

BIMODALITY, PHASE TRANSITIONS, AND SYMMETRY BREAKING IN ARTWORKS

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Phase transitions are one of the often encountered form of behavior in nature. It became especially distinctly after synergetic researches, where the notion "nonequilibrium phase transition" means any form of bifurcation or abrupt changes in complex systems. Any type of phase transition occurs when a complex system exists at the unstable point [4].

There is a very significant for art type of instability which may be called bimodality. This type of instability means the possibility of existence in artwork (most often in position of main hero) two different states one of them may be hidden until a certain time. Commonplace example of such instability can serve books and movies about spy - Secret Service agent being in hostile camp. At any moment unmasking may take place and the task of the Secret Service agent is to extend this state as long as possible [3].

Another, less banal example - unstable bimodality of social nature that may be called according to V.Shklovsky "the man that is out of his proper place" is widely presented in art [2]. In "Golden Ass" by Apuleius the main character is of course out of his proper place because the Ass in reality is a man. The plots of such tales as "Foul Duckling", "Beauty and Beast" also are of the same type of instability sustained over entire period of mentioned tales.

"The novels of olden times were based on the incidental falling out of a man from his society. By almost fatal position of an illegal birth or a loss of documents has been motivated an introduction of a hero into the world which has been a destiny of millions. But a hero has been rescued from that world with the help of recovered documents. A hero of old novel - is the one who is not in his proper place, a hero of one society finding himself in an absolutely different society." [2]. "The History of Tom Jones, a Foundling" by Henry Fielding is an example of such a

novel.

These bimodal states can be graphically depicted as a function with two minimum. Each phase (each mode, each state) corresponds one minimum, where a depth of one minimum with respect to another characterises a prevalence degree of one phase with respect to other one.

It is principally important that a nature of many kinds of art is bimodal by itself. For instance, sculpture art means an ability to depict representatives of living nature (most often man and animals) from materials of inanimate nature (wood, stone, bronze, etc.). Graphically it can be shown by following way

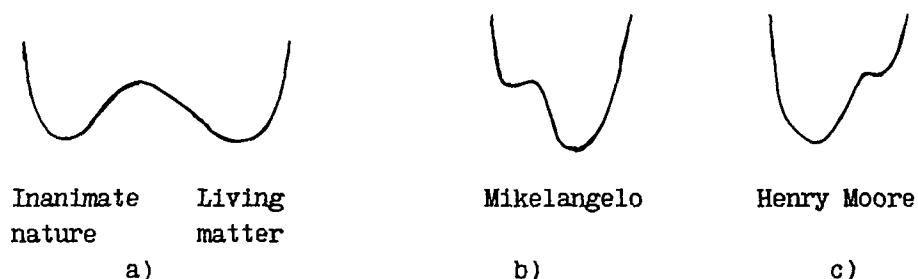


Fig.1 Bimodality of sculpture art.

In creativity of different sculpters one can observe a prevalence one of these phase with respect to another. In Micalangelo works we see triumph of alive and even spiritual under inert matter of stone, where in Henry Moore's sculptures there is a prevalense of a heaviness and inertness (Fig. 1b,c).

Actor art also means an ability to create the second phase - a "role" phase, where the first one is own physiological and psychological nature of actor (Fig. 2a).

In actor art also one can observe the existence of two polar possibilities, that are two polar types of actors.

1. Actor is a bright, brilliant individuality, eccentric person with original appearance (Jeannae Gaben, Lui des Funes, Yury Nikulin) (Fig.2b). It is rather easy to parody these actors.

2. Actor with prominent, outstanding abilities to transformation and reincarnation (Laurence Olivier, Alex Ginnes, Innokenty Smoktunovsky) (Fig.2c). It is very difficult to parody this type of actors.

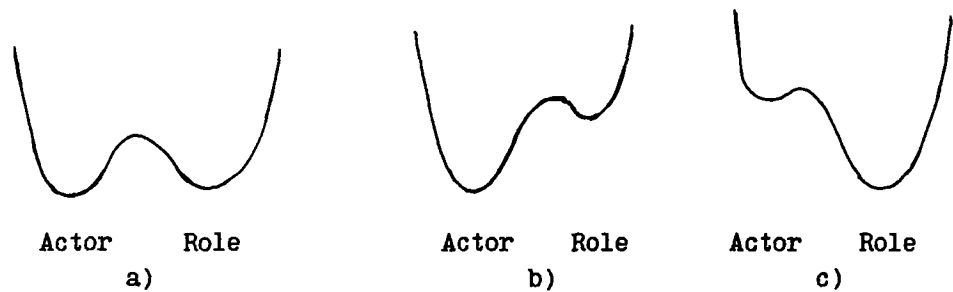


Figure 2. Bimodality of actor art.

When an actor plays a role a perception of occurring bimodal state "actor-role" is analogous to perception of ambiguous pattern. Therefore according to common law of perception of ambiguous patterns [1] oscillation of our attention takes place and we see in turn either an actor or his role.

The presence of bimodality in artworks makes possible an existence of various types of phase transitions. Thus the very emergence of bimodal states from onemodal one can consider as Ginzburg-Landau phase transition [3].

Example of such phase transition give us recent movie "Mrs.Doubtfire" where the father after divorce to have the possibility to see own children have to apply for work in his previous family under the guise Mrs.Doubtfire- houskeeper.

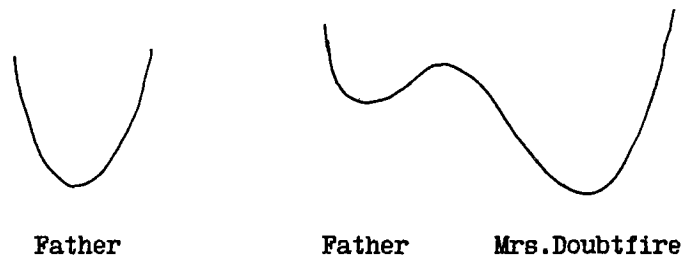


Fig.3 Phase transition in the movie "Mrs.Doubtfire"

In the movie "Wolf" the phase transition "man-wolf" happened after wolf bit the man. In M.Bulgakov's novel "Dog Heart" complete

cycle of phase transitions "dog - man - dog" takes place as a result of surgery operations. It seems all these plots originated from totem teachings and ancient animal epos.

As a rule all metastable bimodal states in the end of artworks turn into stable onemodal state as a result of bifurcation. Thus the bimodal existing of main hero in movie "Mrs.Doubtfire" is ended by usual onemodal state "happy father".

This type of phase transition go back to mask. "To put mask on" means transition from one mode into bimodal state, which usually metastable. Accordingly "to throw mask off" or "to tear mask off" means phase transition from two mode into one.

A plots of some literature works are based on idea of animated statue, that is phase transition "inanimated-animated" ("Cooper Horsemen", "Stone Gest" by A.Pushkin [3]).

In painting examples of phase transitions are provided such canvas as "Creation of Man" by Michelangelo, "Birth of Venus" by Botticelli and so on in which unstable elements are always presented. The presence of such elements makes the picture more dynamical and emphasizes the fact that phase transitions are possible only in the vicinity of instability [4].

References

- 1.Ditzinger T. and Haken H.(1989) Oscillations in the Percertion of Ambiguous Patterns. *Biological Cybernetics*. v.61, No.4, 279--287
- 2.Shklovsky V.B.(1974) *Collected papers*. v.3, Moscow: Hudozestvennaya Literatura, (In Russian)
- 3.Yevin I.A.(1993). *Synergetics of the Art*.(in Russian).Moscow: Lada, -171pp. ("Synergetica Iskusstva").
- 4.Yevin I.A.(1992) Phase Transitions in the Art. *Proceedings of 12 International Congress on Empirical Aesthetics*. Berlin.