ATK Superconcepts Essay

How Can Entropy be applied to the Arts?

There is a tradition going back to Greek philosophy of associating the arts with the establishment of order and harmony. The word composition itself literally means ‘’to put things in order’’. So it seems odd to divorce the idea of entropy - the measure of disorder within a system - from the arts. In his 1959 lecture *The Two Cultures* C.P Snow eloquently summarises this point when describing how intellectuals react to scientific discourse at a party. He argues that the so-called ‘‘illiteracy’’ of scientists is no worse than the lack of knowledge that said intellectuals have on basic laws of chemistry like the second law of thermodynamics. Even though he argues, ‘’it is the scientific equivalent of asking ‘have you read a work of Shakespeare?’’. What makes entropy a superconcept is that it can be applied to everything from tiny particles to the dynamics of human interactions - this universality is what could lead to a bridging of the gap between the ‘‘two cultures’’. Since the role of the arts is to represent human actions, emotions and thought processes then it must follow that entropy can be applied to them. By using case examples in art, music and literature I’d like to show how it is possible to find context for a scientific concept like entropy within the Cultures pathway.

The second law of thermodynamics states that entropy within a closed system must always increase. If we take the process of drawing a painting - more specifically a Jackson Pollock ‘‘action’’ painting as an example - as a system, we can see this still holds true. Taking a very simple view at it, you start with a blank canvas (order) and you end up with an abstract ‘‘action’’ painting (disorder). But on another level, you have the very ordered technique by which Pollock lays the paint on the canvas and the disordered product. On another third level, you could see our interpretation of the painting as a system within itself. If you consider that the paint on the canvas has a low entropy, you could see that our interpretation of the painting has high entropy and so the entropy within that system has increased. Going on to consider Pollock’s life as a system we can also observe how disordered his life became later on due to his alcoholism, so there is even another level where the second law can be applied. In ‘‘Artistic Forms and Complexity’’ Boon, Casti and Taylor aim to quantify the entropic quality of Pollock’s painting, also concluding that the entropic nature of his paintings increased over time. One image of an eye-trajectory that they include shows a chaotic network of dots that occur when a viewer tries to interpret his painting Autumn Rhythm Number 30, reinforcing my point that the interpretation of the painting is more entropic than the painting itself. As Kohler states, the greatest equilibrium is between the object and the observer.

In the same study, Boon, Casti and Taylor examine the tonal works of composer Johann Sebastian Bach. Methods that try to quantify the aesthetics of music through entropy are not uncommon and not unsuccessful either. Like with all artworks, order and disorder play an important role in the artistic value of artistic works, they must be used in the right balance to attract our attention. But entropy’s role in music is unique because it is directly at the forefront. If you regard music as a constant change in the level of entropy at the local level, then according to Neeman and Maharshak in their study ‘‘Order and Disorder, Entropy in Math, Science, Nature and the Arts’’ the pleasurable moments occur when the mind is stimulated to reconcile those moments when the level of entropy increases. They devide a musical piece in to select parameters such as pitch, duration and pitch transition etc. and use this ‘’as the data to which the concept of entropy can be applied to’’.

Peter J. Alexander uses the same theory to make an entropy index in a study to measure the product diversity of the music industry. By analysing sheet music - what he calls the ‘‘blueprint of the recorded product’’ he is able to decompose the piece in to time, meter,

form, accent, harmonic structure and melody. Alexander assigned each musical parameter a value and then compared those values across songs, where the highest score that entropy could take on was 0 indicating the complete absence of product diversity. Ultimately by measuring how diverse these songs were, he could draw a relationship between the product diversity and market concentration or how many hits there were in that period. His findings showed a nonlinear relationship between the two axes, allowing the author to conclude that such an entropic method was effective.

Frank McCarty however, is critical of such methods and claims that they distort scientific tools for the purpose of making them fit human experience. He cites Rudolf Arnheim's notable 1971 piece, 'Entropy and Art' as an attempt to use entropy as value-theory. I disagree, I think such attempts open doors for discussion and provide new ways of considering how we perceive art. I think the second law of thermodynamics is truly universal, it is applicable to human behaviour and therefore representations of human experience in art also.

19th century German author Goethe was unafraid to ''distort'' scientific tools, using the idea of chemical affinities - the tendency of some compounds to react with other specific compounds above others - as the basis for his 1809 novel ''Elective Affinities''. He explores the idea that human life is governed by chemical laws. The plot details the ''experiment'' that occurs when married couple Eduard and Charlotte invite Charlotte's niece Otillie and Eduard's childhood friend The Captain to stay. The house and the surrounding gardens are described as a chemical retort in which the human ''elements'' are brought together for the reader to observe the subsequent chemical reaction. In the 4th chapter, the 4 central characters actually describe what would be a human double displacement reaction; AB + CD --> AD + BC where Eduard and Charlotte (AB) react with Otillie and The Captain (CD). Just like in a chemical reaction, the entropy within the system increases. Goethe succeeds here in explicitly applying a scientific concept to human behaviour and exploring where that could take him in what becomes a novel of manners.

If we look at the process behind writing a novel - or indeed making any composotion - we can again apply the second law of thermodynamics regarding entropy. In this case however, the system in place is an open system; so while the entropy within the open system decreases, this is compensated for by an increase in disorder elsewhere. In ''Entropy and Composition'', John Freund summarises the chemical theory behind this as follows: ''When a writer decreases entropy by the act of composing, the compensatory increase is often absorbed in the physical system of the writer… Just as stress and its behavioural manifestations e.g pacing up and down, drumming one's fingers, smoking etc.''. He mentions how author E.B White struggled to compose with ease as he grew older, stating that even one letter is more than he can bear. White's prose particularly is characterised by the way he delicately orders his words - the entropy in the system of composing decreases. But it increases elsewhere, in White's lifestyle and in his psyche.

The definition of a superconcept is that it transcends disciplines. While entropy can be easily applied to some disciplines in the hard sciences, information theory and in economics, I hope I have shown how this universal law can be applied within the arts. My pathway is about culture - different types of culture and their representation in anthropology, art, film and history. The importance of this concept to culture studies is reinforced by prominent anthropologist Levi-Strauss who is quoted as saying that anthropology should be renamed ''entropology'' because according to him, the study of

man is ‘‘the study of disintegration in highly developed structures’’. Entropy is central to Cultures and more students of the arts should explore further applications of this concept in deconstructing music, understanding literary theory and in considering the artist’s thought process when composing his product.

Works Cited

Alexander, Peter J. "Entropy and Popular Culture: Product Diversity in the Popular Music Recording Industry." American Sociological Review 61.1 (1996): n. pag. Web.

Arnheim, Rudolf. Entropy and Art; an Essay on Disorder and Order. Berkeley: University of California, 1971. Print.

Boon, Jean Pierre. "Fractal Music and Art." Jpboon@ulb.ac.be. N.p., n.d. Web.
Colman, Felicity. "Affective Entropy." Angelaki 11.1 (206): 169-78. Web.

"Elective Affinities." Wikipedia. Wikimedia Foundation, 12 Mar. 2012. Web. 04 Dec. 2012. <http://en.wikipedia.org/wiki/Elective_Affinities>.

France, Michel Mendes, and Alain Henaut. "Art, Therefore Entropy." Leonardo 27.3 (1994): 219-21. Web.

Freund, John. "Entropy and Composition." College English 5th ser. 41 (1980): 493-516. JSTOR. Web. 26 Nov. 2012.

Goethe, Johann Wolfgang Von, Elizabeth Mayer, and Louise Bogan. Elective Affinities. Chicago: H. Regnery, 1963. Print.

McCarty, Frank. "Entropy as Value Theory in the Arts." The Journal of Aesthetics and Art Criticism 32.2 (1973): 268-71. Web.

Neeman, Sol, and Arie Maharshak. "Order and Disorder, Entropy in Math, Science, Nature and the Arts." Engineering Studies Faculty Publications and Creative Works 2 (2006): 198-202. Web.

Shaw, Debora, and Charles H. Davis. "The Concept of Entropy in the Arts and Humanities." Journal of Library and Information Science 9.2 (1983): n. pag. Print.
Snyder, John L. "Entropy as a Measure of Musical Style: The Influence of Priori Assumptions." University of California Press 12.1 (1990): 121-60. Print.