

# What Are Stories Made Of? - Quantitative Categorical Deconstruction of Creation

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We extend the Microscopic Representation approach to the quantitative study of religious and folk stories: A story encrypting symbolically the creation is deconstructed into its simplest conceptual elements and their relationships. We single out a particular kind of relationship which we call "diagonal (or transitive) link": given 2 relations between the couples of elements AB and respectively BC, the "diagonal link" is the (composite) relation AC. We find that the diagonal links are strongly and systematically correlated with the events in the story that are considered crucial by the experts. We further compare the number of diagonal links in the symbolic creation story with a folk tale, which ostensibly narrates the same overt succession of events (but without pretensions of encrypting additional meanings). We find that the density of diagonal links per word in the folk story is lower by a factor of 2. We speculate that, as in other fields the simple transitive operations acting on elementary objects are at the core of the emergence and recognition of macroscopic meaning and novelty in complex systems.

## KEYWORDS:

complexity, emergence, microscopic representation, diagonal link, novelty, creation, stories

## I. MICROSCOPIC REPRESENTATION AND UNIVERSAL DYNAMICS

Several years ago, the Microscopic Representation Approach [1] was introduced in order to understand in a systematic manner the way in which the human concept describes a very big number of microscopic objects, in terms of a limited number of macroscopic characters defined by them. According to this approach, the microscopic picture and the macroscopic one are considered to be two different pictures of one reality, that are complimentary to each other, as the ocean is both an aggregate of molecules and a mass of waves. In each scale should be found the macroscopic objects and the laws of their behavior, which are generated from the microscopic scale. At the same period of time a similar approach, the Universal Dynamics Approach [2–4] was developed but from the opposite direction: from the universal to the macroscopic. It put the emphasis on the theory, therefore it is more comfortable for the presentations of the fundamentals. This approach looked for the most fundamental physical theory, under the rule that a theory is the more fundamental the less structure it assumes a priori. It starts with the basic assumption that: **The human mind thinks about relations between Objects** (this assumption is becoming more precise after introducing axiomatic characters for "relations" and "objects"). A collection of objects with their inter-relations is defined as "a system". Objects of a system can be systems themselves, i.e. with internal structure, which allows a framework for the discussion of self-organization in complex systems. The relations are directed and will therefore be called "arrows", some of which are identified as fundamental in a given level of description and will be called "links". Arrows are composed of links and own the main importance in the description of a system. For example: in a system which is a thin brick wall - the objects are the bricks and the arrows define the relations between each brick and its six nearest neighbors, twelve next nearest neighbors etc. Fig 1 describes a system which is a thin brick wall. The arrows are those who are defining the structure and turn the wall into more than a pile of bricks. In this framework the dynamics of the system is described: the basic options of getting a new system from a given one are - death of an object or a link, duplication of an object or a link, merging identical objects or links, creating missing adjacent links or promoting an arrow, which can be composed of two or several links, to the status of link. The dynamical processes assembled from such elementary operations were called "drama".

## II. APPLICATIONS

Several applications [5–7] of the approach to domains outside natural sciences were developed. Two examples for these applications are the works in New Product Development [8,9] and in Creative Advertising Ideas [10,11]. In both these domains we do not expect to find well-defined lines of thought. Yet, during their study according to the universal approach it was revealed that out of the many possible routes of the dynamics, specific routes can be clearly defined and shown to be preferred - these are the "Creativity Templates". The templates can be identified

and described in an abstract and simple way so they can be easily and efficiently applied and objectively tested. An example for such a template is the development of a delivery motorbike that bakes pizza during the delivery ride according to the Component Connection Template (table 1 shows an example for the Component Connection Template). Following the simple instructions of the algorithm, leads the dynamics of the mind to the new creation. The efficiency of the templates was tested quantitatively: a group of marketing personal were trained for 4-5 hours in one of the templates. This group and a control group who did not receive the training were asked to generate ideas for new products in three categories. The first group used the template and the second group used conventional ideation methods (brainstorming, questionnaires etc.). Eight senior marketing professionals acted as judges and rated the ideas on a 1-7 scale according to their originality (1=not original at all, 7=very original) and according to their recommendation to implement the idea (1=not recommended at all, 7=highly recommended). The judges were blind to the identity of the individuals who generated the ideas and to one another. In spite of the short length of the training the advantage of the first group was salient: they received the average of 5.09 vs. 4.18 in originality and 4.40 vs. 3.36 in value.

### III. THE DIAGONAL LINK OR: THE TRANSITIVE TEMPLATE

In the present paper we propose a more basic elementary building block underlying most (may be all) of the creative acts. We call it the "Diagonal Link" according to its structure or "Transitive Template" according to its function. The "Diagonal Link" seems to be the basic element that humans use in constructing and understanding reality in the widest sense. In order to test this possibility we use the "Diagonal Link" as the elementary microscopic operation in the Microscopic Representation study of Creation as described in symbolic religious stories. Structurally, the "Diagonal Link" resembles a transitivity connection (fig 2 illustrates transitivity connection). In the example brought in the previous section it can be seen clearly in fig 3. In the same way we found that each of the Creativity Templates included, at least once, a Diagonal Link as the core of the creative process. As the basic assumption of the Microscopic Representation and Universal Dynamics related to the fundamental infrastructure of the human way of thinking, we assumed that we will be able to find similar phenomena in other fields and turned to study the tales of Rabbi Nachman of Bratslav using this approach. We focused on the first story and studied the appearances of the Diagonal Link and their role. It should be emphasized that the analysis was performed in a mechanical method that referred only to the syntactic structure and not to the meaning of the text.

### IV. RABBI NACHMAN OF BRATSLAV'S STORIES AND THE CREATION STORY

In a very simplified and short way we can say that according to the Kabala (the Jewish medieval mystical tradition) creation starts when G-d withdrew in order to make room for the world to be created. After the creation, a line of light was sent from the infinite G-d into the created world but due to the deficiencies of the world it could not bear the light and was "broken" with the sparks of light scattered all around it. The human task is to collect these divine sparks and bring them back to their roots. This task is laid upon every human being, more on the Nation of Israel and most on the righteous person - the Tzadik. This dynamics has many manifestations: the exile of the soul in the body and the need of the individual to redeem it by bettering oneself and lifting oneself spiritually, the exile of the Nation of Israel and their need to return to the Land of Israel, the exile of the Divine Presence and the need to help it to be re-united with G-d etc. Rabbi Nachman of Bratslav (1772-1810) saw himself as a Tzadik and as such he felt, like other Hassidic (the Hassidic movement is a pre-modern Jewish revival movement, deeply inspired by Kabala) sages, responsible for the redemption process and for the recruitment of his followers to help in the process. At a certain point he felt that the direct cognitive approach did not give enough fruits and that his explicit teachings did not enlighten his people as he expected. At that point he decided to convey his message in an implicit manner through story telling. The first story that he told was "The Story of The Lost Princess" [13,14]. It starts with a king who once got angry with his beloved daughter and cursed her that the no-good will take her. After she disappeared the king became so sorry and regretful that his Second-to-The-King volunteered to go out and look for the princess. After many hardships he found the princess who instructed him how to save her by fasting, not sleeping and longing for her, but twice he failed by eating or drinking and consequently falling asleep and the princess was transferred to the golden mountain. During his wanderings looking for the golden mountain he met a giant who was responsible for all animals who tried to convince him to give up, but even after all the animals did not know anything about the golden mountain the Second-to-The-King remained determined to continue his search. So the giant sent him to his brother who was responsible for all the birds. After repeating the same scenario he sent the Second to the third brother who was responsible for all the winds. After the winds did not know about the golden mountain and the

Second-to-The-King started to cry, came another wind who apologized that it was late as it had to deliver a princess to a golden mountain. The giant then ordered the wind to take there also the Second and equipped him with a tool that will help him there. The end of the story was not told; we only have a comment of the editor saying that in the end he managed to save her but Rabbi Nachman did not tell how. The story is usually interpreted along the lines described in the first paragraph of this section. The king represents G-d and the pair second-princess represents either the individual and his soul or the Tzadik and the Divine Presence. The story was not completed by Rabbi Nachman, because the story of creation is not finished and the harmonious unification was not yet accomplished.

## V. DIAGONAL LINKS IN "THE STORY OF THE LOST PRINCESS"

When performing the diagonal analysis on "The Story of the Lost Princess", 18 diagonal links were found. Two examples are presented in table 2. Our assumption was that diagonal links indicate key-events in the story and in order to check if the events associated with these 18 diagonal links were to be considered important events we went through 21 authors who commentated "The Story of the Lost Princess". We looked at the 29 events they referred to and ranked them according to the number of writers referring to them. When comparing the events pointed by the diagonal links we found that they matched quite fully the top part of the list: the first event that was not pointed by a diagonal link was number 14 in the ranked list and only one of these events matched a low-ranked event (number 22). The detailed analysis of this study will be published elsewhere. For the purpose of this paper it is enough that appearance of a diagonal link indicates a crucially significant point in the story.

## VI. "THE LOST PRINCESS" AND ITS PARALLEL "THE RAVEN" OF THE GRIMM BROTHERS

The Grimm Brothers' story "The Raven" starts with a queen who lost her patience with her daughter and cursed her to become a raven, which she did and flew to a black forest. A man going through the forest heard the raven and went to it. He met the princess who instructed him how to save her by fasting, not sleeping and waiting for her at a specific time. Thrice he failed by drinking and falling asleep and the princess was transferred to the golden palace. During his wanderings looking for the golden palace he met a giant who first was hostile but then tried to help him. He looked for the palace in his map but in vain. He tried a bigger map and again - in vain. Then he convinced the man to wait for his brother who, when came back, looked at his map that was still bigger but the palace was not on it. At last they found the palace in an old map and the giant took the man most of the way toward it. The man took from three thieves the equipment that helped him enter the palace and release the princess. The story ends with the princess thanking the man for saving her and declaring their wedding to be celebrated the next day. This story is clearly a parallel to Rabbi Nachman's "The story of the Lost Princess" although they are not identical. S. Pitrushka claims that neither of the two stories is the source of the other but they both share a common source in the Polish story "A Diverting Story about the Virtuous Princess Banialuce From an Eastern Land" by Hieronim Morsztyn (died in 1655). Although Rabbi Nachman did not know the Polish language, Pitrushka quotes the Polish historian A. Brinker who proved that "Princess Banialuce" was translated to the Ukrainian language. Finding a parallel story was indeed intriguing in light of the fact that Rabbi Nachman did refer to the relations between his stories and other folk tales. Rabbi Nachman's tales were edited by his main disciple Rabbi Nathan Sternhartz of Nemirow. In his first introduction Rabbi Nathan tells [14]: "Before [the Rebbe (Hassidic sage)] began telling the first story in this book, he declared, "Many hidden meanings and lofty concepts are contained in the stories the world tell. These stories, however, are deficient: they contain many omissions. They are also confused, and people do not tell them in the correct order ...". The Rebbe spoke about this. Then he began to tell the story on the following page. He said, "I told this story while on a journey ..." In contemporary words, Rabbi Nachman claims that folk tales need to be upgraded and is moving to give an example how he does it. Therefore it was especially interesting to perform a diagonal analysis on "The Raven" [16].

## VII. RESULTS

In the analysis we found 12 diagonal links in "The Raven". Further examination showed that out of the 18 diagonal links of "The Lost Princess" only 9 were present in "The Raven". In 8 out of the 9 missing appearances, the event itself was present in "The Raven" but its description lacked the diagonal link. On the other hand, in all three diagonal links that appeared in "The Raven" and did not appear in "The Lost Princess" the event itself was not part of the story. Two of these are placed in the last part of the story, the part that Rabbi Nachman did not tell. When calculating the

density of diagonal links' appearances according to the number of words we found that in "The Raven" there were 12 diagonal links in 1652 words, which is a density of 0.7 percent. In "The Lost Princess" there were 18 diagonal links in 1312 words, which is a density of 1.4 percent.

## VIII. MEANING WE ATTACH TO FINDINGS

In an earlier section we showed that an appearance of a diagonal link indicates a part of the story which is of special quality. From this obviously derives that the overall importance of the text increases with the density of diagonal links appearances. The double density that was found in "The Lost Princess" in comparison to "The Raven" indicates a significant difference in quality. According to our findings Rabbi Nachman managed to execute what he was trying to do - to upgrade the story.

## IX. FUTURE EXPERIMENTS

Our intention now is to analyze the story of "Princess Banialuce" and one of the theoretical teachings of Rabbi Nachman. According to the above we expect to find a significant difference in the diagonal density between "The Lost Princess" and "Princess Banialuce" and a non-significant difference between the stories and the teachings of Rabbi Nachman.

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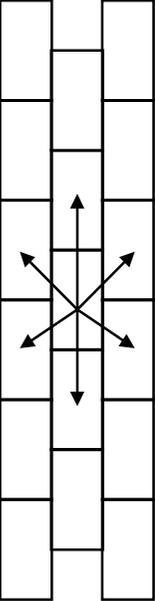
Fig.1: A system which is a thin brick wall

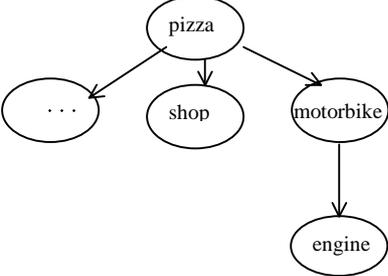
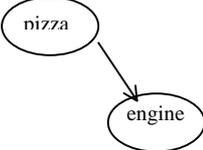
Fig.2: Transitivity Connection

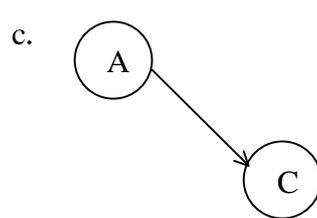
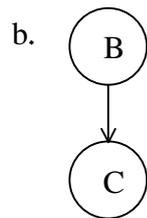
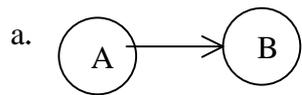
Fig.3: Component Connection Template as Diagonal Link

Tab.1: Example for the Component Connection Template

Tab.2: Two examples of diagonal links found in "The Story of the Lost Princess"



<ul style="list-style-type: none"><li>• List the outside components. Such as: the motorbike, its engine, the shop etc.</li></ul>	 <pre>graph TD; pizza((pizza)) --&gt; dots((...)); pizza --&gt; shop((shop)); pizza --&gt; motorbike((motorbike)); motorbike --&gt; engine((engine));</pre>
<ul style="list-style-type: none"><li>• Include an environmental component. For example: the motorbike s engine.</li></ul>	 <pre>graph TD; pizza((pizza)) --&gt; engine((engine));</pre>



	The event	Diagrammatic description of diagonal link
1.	The king s curse and the daughter s disappearance	
2.	The second replaces the king in search for the daughter	

