

## Mental Diagrams and Maps: Art's Role in the Development of Cognition

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**ABSTRACT** Consider Behavioral Art (BA) not as a thing, nor as an objet d'art, but as a function. If we do so, we must make a sharp distinction between the artifact passively on display, imbued with *a priori* meaning as matter of unfounded faith in a Platonism, labeled only synthetically by its contextualizing environment (e.g., an art gallery, mathematic equation, or grammar), on the one hand, and the active process of creative experience, whether of the artist or audience member where meaning is a cognitive assembly process, as in Constructivism, on the other. Though the mind clearly instigates this process, it fundamentally involves the coordination of gross and fine motor skills, well beyond the eye rapidly reorienting the fovea. Furthermore, these art-systems are generally facilitated by execution of formalized logical syllogisms, which implies code, further implicating computer art. Thus, an important aspect of BA is "borrowing intelligence" from a humanly organized source (e.g., a painting), applying it to computation, and re-rendering it in a humanly detectible modality. In this scheme, BA exploits our species' unique impulse to attach meanings to stimuli. The *embodiment* of metaphorical concepts we can finally identify as *mapping*.

### INTRODUCTION

Behavioral Art (BA) is the practice of employing artistic experimentations during the investigation of human behaviors and motivations. As art is naturally associated with aesthetics, it follows that one would assume computer art follows this aesthetic premise. While hardly inaccurate, this path can be perceptually limiting. BA, and its function in understanding human behaviors and motivations, may be profoundly different. When considering BA, we are required to abandon the notion of aesthetics, at least temporarily. We begin by thinking instead about linguistics and cognitive development in a somewhat novel way. For instance, when discussing cars, it is quite ordinary to tacitly assume that the car is used as mode of transportation; we do not ordinarily assume the discussion

will be about the car as a couch. However, when discussing seating in general, car seats are likely to be considered. Likewise, the computer's unique and unprecedented ability to execute code is implicit in our discussion of computers. Just as one could use a car exclusively as a couch, a computer certainly can be used solely for media. Furthermore, media creation, presentation, and/or editing have long been accomplishable using analogue tools. There would be no reason in a discussion referring to media, for example, that arbitrarily mentions certain tools and not others.<sup>1</sup> However, this possible case is not pertinent to our investigation here. Moreover, the influence of psychology on human experience is far more central to BA.<sup>2</sup>

When we discuss the process by which we conceive of a solution to some problem through a logical syllogism or *algorithm*, we find one such process excels far above the others. Each form of logic has its particular formalized codes; in discussing BA as a programming tool, the mention of couches or media are mere touch points in understanding how the artistic can become a wedge in the better understanding of human behaviors and motivations. Though these may possibly occur in isolated cases, they are unrelated to programming and thus our discussion here regarding this programming tool.

### DEVELOPMENT

We humans are unique from other species, in that we undergo an unusually long period of development. Since this is "costly" in terms of survival fitness, it is unlikely to be accidental. It also indicates that the minds we enjoy are qualitatively different than minds assembled for briefer purposes. Shorter-lived organisms and machines function sufficiently without the need to fine-tune behaviors for an unpredictable environment. Though Behaviorism was generally abandoned decades ago, the model of *instrumental conditioning* (IC) remains deep-rooted in popular conceptions about learning. One ramification of IC is the view of communication proposed by Claude Shannon.<sup>3</sup> Even that children are tested and receive grades is a form of reward/punishment aimed at training for a desired response. Though many children do benefit from this traditional methodology, it is hardly universally helpful, and can even be debilitating for students.<sup>4</sup>

The general learning strategy begins prior to birth, and is most conspicuous in youth, but continues throughout life. In its initial creation of a haphazard network of many connections during periods of *exuberance*, the brain is built for nearly any species-typical cognitive function. These connections have not yet undergone the strengthening that occurs with repeated use. However, this all-pur-

pose brain would then operate too slowly to be of much use, and efficient processing requires we prioritize the expenditure of our most precious resource. At around two weeks, the vast majority of these unused connections are abandoned by a fairly consistent schedule of *pruning* in the brain.<sup>5</sup> Less extensive pruning occurs around age two, and again around age six. Still others occur later, though never again of this magnitude. This schedule roughly corresponds to the Piagetian stages of development, from about two to seven.<sup>6</sup>

**A GROUPING IMPULSE**

A peculiar and unique tendency in humans is to elect to divide fluid stimuli impulsively, such as the *allocentric* (as opposed to *egocentric*) demarcation of space into meters, sounds into frequencies, frequencies into discrete pitches, the rainbow into hues, and so on.<sup>7</sup> Like language, every culture, it seems, has some version of a music theory. The tendencies and rules may differ in (learned) details, but only between peculiarly limited param-

eters, making music a prime candidate to compare with language.<sup>8</sup> Generally, perception is culturally framed in composition and perception.<sup>9</sup> Thus, some system must be shared between composer and listener for the music to make any sense, and have particular observable neurological effects.<sup>10</sup> Noise must be potentially compelling before the brain determines that it is music and worthy of a fuller assessment.<sup>11</sup> The role of some music theory is similar to Chomsky's deep structure, as revealed in his famous quasi-sentences. While "Colorless green ideas sleep furiously" may strike one as potentially meaningful at first glance, it is unlikely that "Furiously sleep ideas green colorless" does.<sup>12</sup>

**ANTHROPOMORPHIZATION AS THEORY OF MIND**

These messages need not come from intelligent sources, however. Rather, the recipient assumes the intelligence of the source. Of note here is *assessment theory*, in particular the famous experiment by Fritz Heider and Mary-Ann Simmel, in which subjects were shown an animation

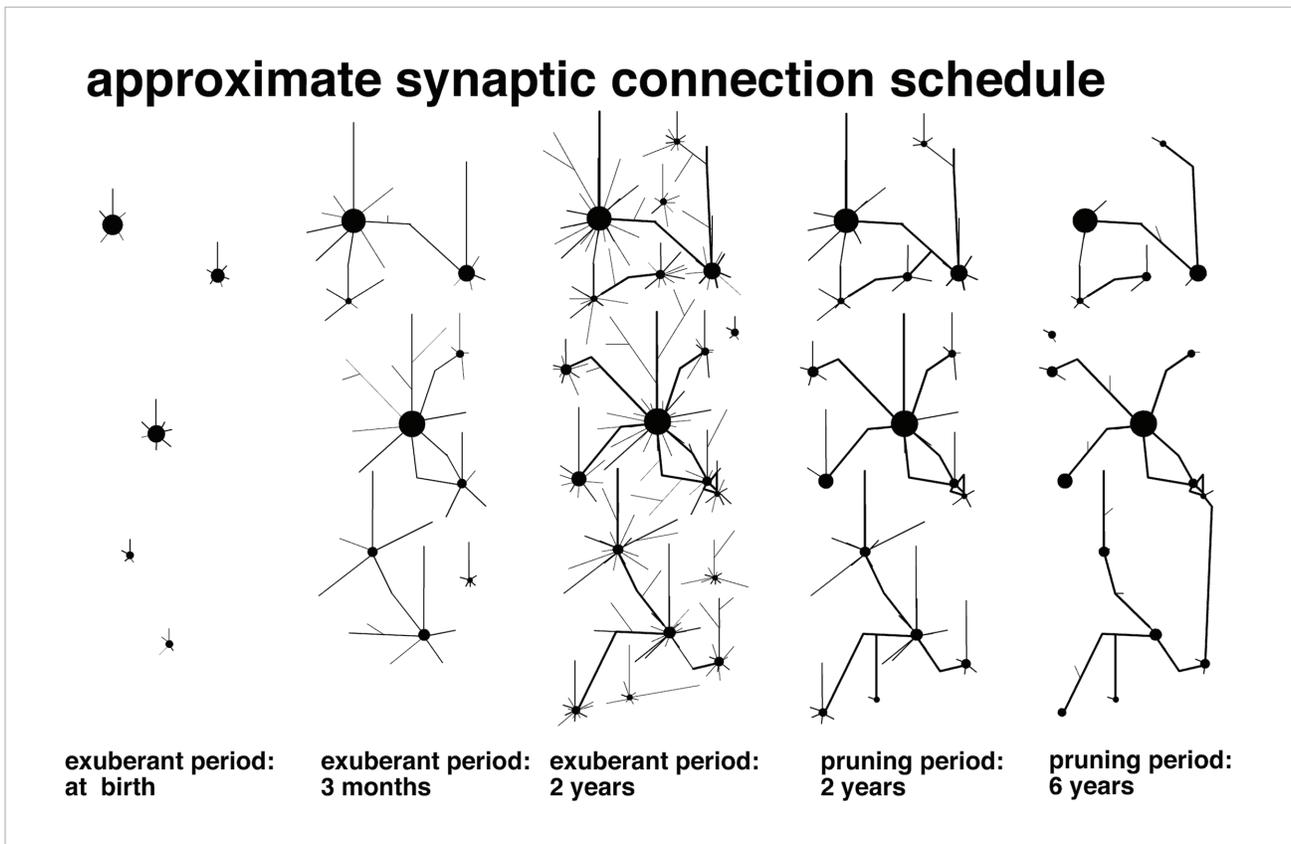


FIGURE 1: An approximate illustration of pruning and exuberance, showing how unused connections between neurons are lost drastically beginning after about two weeks

of simple geometric shapes.<sup>13</sup> Afterwards, the subjects, in near unanimity, described the events on screen as if the shapes had personalities and volition. Likely, each individual did realize that these obviously drawn shapes could not possibly behave in social ways. Regardless, it is notable that the subjects suspended belief to the extent that it becomes vague exactly how much these subjects insist their descriptions reflect their interpretations.

Though we might argue that the ability to contextualize information, even symbolically, allows for beneficial prediction which increases fitness, it is not evident how envisioning a holistic world with a degree of detail would be essential to prediction of some isolated event, which could easily be conceptualized/detected independently.<sup>14</sup> A crucial distinction need be made between volition and execution, for instance in attributing “intelligence” to entities that appear animated. Computers manage the assembly of computers; but *recursion* is hardly sufficient. What is intelligent is that the execution is not an end, but a means concocted with no explicit connection provided between the goal and the strategy. In this scenario, there is no reason to believe the computers coming off the assembly line are intelligent. The computer/manager is simply obeying code. Only the human who designed this system as a solution to a personal need shows actual intelligence, the managing machine cannot be said to have needs. However, attributing personality traits to the inanimate computer/manager often fools not only those in search of evidence of *artificial intelligence*, but many of us who merely engage in tool-use during play.

However, before we decide that this *impulsive projection of communicative meaning* is an inaccurate—and thus “wrong”—view, consider alien abduction stories.<sup>15</sup> In many cases, the truth of the matter is not actually provable, nor is ultimately relevant. What is often the case, these soon-to-be-abductees suffer from some experience that is inexplicable within the world they have constructed. This event need not be traumatic, but may simply be a temporary paralysis of mundane causes. However, in the larger scheme, these subjects may feel life has been unusually difficult, disappointing, and depressing. Though alien abduction would hardly be the first explanation to justify the disconcerting event, eventually all other reasons fail to satisfy. Alien abduction further has the benefit that the abductee, who previously felt undistinguished by luck, can now feel chosen. A peculiar result, that Susan Clancy found, was that once the dubious alien abduction story was accepted, the abductees outlook changes for the better.<sup>16</sup> A possibility then is that

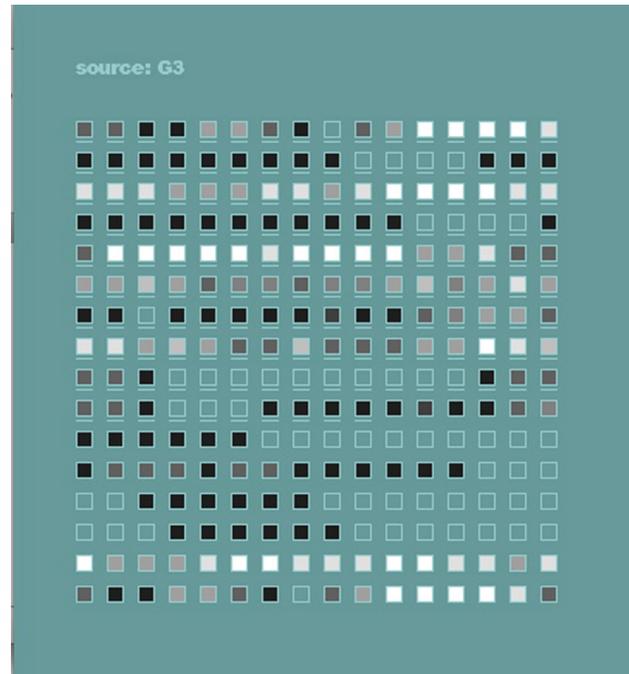


FIGURE 2: Compos-o-matic screen shot.

the alien story, though perhaps even false, was a “white lie” invented by the psyche to heal a much broader problem in processing experience. Active, devout response to other worlds, fantasized or concrete, as if these worlds are realities, can be psychologically beneficial.

#### UTILIZING SENSATION

Modalities are a conventional distraction from the core concept here. Though a fuller neurological discussion as to why this is the case takes us well beyond our scope, suffice it to say that BA is not Visual Art, nor music; it is not media, but what media does. A piece which gathers text from RSS feeds and converts the ASCII characters into musical pitches, though obviously sonic rather than visual, would certainly qualify as mapping. However, in the larger scheme, this experiment failed in the way it set up a relationship between the intelligently organized text and chaotic output of the musical composition software. In *Compos-o-matic* (2008), information was gathered from multiple feeds and thus from multiple authors, with multiple unrelated contexts. No singular organizing scheme came through. Imagine if single notes were selected from various compositions and strung together *at random*, the resulting music would not reflect what each note was leading toward. This is a peculiar relationship, where the individual notes are somewhat arbitrary out of context, but are essential



building blocks in creating a context (see FIGURE 2).

In *You've Got Bugs!* (2006), the conversation is similar. The screen depicts a closed-circuit video of the space in front of the screen, which includes the audience member. The scene is somewhat distorted and discolored but easily recognizable. One may wonder why this particular unappealing effect has been applied, and then the answer appears. Small, virtual insects crawl onto the scene. The audience member does not know at first, but the insects are crawling toward points of motion. Thus wherever the observer moves, the bugs follow. In the course of discovering what is happening on the screen, the audience member must behave in ways that the gallery setting would not predict. In fact, without this explanation, it would be rather unclear as to why the gallery visitor is ducking and swaying. This unpredictable behavior is rather conspicuous (see FIGURE 3 & 4).



Nonetheless, facilitating this conversation, while essential to BA, is not the end goal. Two more examples may help to clarify. Several years ago, I had created *HTTP in the House* (2005). The piece allowed visitors to type in a URL. The text found there was rearranged and combined with rhyming words, to create rap lyrics of that selected page. The piece was very popular for a (brief) time. Gradually, however, as it became less common for web users to actually create pages from scratch, rather than use automated forms such as Facebook pages and blogging platforms, it became more technically complicated to gather that text. What resulted is that previously, the server script might have taken a few seconds to produce the result, later iterations found the script taking several minutes, and the data merely forwarding instructions for a browser. Though interesting at first, about three years later, the piece was not at all.

*Compost* (2008, 2009) was originally created for a specific upcoming show where artists created a garden using various new media technologies. This piece analyzed audio from live analog TV signals and translated the sample rate-worth of variables into parameters for virtually growing vines, flowers and leaves on the screen. Ordinarily, when a fluid dynamic is depicted in a rigid, precise way, it can give the appearance of mapping; this does the opposite. A map is created from a mechanical array of values to render a chaotic flux. Shortly after this, the piece was invited into a show in Washington DC at a gallery deep under ground. Additionally, the transition was underway in the US from TV broadcast analog signals via airwaves to digital signals (primarily) via hard cable and satellite. It was hardly guaranteed that any live TV signals could reach this gallery. As a slight

FIGURE 3 & 4: *You've Got Bugs!* Pictures of installation with and without audience member.

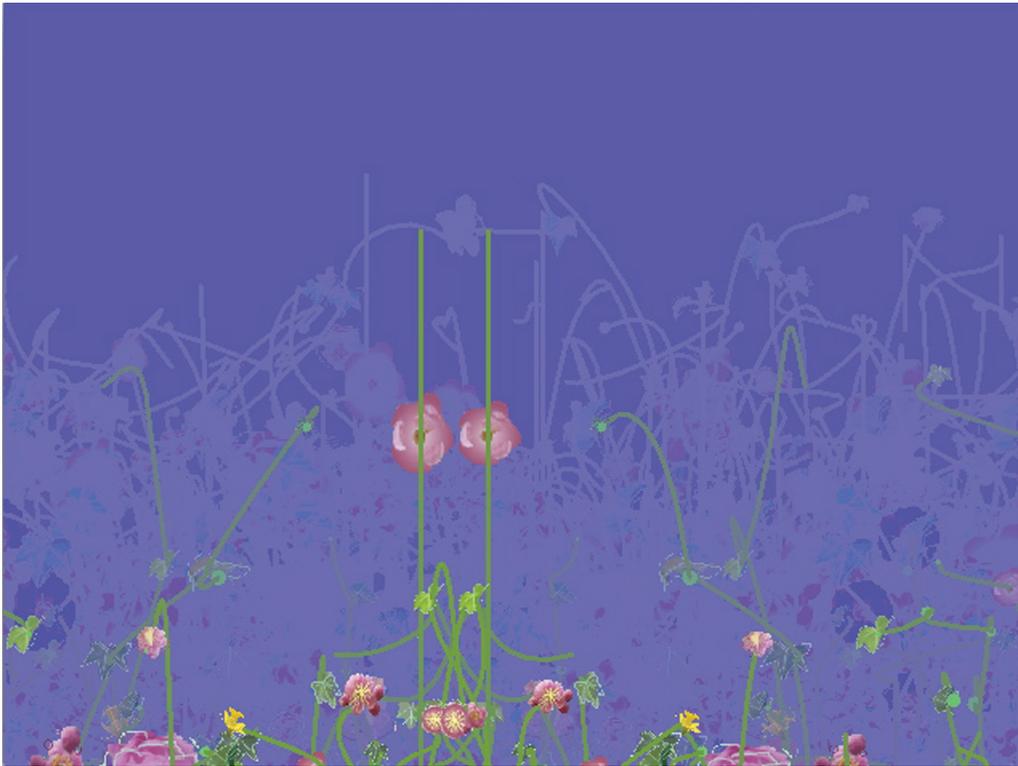


FIGURE 5:  
*Compost* (2008  
& 2009) with pho-  
tographer K Staelin.  
Screen shot.

modification we played vintage commercials saved to a DVD, allowing the audience access to the player.

The point here is that BA is more akin to performance than to Visual Art in its inherent ephemerality. While we might appreciate Shakespearean jokes or comedy shows from the 1970s intellectually, it is not likely they will cause us to roll in the aisles uncontrollably. Though art might be viewed as a product of aesthetic expression, it is also a means of communicating the current concerns of a given culture. An important aspect of communication in general, and BA specifically, is that both actor and observer play an active role; the listener adjusts to the speaker, but the reverse is as essential. Emulating older operating systems (as time moves on with no regard to technology) does not preserve BA. The essential component is not the software, but the mind of the audience member.

#### CONCLUSION

Though art as a medium of an aesthetic is certainly viable, the artwork serves as the end to the process. Art can also be employed as a means toward further investigation. In particular, we ask, "What is *not* interpreted as art and why?" Because the costs in cognitive processing must be rather significant, we can hone our concern

further: Why would our species bother to make such a distinction? Precisely, how might an ability to map abstract concepts and concrete sensations enhance fitness, and thus be retained by evolution? One might be quick to argue that this ability would be useful in planning cooperative hunting, for instance. One might also imagine ancestors drawing maps of attack as primitive football coaches with sticks in the dirt. But, we can also imagine that this cave-dwelling coach could somehow gesture to the diagram, perhaps even point. The rather complex ability on the part of the other hunters, to distinguish a designed signal from a non-designed signal, is not obviously essential. Why, if this ability merely serves as planning, might we be enthralled by some pieces and disgusted by others? Yet, in our modern environment, the impact of this ability, not easily recognized, but shown through BA, the practice and appreciation for art is profound.

#### BIOGRAPHY

*Judson Wright* is a computer programmer who studies cognition. His software experiments/artwork have been featured extensively around the world and on the web since 1996. He graduated from Brown University and has an MA from the Interactive Telecommunications Program at New York University.

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