Dissection & Simulation: Brilliance & Transparency or Encumbrance & Disruption?

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Introduction

In his influential essay on “Digital Natives, Digital Immigrants” (2001) Marc Prensky encourages the development of simulations, or of educational video games, for all types of curricula. He boasts that there is no subject too involved or sensitive for which he cannot suggest “a game or other Digital Native method for learning it.”

*Classical philosophy?* Create a game in which the philosophers debate and the learners have to pick out what each would say. *The Holocaust?* Create a simulation where students role-play the meeting at Wannsee, or one where they can experience the true horror of the camps, as opposed to the films like *Schindler’s List.* (6)

But what would “picking out” what a philosopher might say be different from being in such a debate? Or, what might be wrong or inappropriate about trying to simulate or create a game for the “true horror” of the concentration camps?

My purpose in this paper is not to consider issues regarding “true” philosophical debate or the representation of the Holocaust (e.g. Adorno’s warnings against “poetry after Auschwitz”). My intention is instead to take a look at some of the experiential limits of simulation technology, and consider the significance of these specifically for education.

I focus particularly on the experiences of laboratory and simulated dissections, of the kind that are carried out in high school or in the first years of university biology. I begin with a brief descriptive study of the experience of these two types of dissection, and follow with a more general analysis of “virtual” or the “hyperreal.”

Descriptive Study

In the context of various debates about animal dissection, many studies have been published using ethnography and other methods to examine this process and student responses to it. As a result, there is a range of experientially rich accounts of dissection in both school and university science labs. Accounts of classroom dissection typically follow a common sequence of events, punctuated by experiential moments of particular prominence.

One moment is the experience of an initial encounter with the animals to be dissected. Students typically notice them as they walk into the classroom, spotting “flattened rats in a jar” (interviewee), “little dead pigs lying in the sink,” “a jar of pickled animals,” or a creature simply “tossed... into a plate” (quoted in Solot & Arluke, 1997, p. 34). This is accompanied by strong olfactory impressions, including the smells of formaldehyde, which “refuse to leave your hands” as one interviewee says, and of rotting flesh, which was said to “get a little riper with each passing session.”

A second experiential moment in the dissection that seems to stand out is the act of touching and above all making the first incision into the dead animal or carcass:
The initial incision ...the transforming cut and the only one made into a body that bears the obvious markers of “animal”... is frequently the hardest one for students to make. Even some students who had never dissected predicted that “opening” the animal would be the hardest part. (Solot & Arluke, 1997, p. 35)

Students’ comments give special emphasis to the embodied and in a sense, incorporeal character of this moment. Here is one student’s account in a study of the “high school dissection experience” involving a fetal pig:

The first day, I thought I was just gonna be sick when Linda was actually slicing this pig open. I felt nauseated.... I don’t handle blood and that kind of stuff very well. I was very glad that it didn’t have blood in it. If it was a pig that had just died and had blood, I would not have been able to handle it.... (Barr & Herzog, 2000, p. 64)

Of course, there are well thought-out and articulated reasons for the inclusion of dissections –either in-class or virtual-- in basic science and biology curricula. These reasons include acquiring knowledge of “the structure and function of organs” (Jordan School District, 2004) and the ability to safely select and use of dissection “apparatus and materials” (Sackville High School, 2008). However, speaking experientially, impressions of disgust, nausea and repulsion initially seem to overwhelm other, less visceral and more intellectual aspects of the in-school dissection.

A virtual frog dissection provides a number of points of conspicuous contrast to this. [4] Taking the simulation at http://www.frogguts.com as an example, this dissection experience begins by clicking on a link on a course website. After waiting for the software to load, the student is greeted by an animated homepage advertising a number of different demo simulations. Choosing the appropriate option, an image of what appears to be a life-size bullfrog fills much of the browser window. First, the student is asked to fasten the frog to the tray, and this is accomplished through a series of mouse-clicks. Next, a red, line running up and down the length of the frog’s abdomen appears. The student is instructed to “make 3 incisions along the dotted red line.” This is achieved by clicking and then dragging the cursor along the red line marking the frog’s glistening and smooth but mottled underbelly.

Any sense of unease that one might feel at taking a simulated scalpel to this simulated surface would be in conflict with the absence of other sensations accompanying this act: No unpleasant sounds or unusual feelings of resistance or elasticity, no moist membrane to puncture and incise are detectable --only the frictionless gliding of the cursor across the computer screen. Following the incisions into the belly of the frog, the dissection software shows the student a pair of scissors. The student is then asked to “cut upwards with the scissors through the muscle tissue.” Clicking on the scissors a few times, the student cuts along the tissue. Half way up the belly, though, text pops up advises the student to “twist the scissors to avoid cutting the heart under the ribs.” To do so, the student clicks on yet another icon, and the scissors slip over to one side, allowing him or her to continue cutting. Finally, the internal organs of the frog are visible, and can be examined and identified through the use of a magnifying glass and writing pad are now made available. When an organ becomes visible through the magnifying glass, a label identifying it appears; a click of the mouse causes the name of the organ to be added to the notepad.

The manifold sense impressions that assaulted the students in the lab are either absent or very much muted in this virtual exercise: There is no smell of formaldehyde or rotting flesh; there is no need to fear
that blood or any other liquid might come “spurting” from the creature being dissected. Also, instead of first seeing the animal “lying in the sink” or “flattened” in a box or jar, the first experience with the frog is mediated by an advertisement; a direct encounter occurs while waiting for it to load in the browser window. Handling and even cutting into the animal, furthermore, is a question of clicking on the correct button (the scalpel) and gliding it, in effect, across part of the screen.

The next conspicuous moment in the experience of the lab or classroom dissection has been described as one of distantiation or “de-animalization” (Solot and Arluke, 1997, p. 35), and has already been covered in the final stage of the simulation just above. In the case of the lab dissection, Barr and Herzog report that some “students cover[ed] the face of the animals they were dissecting,” with one of these students explaining:

Every time we’ve worked on it (the pig) the face was covered. I couldn’t cut the face. I could watch, and once the face was cut it didn’t look like a pig anymore, and I could deal with that because it looked like - you know - a scientific experiment to me. (2000, p. 59)

In the place of a strong intercorporeal link between the dissected animal and the student doing the dissection, a different relationship between the two is gradually emerging. Instead of being marked by a visceral, acutely empathic response, concerns of a more intellectual manner come to the fore:

One interviewee describes what was revealed in the rat’s insides as a kind of “marvel: all of these little body parts, fitting and working neatly together like a sort of beautiful wet machine.” [Barr and Herzog say they “heard comments like “God, his liver is like a mushroom or something. His heart’s kinda tough. Feel that,” and “look at that. Ooh, its got a weird texture” (2000, p. 63).

It is still worth noting, though, that a particular, but not overwhelming sensory richness remains, with tactile sensations in particular being foregrounded in the passage above.

The Virtual versus the Organic

The experiential possibilities and limitations presented by simulated and in-school dissections can be further explored by looking specifically how virtuality or the hyperreal is considered in philosophy. [5] In a critique of “hyperreality,” philosopher Albert Borgmann characterizes virtual contexts and objects as being (among other things) “pliable,” “brilliant,” “discontinuous and disposable” (1992, p. 87-102). Borgmann describes hyperreal objects as being pliable specifically in the sense that they can be “entirely subject[ed] to…desire and manipulation” (p. 88). This pliability is perhaps most vividly illustrated in the online dissection in the ease with which the virtual frog can first be sliced open, its organs revealed, then inspected with a magnifying glass, and finally noted with pencil and paper. As mentioned earlier, no one tool or task in these activities requires a particular disposition or comportment that would differ from any other. For all of these steps or tasks, only relatively repetitive movements of the computer mouse are needed.

Borgmann describes the discontinuous and disposable characteristics of hyperreal objects and environments specifically in terms of their relationship to context:
To be disposable, hyperreality must be experientially discontinuous with its context. If it were deeply rooted in its setting, it would take a laborious and protracted effort to deracinate and replace it. Reality encumbers and confines. (p. 95-96)

The description of classroom dissection above is rife with examples of encumbrance and confinement: This begins with the persistent odor that is a part of the preserved animal’s “context,” and extends to the irreversible incisions that might render certain organs absent or unidentifiable. Neither the process nor the product of physical dissection lend themselves to discontinuity or disposability in the sense that Borgman associates with the hyperreal: the toxic remains of the dissection are also all too persistent, and present particular challenges for safety, cleansing, and disposal. By way of contrast, undo and redo options or buttons on the virtual dissection are not so much convenient features as they are intrinsic properties for this virtual world—a world in which an object can be refreshed, rebooted or simply shut down at will.

Borgman describes the “hyperreal” quality of brilliance, in terms of an “absence of noise” and a heightening of an object’s “attractive” features. The “truly brilliant reality,” Borgman says, “would exclude all unwanted information,” resulting in an experience in which only those aspects of explicit relevance are provided. In the online dissection, all (or nearly all) encumbering physical and intercorporeal aspects of the activity are removed; what remains is indeed brilliant in Borgmann’s sense, from the X’s and dotted lines that appear in the places for fastening and incision to the appearance and disappearance of instruments, labels and other visual prompts.

The inclusion of “brilliant” features in virtual contexts—and the systematic exclusion of all forms of encumbrance and confinement-- is remarkably consistent with the way that instructional simulations are conceptualized and designed. Specialists in “instructional design” sometimes reference a quasi-mathematical formula that captures these processes of inclusion and exclusion. For example, Jacobs and Dempsey explain:

one only needs to simulate those events or characteristics that allow the learner to perform in a proficient manner when performing in the operational environment, i.e., the real world. This representation of the characteristics of simulation has been characterized by Gagné (1962), and later by Clariana in the following formula:

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\text{Simulation} = (\text{Reality}) - (\text{Task irrelevant elements}).
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(Jacobs & Dempsey, 1993, p. 200)

Using Borgmann’s terms, this means that the dissection excludes “noise” that would “encumber” and “confine” the user. And it includes those features—such as labels, pins, scissors and a magnifying glass—only when their presence is instructionally and practically desirable. The end product, then, is a simulated experience of a world which is as “pliable” and accommodating of “discontinuity” and “disposability” as possible; it is as fully deracinated or uprooted from any environment—laboratory or otherwise— as design will allow. In short, the simulation can be said to be “brilliant” in a way that is specifically instructional or educational.
But important differences remain. First, the object of concern in the classroom dissection is organic in its origin, development and growth, whereas the other is designed according to specific goals or objectives. Of course, this process of development and growth does not revolve around explicit, educational objectives, but occurs for “reasons” (if they can be called that) which are rather different. To summarize simply, the virtual object is designed by someone for explicit human (educational) purposes, whereas its physical counterpart develops on its own for purposes that are (at best) implicit and are not directly reducible to human ends.

Like any other piece of software, students engage with the simulation via an “interface.” This refers to the means by which the various components and tools of the simulation are accessed and manipulated. A quick look at the language used in the literature of interface design reveals some interesting patterns related to phenomenology. This vocabulary for interfaces includes words such as “seamlessness,” “transparency,” “translucency,” “playability,” “learnability,” “flow” and “intuitiveness” - all of which designate desirable design attributes for interfaces (e.g., see: usabilityfirst, 2010). This vocabulary makes it clear that one of the goals of interface design is a kind of comfortable certainty and familiarity. And this type of experience, moreover, is clearly resonant with the kinds of terms Husserl uses to describe intentionality. Intentionality, of course, refers to the everyday purposes, plans and categories that connect us with the world around us. It renders the world familiar, enabling us, as Husserl says, to “live in certainty of the world,” and in this sense sustain the everyday, commonsensical “natural attitude.”

Computers and particularly their interfaces, in other words, are designed to anticipate and facilitate what we want to do, when we want to do it. In the dissection exercise, as a very simple example, scissors appear precisely when an incision is required, and a magnifying glass takes their place when closer inspection is needed. This smoothly flowing movement from one tool to another is intended to provide students with an experience of uninterrupted transparency and flow, and a sustained but prereflective assurance of “living-in-certainty-of-the-world.” The figurative “threads of intentionality” that Merleau-Ponty says are “slackened” through the phenomenological reduction or the suspension of the natural attitude (1962, p. xii),¹ are in this case carefully kept as short and taut as possible. Possible experiences of strangeness, otherness, disruption and surprise are in this sense assiduously avoided. The student, in other words, remains in the world of computer controls and images, a world of culture that is all too familiar and certain. Exaggerating slightly, one can say that what the student is confronted with in the simulation is not something of alien or other, but of the self: The student, in short, experiences elements of the self, and is encouraged to engage with these only in a way that already frequently repeated and rehearsed.

Attempts to simulate experience of encumbrance and inconvenience on the computer highlight further important differences that separate online dissection from that undertaken in school: In particular, and as already indicated above, each involves rather different experiences of care. A very specific example of this is provided by the warning in the frog dissection simulation to carefully “twist the scissors to avoid cutting

¹ The full quote is: "Reduction does not withdraw from the world towards the unity of consciousness as the world's basis: it steps back to watch the forms of transcendence fly up like sparks from a fire; it slackens the intentional threads which attach us to the world, and thus brings them to our notice. It, alone, is consciousness of the world, because it reveals the world as strange and paradoxical."
the heart under the ribs.” What the simulation actually requires at this point is a mouse-click that is no different –no more “careful” or skillful-- than any other. To simulate this type of care, and the encumbrance and confinement that it presupposes, is to work against the very logic, design and purposes of the computer and its interfaces. Attempts to simulate encumbrance, and confinement --and other experiences like deprivation or deprival-- end up being experienced as either trivial or futile. They are seen as arbitrary or unnecessary irritations, rather than as challenges inherent to the task itself.

If the simulated dissection thus unavoidably confronts the student with aspects of her world or herself, then the classroom dissection can described as presenting the student encounters with that which is not the self, with that which is “other.” The “other” according to phenomenologist Bernard Waldenfels is something that is manifest as a kind of disruption of the self, its world, its plans and intentions. Waldenfels goes so far as to describe it as an “upheaval,” and he adds: “As far as such upheavals are concerned, one can only yield to them or withdraw from them” (2007, p. 30). One could say that this choice between yielding and withdrawing captures the situation faced by the students in the in-school dissection exercise.

Like all experience, pedagogical experience is about an encounter between self and world. This experience can have the character of an upheaval or disruption, or it can be planned and optimized in advance, down to the finest detail. Both of these types of experience —experiences of inconvenience, encumbrance, or disruption and of familiarity, pliability, flow, and brilliance-- are important in education. For example, the attribute of “brilliance” that Borgmann ascribes to the hyperreal can be seen as being of significant pedagogical value (as the above reference to “educational brilliance” already suggests): The elimination of irrelevance or noise, and the foregrounding of that which is relevant or important is —with good reason—an indispensible part of lesson planning and instructional design processes. In many contexts, “educational brilliance” —and the associated phenomena of flow, transparency and learnability—makes excellent sense as a pedagogical goal. But we should not conclude from this that such experiences represent the sum total of what is desirable for education. Opacity, disruption and upheaval —rather than always requiring withdrawal or protection—need to be studied and cultivated as learning experiences. Experiences that are emphatically embodied, mediated affectively and viscerally, are intrinsic to what it is to know, to learn and to educate. At the same time, it is evident that these experiential elements cannot be captured or engaged through the systematic categorization and planning. By definition, disruption and upheaval are mutually exclusive to processes of systematic planning—and run against the grain of the interfaces through which planned instruction is increasingly delivered. Opacity, encumbrance and disruption—with the upheaval and uncertainty they imply— are instead disclosed only through a slackening the figurative threads of intention, categorization and planning. As a rigorous means through which these threads can be loosened and the grip of intentionality relaxed, phenomenology takes valuable first steps in bringing this experiential and educational realm into focus.
References


Waldenfels, B. 2007. The Question of the Other, Hong Kong: Chinese University of Hong Kong.