The Outlines of an Art Machine

Tirtha Prasad MUKHOPADHYAY
Department of Art and Management, Universidad de Guanajuato
Salamanca, 36885, Mexico

Victor Hugo JIMENEZ
Department of Art and Management, Universidad de Guanajuato
Salamanca, 36885, Mexico

ABSTRACT

In this paper we propose to examine the cognitive aspects of artistic creation. Art objects are supposed to elicit emotional responses in the viewer. Behavior related to the making of art objects are analysed. Both visual art and artistic verbal expressions are considered for analysis. Emotional appraisal is claimed to be indispensable to artistic creativity, as opposed to appraisal objectives in design cognition where structural variation and the resulting innovations produced could well be emotively neutral in their appearance. The authors propose a heuristic and connective-functionalist thesis of machine art following identification of responsive elements for art as they are laid down in precepts of different philosophical traditions. The insights deriving from ancient and contemporary traditions demonstrate that innovative variation in art presupposes the presence of a set of corresponding variations in visual patterns or linguistic expressions that typify a range of expectations for target objects. A database of categorically defined 'genre' of art should exhibit visual or verbal preferences in interactions. Binary operations may be domain specific depending on the kind of art that is under scrutiny, but from a philosophical perspective, emotional representation must be assumed to be indispensable across generic requirements.

Keywords: Art, Cognition, Emotion, Connectionism, Functionalism, Heuristics

1. INTRODUCTION

How could we describe cognitive behaviors that regulate the making of art works, especifically within the domain of arts disciplines, like painting or sculpture, or as it may appear in more contemporary expressions like illustrations and videos, as much as it occurs in all the new media arts. We may also consider the literary arts, involving verbal expression, as a means of artistic innovation where human language acts as a medium of innovations. We could also, more importantly, think of 'art' broadly, as a generic activity and hope to isolate its tokens from other processes that have innovation as a key element of motivation. Of course, artistic processes quite evidently involve representations that are visible in innovative functions of complex systems. Simon (1988) explains that the search for innovation is an intrinsic behavioral tendency for human beings and that, as such, it drives creative people to produce more and more complex representational systems [1]. But much less has been stated about the extra-representational aspects of the 'arts', namely, its affective demands on the spectator. Even though arts are recognized as an important social or cultural activity where innovations determine the end-product and the success of consumption, there is no dedicated discussion on how the arts should function for human observers. Efland refers to the uneasy connection that exists between arts and psychology and makes a case in favor of integrating visual arts in the curriculum of cognitive sciences [2].

In this context we wish to ask if 'artistic cognition', like in its associated discipline, 'design cognition', should also function like a modular process within our neural systems, just as Taylor explained all creative activity in terms of empirical psychology [3]. The notion of modularity emerged later in the writings of Jerry Fodor [4]. Further, a computational account of 'artistic cognition', distinct from 'design cognition' has not been explored in any detail. The closest study that helps us find some parallels is to be found in Visser's account of developments in design studies, in its turn towards more situative analyses of design processes [5]. We do acknowledge that certain studies explain how specific aspects of feedback behavior in design studies may be partially relevant to our understanding of artistic cognition but generally the arts have not been singularly identified as a unique cognitive process, not at least generically, and neither in terms of what we shall posit as the defining element in artistic cognition, namely as an emotive process.

2. FUNCTIONAL ADAPTATION

We could start by asking how the brain picks chunks of information and incorporates them in syntactic structures that are either 'visual' (as in case of visual formats like sketching or architectural planning) or 'aural' (as in case of music for instance). Methods of visual representation that involve cognitive priming and selection have been studied by Margolin and Buchanan (1995), Choueiri (2003) and Zainal Abidin and colleagues (2011): findings suggest that the design process involves 'conceptualization' of a problem and negotiating visual alternatives in a spiral of constant feedback [6]]7][8]. Experiments have been used to check whether the brain functions in pre-established circuits of information so as to generate anticipated results [9] [10]. The effect of novelty is produced by means of simultaneous matching and differentiation involving structural analogies with given objects. Now, design cognition provides insight into the ontology of simulated shapes and patterns, yet it also shows how the designer tends to adapt representations with emerging syntactical requirements. Some case studies indicate what in cognitive science we call 'functional' adaptation of design commands. Cognitive functionalism allows us to consider the nature of adaptive behavior that is crucial to planning and creation of innovative maps. Last but not the least, how human innovators make functional decisions may itself be a heuristic exercise. The theory that creativity or design actions should also utilize heuristic models is imperative [11]. Both functionalist as well as heuristic variations are intertwined in artistic solutions.

3. EMOTIVE TEMPLATES

Classic studies thus show that creativity arises out of improvisatory thinking on prexisting templates of information [12] - an idea that seems to provide a backbone for the splay of experiments on how design functions are realized in practice. Designers' decisions help in unfixating the mind from a prision of memory even as they have a mental stock of a very wide range of pre-existing structures of work. Expert innovators are constrained to use these former models for changes and adaptation in novel contexts so that free and ingenious forms of mimesis could emerge in the world. In this sense, 'art' constitutes a functional subdivision of design cognition since any artistic activity depends on improvisatory adaptation. But it would be wrong to classify artistic representations solely under the rubric of adaptive behaviours. We would refer towards an epistemological shift in our understanding of the arts since behavior that is specific to art inescapably comprises emotive triggers. This *a priori* distinction defines the exclusive nature of the arts.

Design cognition would have to involve emotions in order to qualify as artistic cognition. That design employs elements of emotive stimulus is evident for an entire range of products that occur in sports and design of animated games. Th potential for design emotions is already implicit in social media, commercials, and opinion analytics [13] but how mood reinforcing games differ from emotional deep states typical to 'artistic' expression. Historically, the 'arts' are known to elicit strong or deep emotions involving human norms and transgressions. Thus, Plato said in *The Republic* that arts feed or water the passions. Classic texts of Eastern cultures say that art consists of emotive appraisal of histrionics, gestures or representations [14]. Greek theater uses emotive masks of facial and figural gesticulations that elicit specific classes of feelings in spectators – this is also wonderfully visible in the artistic masks of Japanese theater, like *noh* or *kabuki*. The origins of such emotive representations appear out of deeper evolutionary reflexes that the performer incarnates for the audiences' contemplation. Hence, we have stories of incest, death and survival, or the anxieties and frustrations of contemporary individualism in modern novels or films. Bharata the sixth century Indian aesthete suggests in the *Natyashastra* that arts have specific goals – and have their place only within goal-oriented behaviors [15]. Artistic cognition is something specific to arts-like improvisation rather than non-art design, since art creates emotive surge. Bharata also formulated a taxonomy of basic emotive states, and a taxonomy of secondary emotions which are triggered in the context of these spectator-oriented histrionics.

The effects of art may thus be examined in the context of artificial emotive systems. The question is no doubt tricky. Could we separate cognitive design from more emotively bracketed design acts that are intrinsic to art? Are not the boundaries blurred? We ask if in its extreme cases, is design cognition capable of being conditioned by independent emotive content just as proponents of autonomous emotive states like Zajonc predicted [16]? That for artistic cognition overbearing emotive appraisal is more imminent and necessary is not in doubt.

Design, in general, is emotively neutral, even though it may have a broader range of material or industrial application and even if it may need to satisfy a broader consumer base. At the same time it is important to understand that there can be no independent and formless emotive cognition - since the arts, by definition, employs aspects of design thinking in their pursuit of tradional historical forms and manifests, but what makes such manifests unique is the definite goal that it tries to achieve, namely its appraisal of emotive states or feelings involving all the basic passions.

4. COGNITION AND EMOTION

In what ways could we thus approach computational issues in artistic cognition? Standard approaches based on the AI paradigm, include a neural-network paradigm which is again subdivided when it comes to specific steps in the process, like memory and adaptation. We have a GOFAI approach to basic understanding of cognition as a systemic process [17]. Moreover, both neural networking thesis and GOFAI (Good Old Fashioned Artificial Inteligence) derive from the approach to understanding cognition in terms of "belief boxes". We would like to propose a theory of "emotion boxes" as part of that schema, wherever emotional appraisal is in focus. Hence, we could define the origin of emotions epigenetically in terms of a network of triggers and appraisals from which the artistic intentions would naturally fire and create all those super-moments that are valued in the traditional arts and rituals in all human societies.

Artistic cognition implicates a possibly dualistic or double-phase cognitive-emotive network. Antonio Damasio famously disapproved the erroneous attitude in neuroscientific psychology, namely the one of considering the so-called higher order cortical decision-making processes as being distinctly superior to subcortical emotional processes [18]. Indeed, this does not make sense in the context of recent findings based on MRI and PET scans of the brain during its more attentive problem-solving states. Artistic cognition invites cognitive science to reconnect cognition and emotion in one immanent network of rules that would integrate in *gestalt-like* clusters or moments: we could probably describe them as emotive quirks. The ancients had these ideas - Sanskrit aesthetics speaks of *anubhava* or *rasa* and *sadharanikaran*. Whereas the *anubhava* or *rasa* is a quantific experience or quirk of feeling, the latter, that is *sadharanikaran* (translated as 'collectivisation') dictates how artistic creations elicit not just personal but interpersonal states of feeling in collectives of spectators and could unite several or countless persons in a stream or timeline, such as occurs in cinema audiences, stadiums or performance venues, and responses in mass culture diasporas, like TV audiences spread across different contextual environments and spaces. It is one of the pre-conditions of artistic cognition that they can sweep and somatically involve participants or spectators in their modes of presentation. The Chinese notion of the *dao* is similarly a completely amodular state in its moments of revelation - *wu wei* means an action bereft of intentionality, in the sense that it is supraintentional, but at the individual level it may retain some kind of intentionality [19]. A quick translation would be like the meaning embodied in the phrase 'go with the flow'. The Chinese idea of non-intentionality however is primarily also emotionally viable.

5. THE SOMATIC MARKERS OF ART

Consider the foundation of emotive sciences as it is laid out by Antonio Damasio [20]. Damasio stridently divides the entire substratum of emotions - he speaks of the presence of basic emotions or primary emotions that are caused by excitability of the limbic system, which he calls innate emotions. Damasio also

speaks of 'secondary' emotions or 'acquired' emotions that depend on how emotional receptors get activated by the primary emotions. The model has been conducive to the development of algorithms in reinforcement learning, which considers emotive levels in decision making processes [21]. Damasio also speaks of bodily manifests of emotions – the fact that we can understand emotions only as they are incarnated in the human body, as 'somatic markers' as he calls them. What the theory of somatic markers helps us in understanding is the way results of emotion-based decisions are projected on the human body or face, especially in situations involving interaction and adaptation between individuals or collectives. The paradigm, we suggest, is especially helpful for understanding design-like cognition but especifically artistic behaviors as they are manifestly visible in the representations of the bodies of painting or portraits for example.

We might think of instances from pre-historic rock art - in the visual systems on petroglyphs, in which visual stimuli create iconic effects resembling images of the body. One of the reactions, among others, that this kind of semiotics inspires, even for a viewer situated in a different or distant time and space, is the feeling that is elicited by the indexical power of the bodily gesture, like a dancing human or a human with raised arms. Peirce and Peircian semioticians would like to suggest that this visual power is an emotive tweak [22]. Creative effects illustrate improvisation on biomimetic iconography, like in the shapes of anthropomorphs or zoomorphs which appear repeatedly inside the *umwelt* of cave paintings. Bharata, the ancient Indian philosopher likewise speaks of an emotional substratum of basic states and defines the finer artistic emotions as products of interrelated stimuli generators. Damasio speaks of the art of comedians who induce realistic settings and gestural or facial incongruencies typical to comedy and involve both the performing subject and audience. Damasio's somatic markers are all visible in comic art, as well as tragic arts, which represent grief and fear. The performance space resembles the neural map of immersive and interactive secondary emotion environments.

Damasio's theory of emotional appraisal would lead us to believe that emotions are perceived on the body and then create feedback loops. This principle is exactly what reinforcement learning algorithm captures - in its episodes of programming which either generates a reward or a punishment, that is an accumulation or redaction of a 'reward' depending upon a decision that is made by an emoting agent. If this happens for emotions in general then it is obviously true for 'artistic cognition'. Creative decisions are naturally goal oriented [23]. If considered from a functionalist perspective, a creative task that is also artistic, will consider if the decisions also lead to greater emotive satisfaction in the end products of that flow chart.

6. INTENTIONALITY IN ART COGNITION

Thus, what do we learn from the ancients? What the ancients taught us, and what we also learn from Damasio's philosophy of emotion is simply this: creativity should be an organic, improvisatory process as much as a connectionist-functionalist (thai is, adaptative) episode. It is both adaptive and perhaps also non-intentionalist [24] [25]. Indeed, what about the most conservative question in relation to artistic *praxis* - as opposed to much of design thinking in contemporary discussions? Conservative opinion in cognition favors the subjective role of the artist but for a more functionalist definition art cognition starts with given templates from material culture and supports a

memory-based modularity of some sort. Even in very recent postmodern explanations which suggests the arts completely break down pre-existing rules and grammars, the role of the artist as an individual, intentional creator is not completely ignored. Can we accept this model of intentionality for the artistic process?

Gopnik and others have tried to demonstrate that first-person intentionality, similar to what we call 'authorial' intention, is constructed around age three and a half when children begin to develop insights into the so called transparent nature of object - and their "objectivity". Gopnik locates intentionality in the growing child's negotiations with a real world filled with objects and inter-objective relationships in a causal way [26]. Gopnik even goes to the extent of suggesting that intentionality is a direct result of the causality implicit in the child identification of construal and formation of objects in the real world [26]. This attitude solidifies into the subsequent concept of a first-person intentionality. Perhaps Gopnik shares, in principle, the same kind of connected perceptive environmental evolution of what Dennett calls the 'intentional stance', a human tendency to ascribe agency to objects and identities. In the history of arts societies have also in a sense upheld and deified the artist as an intentional entity. In case of assuming a theory behind artistic cognition we can consider the challenge posed to intentionality by a strictly computational view of artistic production. How could databases predict an artistic configuration? Is machine art ever going to happen? Is it not the same question as the robotic typewriter getting to be successful in ultimately writing a Shakespearean sonnet? While this is computationally feasible, let us look at the various hierarchies of interactions involved - in an example like of literary creativity.

7. METAPHOR

Something of this paradox can be explained in the example of the effect metaphor has on the human mind. We remember in this connection that metaphors, as Lakoff and Johnson showed are dependent on physically embodied actions. The "journey" metaphor: "Life is a journey", shows how journey is metaphorically linked to life, as an event laid out in time, just as all journey are. The journey metaphor captures the analogy of the interests and dangers of a real journey. The analogy holds for life as well with its sequence of shocks and surprises. Indeed, the semantic networks that activate these two different metaphorical experiences create an emotive effect because of the interplay between cognitively appraised experiences as well as emotional experience. The happiness associated with the journey through life, which is full of experiences is emotively equal in maps of both life and journey. From the computational standpoint the problem precisely lies in recognizing the moment in which parallels consummate an emotive quirk in the equivalences of these two separate cognitive maps. There is a certain degree of uniqueness in the intertwined narratives of the metaphor discussed here.

But again, in case of metaphors, we ask why is one set of analogy preferred over another? In any artistic engagement these interplays are crucial - the manner in which the tokens of experience are interchangeable and validated or valued. Like chunks in visual clusters, artistic moments will have to rest finally on whether the chunk turns into a quirk. Now more and more evidence suggest that such emotive analogies are heuristically apprised. There is a good deal of evidence to argue in favor of a heuristic art machine, since the arts involve long and complex acculturation with chunks of experience but in practical

engaement all associations are rendered into an emotive channel very rapidly. It turns out that a word may be used in an emotive way - it is also true that that the reverse - that counting the number of emotive usages of single words will not necessarily create metaphors that automatically elicit the same effects on the listener. Consider the case of dead metaphors that pass on into language. Dead metaphors are dead precisely because they fail to evoke emotive states after a period of usage and decay. Similarly, 'art' - produced on an industrial scale can die from usage and mechanical reproduction. There is no way of finding out except by means of feedback from the contexts of meaning that are available for the moment. These are some of the complex questions implicit in artistic computation. In any case the undivided singularity of the experience gives us a clue.

8. CONCLUSIONS

There is no way in which we could evade around the question 'what is 'art'? In as far as we are concerned here we cannot consider any definition of art that does not take into account the function of art achieving a certain goal, which we just showed from ancient analogies, is not simply a cognitively realized goal. Art is the only activity that aspires to a goal in which the goal itself does not need to have a reference to the product, other than eliciting an emotion. Since the goal of art is emotive, cognition either does not play a role in its improvisatory stages or is subservient to emotive effects or remains at best intra-relational between levels of processing and attitude building. The arts, as we said, seek to capture what Confucius called a *wu wei* or the Indian grammarians called *rasa*. The *wu wei* or *rasa* can create bodily feedback and engender a sense of well-being.

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