating their interactional histories in the classroom.

Indeed, "disruptive" students often dominate classrooms and, understandably, shift their teachers' focus from relationship to damage control. From a systems perspective, the most incorrigible students need help at a relational level, which includes attention to the various social systems (family, peer groups, etc.) that they belong to. I would go so far as to suggest that students who are not prepared to engage in the types of relationships schools are meant to facilitate should not be in traditional classrooms at all but in settings—

work-study situations, after-school programs (Heath & McLaughlin, 1993), apprenticeships (Lave & Wenger, 1991)—that offer them the support and help they need to grow. Radical as it may sound, it might be wise to acknowledge that some students who act out the irrelevance of school are speaking an undeniable truth: that they actually do need different types of experiences and relationships to help them make sense of themselves and their lives.

Fortunately, we are not enslaved by our histories or our structures. As Maturana (1988) insists, we interact with our thoughts and our feelings just as we do with people and objects. Our ability to reflect, to develop mindful awareness (Tremmel, 1993), to be “present” (Rodgers, 2002), to risk novel behaviors has its own influence on our biological structure. In short, we are evolving, potentially self-improving systems whose structural coupling with others can encourage self-improvement in them as well<sup>7</sup>.

The conclusion that unilateral control is impossible shifts our picture of the entire educational enterprise. It suggests that schools are places where teachers and students can, through awareness, reflection, and risk-taking, improve themselves. This self-improvement happens through interacting, through engaging in relationship, with people and ideas that present themselves in ways that allow for experimental interaction. Again, if we are to influence our students, “*we must fit ourselves to the situation*. We must fit our structure to the structures with which we are dealing” (Dell, 1982, p. 9; italics his). If the ideas we value and hope to teach are to influence our students, the ideas, too, must fit themselves to the situation—that is, we must facilitate the conditions under which our students can structurally couple with those ideas. We must, as Dell (1982) puts it, “go with the reality” (p. 31)—discover our students’ and our class’s organization and effect coherence through informed, if experimental, action. The best teachers already do this; systems theory confirms the wisdom—actually, the biological necessity—of doing it.

It is interesting to consider the final assumption underlying the objectivist definition of control in this light. If we are to allow our students to feel their way into structural coupling with ourselves, each other, and the ideas that are central to a discipline, we must be willing to embrace uncertainty and to expect, at times, chaos. In aiming for the *edge* of chaos, where the most productive communicating (and thinking?) presumably takes place, we will occasionally overshoot. But, contrary to the objectivist assumption, chaos is not necessarily bad. With the right sort of structure and with energy enough, new order—greater sophistication and complexity—can, possibly, arise.

By now it should be clear that, from the systems point of view, efforts to control classrooms are erroneous. Teachers can—and should—have the “psychological experience” of control (Dell, 1982); but their success at getting students to do what they want is due to something far more complex—and laudable—than simple cause and effect. Rather than putting their energy into forc-

ing obedience and learning, teachers could, rather, hone their observational skills so as to more sensitively enact relationships with their students (and structure their classrooms so as to afford themselves time to engage in observation); teachers could practice the art of being authentically "present" (Rodgers, 2002) to students, experiencing and noticing themselves moment-to-moment and accepting and working with their students' moment-to-moment experiences in turn; teachers could earn their students' respect and trust, through a history of consistent, thoughtful interactions, and invite cooperation rather than resistance. This is what "classroom management" is all about: being able to enact healthy relationships, and to encourage others to do the same, that lead to self-improvement, to evolution, to change.

## Conclusion

In truth, making epistemological errors is only human. After all, how many of us are capable of always recognizing and accepting reality, no matter how it is defined? What is any given reality anyway; how do we infer a social system's organization? And how can one person—namely, a teacher—fully or even effectively understand the reality of a classroom?

A starting point, systems theory suggests, is to turn our focus away from individuals—individual students, individual bits of content—and onto the relationships that are enacted between them. The relationships hint at the contours of the underlying organization of a classroom—what roles get to be played by whom, what roles *need* to be played if the classroom system is to retain its identity, what that identity is in the first place—and hence help us to grasp classroom "reality." We might be surprised at what we find: discussions of "hidden curriculum," or the lessons that are learned implicitly through participation in the culture of a school, suggest that schools are better structured to socialize students into obedience (or rebellion?) than to cultivate autonomous, creative thinkers; close analysis of just a few minutes of teacher-student interaction can reveal a tacit agreement between the two to avoid each other and thus miss any opportunities to teach or to learn<sup>8</sup>. Living systems, we are told, have no "purpose" at the level of structural coupling (Dell, 1982); their cognition, or action, is not driven by some meta-level *raison d'être*. As Dell (1982) tells us, systems simply are what they are. We cannot assume, then, that current classroom systems are necessarily organized to accomplish academic learning. Given the relationships that seem to govern our classrooms, what actually *are* these systems in which teachers play such consuming parts?

Here is where the example of therapy helps. Just as family systems can require therapeutic interventions that (one hopes) encourage healthier behavior for all, classroom systems, presumably, can benefit from similar at-

tention. Accepting the primacy of relationships in complex living systems and recognizing that systemic organization—the teacher's, the students', and the classroom collective's—enables and limits teachers in their interactions (the very assumptions that seem to underlie family systems therapy) can lead to two notions: (1) that teachers could use some “professional” help in getting a handle on their classroom's organization and (2) that they could alter their own behavior to invite changes in their students that amount to the desired academic learning.

Dell (1982) warns that, given the nature of living systems, therapists can naturally achieve a coherence with their clients that limits the growth capacity of the clients due to the inherent limitations of the therapist, the clients, and the consensual frame they enact. The same must be true for classrooms: Just as with any relationship, teachers and students function with blind spots that prohibit them from seeing what they are not organized to see. In the therapeutic field, supervisors often review with therapists their work with clients, offering an alternative perspective from outside the coherence, or consensual frame. The supervisor's suggestions can help the therapist subvert the current coherence by encouraging slightly different interactions with the clients that invite novel behaviors from them. The same approach might be useful in classrooms if teachers are to continually co-regulate in ways—possibly unfamiliar, possibly uncomfortable—that support change in all students.

To do this—to apply ourselves to the challenge of better “fit[ting] ourselves to the situation” (Dell, 1982, p.9)—requires a fundamental paradigm shift in the field of education from objectivism to enactivism, or the systems perspective. As I mentioned earlier, our best teachers are able to “fit” naturally (see Burris, 1998, for discussions of at least two such teachers), but many more are not. If individuals can seek therapy to help themselves change, why not classrooms?

The therapy I refer to here is not psychoanalysis; it is systemic analysis of a dynamic social system. It is understanding the relationships that constitute a social system and exploring the human elements that contribute to those relationships: emotions, intuition, love, awareness, etc. It is considering thoughtfully what “learning” is: what kinds of changes teachers should encourage in themselves and others, what kind of person any of us hopes to become. It is developing the capacity in teachers (and in their supervisors) to discern pathology in classroom interactions and to correct it. The groundbreaking work of Maturana (1978, 1988; Maturana & Varela, 1980, 1987) and others and Dell's (1980, 1981, 1982, 1985) courageous application of systems ideas to family therapy have opened the way for educators to make this paradigm shift for themselves: to reduce their epistemological errors and “go with the reality” in their classrooms.

## Notes

1. Davis, Sumara, & Kieren (1996) make a similar argument to mine in relation to teachers' "curriculum actions," or teaching methods.
2. Consensual frames are co-constructed, most often completely tacit, parameters for communication. While they are, through unanimous participation, constraining, they are also completely flexible, open to ongoing influence from the participants (Fogel, 1993; Hanks, 1996; Tannen, 1979). The notion of "consensual frame" as I understand it is akin to that of "context" and "culture."
3. Dissipative structures are, according to Nobel Prize winner Ilya Prigogine, open systems (or systems that use energy from their environments) that spontaneously self-organize into higher levels of complexity in conditions that are far from equilibrium. Positive feedback loops—feedback loops that increase certain behaviors rather than dampen them, as negative feedback loops do—play a role in this self-organization.
4. But it still matters what they think about. Systems theory holds that the components of a system—the actual instantiation of the system's organization—are important, but it emphasizes the centrality of the relationships that hold those components together. In an intellectual system, then, the ideas, or content, are certainly important (though ever-changing), but it is the relationships between those ideas that constitute the system's identity.
5. Our linguistic ability to describe any mutually constitutive phenomenon is limited by the current English lexicon, influenced as it is by the objectivist—or, as Spender (1980) would have it, masculinist—paradigm. Up until a couple of decades ago, our ability to mathematically model the behavior of more than two mutually influenced moving objects was limited by our reliance on linear equations (Laszlo, 1996). Using non-linear mathematics to describe complex phenomena has revolutionized systems theory (Laszlo, 1996); the English language, however, still lags behind.
6. This statement implies that "who they are" is a stable, become-able self. In fact, that is not true from a systems, or enactivist, perspective: the self is constantly emerging and has no absolute identity. For a fascinating discussion of self and enactivism, see Varela et al. (1991).
7. I do not mean to imply that education puts teachers and students on an increasingly upward evolutionary trajectory. Rather, I am opposing the notion of "self-improvement" to Dell's (1982) "rigid homeostatic redundancies," suggesting that we can help ourselves and others break out of pathology and into different, healthier behavioral worlds.
8. In a class he conducted at Stanford University in the spring of 1992, Ray McDermott showed a video of a teacher and her student, "Maria," interacting in this way during a meeting of the "bottom" reading group.

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