

A Twist in the Plot - Systems Thinking and Building Models for Analyzing Literary Artwork

Ben-Moshe Sheli

Correspondence: shelib@mail.tau.ac.il

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Table of Contents

Abstract	1
Significance & Public Understanding	1
Introduction	2
Building the models	7
First example - Qualitative Model	9
Second example – System Dynamic Model	17
Third example – Agent-Bases Model	22
Insights and Discussion	30
Summary	35
References	36
Appendix: The three textual sources	43

Abstract

Models are being used extensively for practicing and understanding scientific, engineering and mathematical subjects, but are rarely used as art analyzing tools, particularly, in learning environments. Contrarily, using art to explain mathematical ideas is not unprecedented. Strogatz (1988), for example, built a model based on Romeo and Juliet's love story and used it to explain the idea of differential mathematics, and system dynamics. Artwork, specially written and plastic classics, is a fixed form of art. We frame them and put them in a gallery, or a book (digital or physical). We don't try to "fix" them or optimize their functioning, we analyze them to find meaning, intention, and patterns. In this article, we aim to show how, by building models combined with simple mathematical representations and analogies, it is possible to understand literary texts, from the prism of system and complexity theories, which emphasize the dynamic, non-linear, and non-reductionist aspects of the observed. We'll demonstrate how modeling processes of three cultural assets, allow active correspondence with the original textual art, by treating them as systemic objects with interactions and dynamics. They will be analyzed while raising questions about the significance of modeling as a cognitive learning process.

Significance & Public Understanding

This paper introduces an interdisciplinary approach to analyzing cultural assets. It intends to inspire educators, researchers, and thinkers to implement independent methods by crossing domains and using different representation tools for the enhancement of thinking and learning. Using this bridging attitude between disciplines may contribute to the individual and public understanding of phenomena (social, cultural, or personal), and to the ways we process and represent knowledge in the information age.

Introduction

The world is made of systems. In an attempt to understand its complexity, we inevitably try to narrow the gap between cause and effect, between description and explanation, and between known and unknown (Bar-yam, 2018). A system is not only a set of physical components but also a natural and even conceptual phenomenon (Ossimitz, 2002). A work of art may be considered a complex system because the message is embedded in it and is subjected to different interpretations and levels of conceptual comprehension (Bennett, 1995, 2003). Art can be analyzed from the perspective of complexity and does not separate the viewer from the art object (Yevin, 2022; 2006). This view, bridges the abstract and the tangible, examining the contradiction between order and disorder (Arnheim, 1971; Zhao & Zhu, 2013). The roots of the symbiosis between science and creativity lay deep in human culture, from the time of Leonardo da Vinci to the modern era (Levy, 1996). Waddington (1971) compares graphic representations of what he calls "the third science" and works of art and explains the underlying ties between scientific theories and unique methods in the plastic arts (Waddington, 1971). For example, a fractal analysis of the techniques and products in the art of Jason Pollock allows a comparison between his early and later works. This analysis sharpens the distinctive nature of patterns created chaotically and their aesthetic value. It intertwines the technique, the artist, and the work in a measurable way (Taylor, 2003). A scientific point of view and the use of systemic methods such as identifying the degree of noise in an artistic work allows one to examine it according to its position on the scale between predictable, interesting, unpredictable, and avant-garde and to condense and distill the unique characteristics of their creators (Casti, 1994). Haken and Portugali use information theory, to build a model for analyzing semantic, visual and conceptual structures in artworks such as Picasso's *Ox Reincarnation*, and Andy Warhol's prints series (Haken & Portugali, 2014). Examples of the use of a mathematical model in non-scientific fields of knowledge can be found in philosophy, to present an idea or argument on human issues. On the other hand, it is difficult to find the use of mathematical models for literary-textual analysis, especially in education, despite the claim that transitions between forms of representation are necessary for learning because of the connection between the written word and the senses (Eisner, 2002; Siegesmund, 2004).

There is a reciprocal triangular connection between the real world, models, and art. Isaiah Berlin argued that artists and writers such as Tolstoy were better at describing reality than historians because they made the general story private, concrete, and tangible and thus came close to understanding constitutive processes and events. He argued that humans are motivated by thoughts, ideas, and desires that do not necessarily coincide with simple logic (Berlin, 2019). In this sense, it is legitimate to study literary work as a means to understand processes and trends, using approaches that combine individual and general views. It can be assumed that integrative approaches, as done in other fields of study|(e.g., integrating human factors with

science such as in ecology or anthropology), the analysis of a literary work using models and mathematical representations can and should be used to present ideas or interpretations of it.

Even though, art and math intertwine in the way we think, in the scholarly world they are still separated.

Using math to articulate artwork, make sometime raise an eyebrow. It is easier for us to see and handle our perception while looking at the edges of things (i.e the contour) but we believe that focusing on the “joints, where components of the whole conjunct and interact, brings us a more clear and coherent picture. System thinking offers method, concepts and tools (e.g. modeling) that helps to communicate and share the way we capture existing and observed phenomenon-whether it is static or dynamic, artifact or natural. we suggest that using system thinking as a framework, especially in a learning environment, can be essential to knowledge building and processing.

In this article we are focusing on three aspects:

- Bridging- bridging between disciplines, which is necessary to get a holistic view
- Practice- using method borrowed from the complexity theory and systemic thinking as an intellectual exercise and to refine the classic literary analysis
- Medium- using models and building models with mathematics and algorithmic foundation, as a complementary medium for iterating over, and re-create ideas and thoughts

Thus, this article shows how the construction of models aided by tangible and mathematical representations, motivates learning processes while interpreting and concretizing cultural creation, by exploring three examples as case studies. To do so, we were faced with the following questions:

- Which systems thinking skills are expressed in the analysis of a literary work?
- What forms of representation are used in the modeling process and how do they help to understand the original literary work?
- What ideas and issues are raised by the source text and how they can be classified and characterized?

In the next section, we will briefly review the system thinking theory as a framework for using modeling for learning, representing, and explaining ideas, by exhibiting three modeling approaches and their implication in education. We will also address the role of analogy and metaphors in analyzing systems and thinking processes

Background

Systems thinking

Systems thinking is a set of thinking skills. There are several approaches and definitions of systems thinking. In general, Systems thinking is the ability to continuously observe the functioning of the system and explain its behavior by placing the components in feedback loops so that a factor can become an outcome (Richmond, 1993). Apart from identifying elements and internal connections, this thinking also focuses on the purpose of the system, which is not always visible and therefore requires effort (Arnold & Wade, 2015; Meadows & Wright, 2008). It is heuristic critical thinking (Flood & Jackson, 1991), independent, based on problem design and combining the thinker's rationality with its object of thought (Ulrich & Raynolds, 2010) and serves as a tool for identifying and evaluating thinking forms (Stave & Hopper, 2007).

There are several systems thinking models, such as the SBF model developed by Hmelo-silver and others (Hmelo-Silver & Pferr, 2004; Goel, Rugaber & Vattam, 2009). SBF model focuses on three dimensions: **Structure**- structural elements of the system, **Function**-what is the purpose and what is the mechanism for achieving it, and **Behavior**-how that goals are achieved. The STH model has additional reference to hierarchy in the system and temporary thinking (Batzri et al., 2015; Tripto et al., 2016, Ben-Zvi Assaraf & Orion, 2005). The dynamic mapping approach emphasizes the interplay between skills and the mechanism of the thinker (Arnold & Wade, 2015). In this article, we will focus on functional aspects (Liu, Hmelo-Silver & Marathe, 2005), namely the identification of intra-systemic mechanisms, referring to feedback loops as a major characteristic component and a perceptual changer.

Model and learning through models

Scientists use models to test theories, develop an in-depth understanding and learn - about complex phenomena and systems. Choosing and examining a refined model in different scenarios is part of the scientific method and a layer in the completion of knowledge. The model makes it possible to see the partiality of existing knowledge and the lack of knowledge (Kreutzer, 1986; Dupre, 1995, 2007), serves as an organizing axis for learning, while creating reexamination cycles (Jackson, 2008; Forbus, 1984). A conceptual model combines physical, dynamic, and causal information (Gobert & Buckley, 2000; Clement, 2010). Building a model is a perceptual process (Leech, Mareschal & Cooper, 2008 p. 361-362) carried out through filtering and finding conceptual equivalents (Forbus et al., 1994). Apart from the relationship between the world and the model in defined situations, the model should represent new entities and situations obtained from running it (Miller & Page, 2009).

The integrative nature of learning through models leads to the expansion of knowledge while validating and confronting the model with reality (Forrester, 1992). Building a model allows students to construct personal knowledge about phenomena. In this process, the existing mental model is externalized and reconstructed (Papert, 1990). Technological tools for building a model serve as scaffolding for constructing knowledge by updating and formalizing our mental models (Campbell & Oh, 2015).

Three modeling approaches

Among many existing modeling approaches, we will focus on three approaches for dealing with systems and complexity that led to the development of modeling tools like STELLA, Dynalearn, and Netlogo. These tools allow the modeler to tell the story of a phenomenon and shift from the mental model stage, through verbal expressions to formalization (e.g. Andrasik, 2001). We will briefly review the approaches and their contribution to education.

- **Qualitative reasoning**-QR approach focuses on qualitative relationships between components and the orderly representation of values for management and decision-making (Kuipers, 1994; Plant, 1997). The idea is to use inferences derived from cause-and-effect relationships, in systems with constraints and limitations, to describe dynamic behavior. Time is symbolically represented as a sequence of changes (called state space). The initial state is defined using qualitative indicators, and the simulation (i.e., running the model) actively describes the branching of the possible situations descendent from this definition (Wong et al., 1997). This approach has been applied to the study of systems such as hydro-systems, agriculture, and ecology. From an educational perspective, it considers the importance of creating a visual environment that will allow seeing generic relationships, finding common basic principles, and identifying cause-effect relationships as part of a learning process. (Bredeweg & Forbus, 2003). Published work showed that the QR approach fosters learning processes such as: establishing and completing terminology in a missing model while comparing it to a reference model (Lozano et al., 2015); providing an inductive explanation versus a mere measurement of the outcome (Petrou et al., 2014); integrating interdisciplinary knowledge (Mioduser et al., 2010); conceptual understanding of processes in ecosystems (Salle, Salles & Bredeweg, 2004); detecting errors in the process of learning a second language (Twidale et al., 1990); understanding community behaviors through qualitative models (Salles & Bredeweg, 2001; 2006).
- **System Dynamics** - In this approach, each factor in the system influences and is influenced by others. The system is estimated according to the dynamics of its components (Richmond, 1993). Its goal is to locate generic structures and patterns of dynamics and behavior; expand mental perception, intuitively; Expand the perception of time limits and processes occurring beneath the

surface and identify patterns and behavior that are the result of feedback circles within the system (Forrester, 1995; Costello, 2001) in a variety of situations (Sterman, 2002). The models in this approach try to bridge between varieties of opinions and avoid gross reduction and a tendency to oversimplify the system by representing feedback as a control mechanism in multiple parallel processes. The components in the models will be described as stocks and flows and will combine the mathematical model (i.e differential equations) with the qualitative conception of the system. The system variables are treated as state variables that are tested in an independent and homogeneous time series (Shalizi, 2006). A dynamic model in a computerized environment enables defining the relationship between cause and event and the examination of conceptual consistency (Senge & Sterman, 1992) while overcoming the difficulty of understanding static changes in the system (Sterman, 2000). Collaborative learning around a dynamic model that deals with an ecological issue has raised the level of understanding and knowledge on the subject (Thompson & Reiman, 2006). Building a model with a dynamic approach expands the boundaries of the problem from the story to the dynamics and brings a new light to mathematical-classical learning (Fisher, Medaglia & Jeronimus, 2018) an integrative learning space that combined a dynamic computerized model and dealt with the play "Hamlet", provoked an examination of phenomena with feedback loops, a study of a variety of topics, a discussion of strategies and daily decisions (Hopkins, 1992).

- **Agent-Based** - the system driven by agents of knowledge (Minsky, 1988). It allows a holistic view on the one hand and a details-levels oriented on the other (Ch'ng, 2013) as a way to understand complex systems. Models in this approach are based on the context, the communication between the components, their behavior, and how individuals become a collective. The components are called 'Agents', enabling us to focus on the local and the contemporary but also observe the behavior of the system over time. In the definition of agent characteristics, we include behaviors and conducting rules that exist at the micro level and are relevant to the macro level. The agents can be diverse and represent different attributes and constraints. Models in this approach are built from the bottom up and are independent of firm design (De Wolf, Samaey & Holyoet, 2005). They represent communication and information management that takes place in an adaptive structure, which is not mathematically generalized, it combines an active and dynamic mechanism with differential equations (Bonabeau, 2002). The Agent-Based model helped learners develop an understanding of patterns that arise from simple and unintentional interaction, and how aggregating random properties of agents in the micro leads to self-organization and balance in the macro (Wilensky & Resnick, 1999). Bifocal learning through a constructive environment of agent-based models produces a common language and an understanding of physical phenomena, such as the diffusion of gases, while building a set of assumptions and conclusions adapted to the formal

scientific idiom (Brady et al., 2015). This approach makes it possible to identify similarities between systems and to examine the influence of initial conditions, integrate random variables, explore and see the emergence of traits (Yoon et al., 2018), map mechanisms, correct misconceptions and establish new knowledge (Cooper, 2016).

Analogies in thought processes

Building a model is a thought process (Wimsatt, 1987) and once the model is built, the affinity between the modeler and the model is strong and inseparable. This process involves the use of different forms of representation and knowledge such as analogies and metaphors which serve as building blocks together with other models (Holland, 1996). The virtue of analogies and metaphors (Lakoff, 1993; Ortony, 1993) lay in the crossing between domains while dispersing and converging ideas, it is not only a ‘decorative’ mean. Analogies and metaphors refer to similarities but with different degrees of separation between a source and a target domain. Apart from designing ideas, they have an argumentative and persuasive power (Hesse, 1964; 1966; 2000; Kellert, 2009). They serve as epistemological starting points and make it possible to substantiate a claim, drawing a conclusion or prediction based on the justification of difference and similarity (Boyd, 1993; Montuuschi, 2000) and play a role in causal representation and structural mapping (Yan, Forbus & Gentner, 2003). Using Analogy, either spontaneous or pre-defined, evolves interdisciplinary transition and borrowing which can be imperfect and sometimes wrong. This incompatibility and incompleteness constitute a breakthrough leading to understanding. It is possible to use borrowed and partial ideas, from different fields, as metaphors (Holland, 1996; Kellert, 2009), disassemble and reconstruct them in the same way synonyms, puns, antonyms, or other literary structural means, serve an idea in an artwork. Here we’ll reveal how analogies play an essential role in textual art analysis by demonstrating their use in the modeling process and open the discussion about the link between models and analogy as forms of representation.

Building the models

To examine the idea of using models from a systemic perspective, as a way to analyze textual works, we defined four preliminary questions that are essential for laying the foundation of the model:

- What is it –What do we understand about and from the text, and how do we narrate and translate it for ourselves
- How does it work –What processes do we identify in the textual frame?

- Why- Why does a component or relationship exist in the textual source and what idea /purpose do they serve?
- What will happen if...- What will happen if we change elements or intra-substructures? Will the obtained results correspond with the internal logic of the source text, and do they reconcile with the internal logic of the model?

In addition, we map the modeling skills that are required. The following concept map illustrates the modeling skills (Figure 1). This is complemented in an elaborated table of examples from the modeling process (Table 8).

Three works were selected, and for them, a model was built using one of the methods we presented above. The first example is a medieval poem by Shlomo Even-Gvirol "What will you be afraid of my soul" and it was analyzed in the qualitative reasoning approach using the Dynalearn modeling tool. The second example is chapter 4 of the book of Judges in the bible, The Story of Judge Deborah, analyzed by the dynamic approach using the STELLA modeling tool. The third example, a children's poem by Levin Kipnis "Dadd's Big Umbrella", was analyzed by the agent-based approach using the NetLogo modeling tool. The process of building the model was accompanied by construction aids such as tables, graphs, and textual writing, which we will refer to in the discussion section. In the next section, we will present each model's background, key ideas, and insights following the running of the simulations in each of the examples.

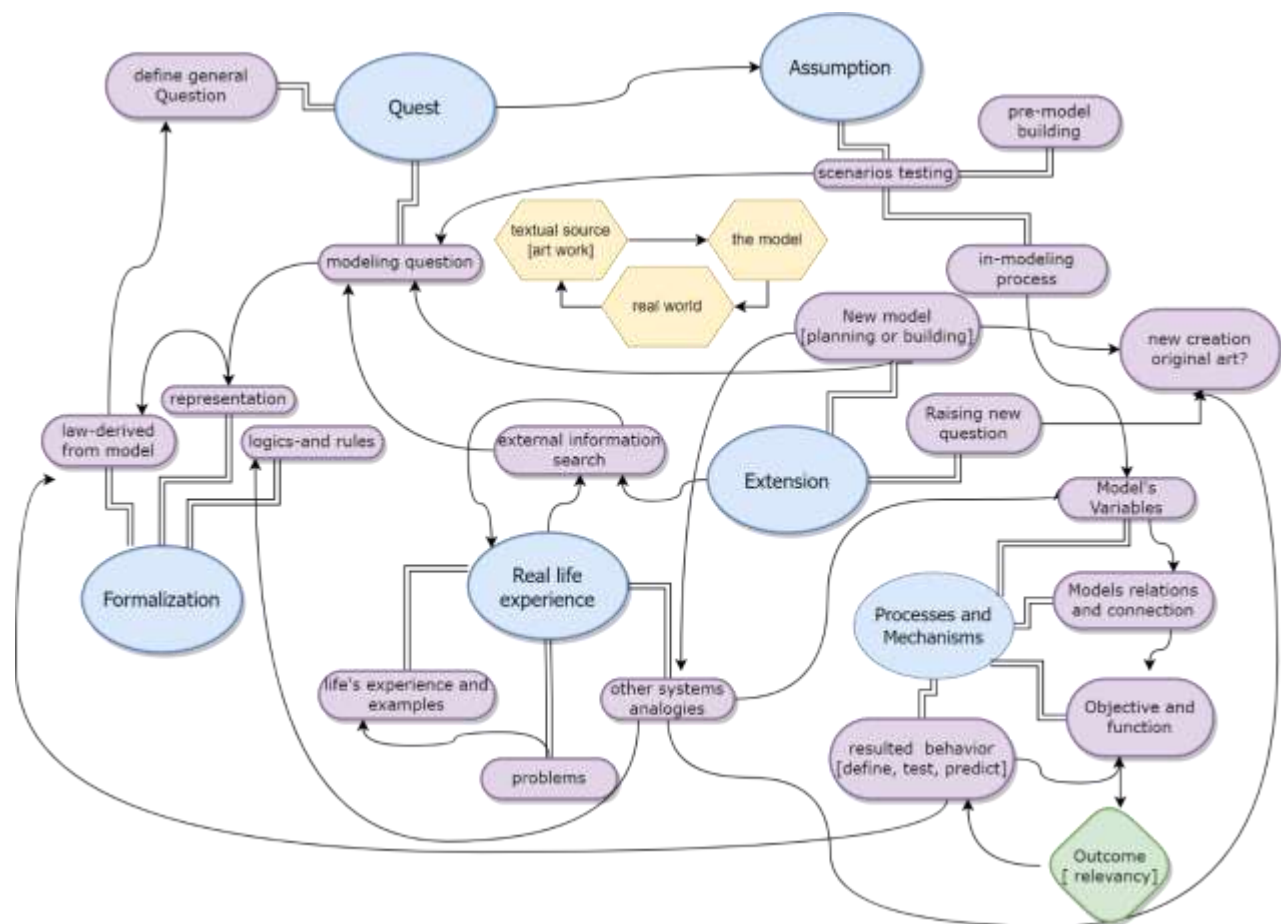


Fig 1-Concept Map of Modeling Skills

The concept map is based on insights and reference from previous studies (Mioduser, Zuzovsky & Ben-Moshe ,2020; Ben-Moshe Zarfati, 2021) It shows the triangular connection exists between textual-artistic space, the real world and a model[Hexagons] and each skill dimension[Ellipses] and their specific skills[oval rectangular]. The double lines represent ontological connection [i.e belongs to...] and the arrows represent more dynamic connection. Table 6 presents examples of the map components as they appeared in the modeling processes exhibited in the three case studies.

First example - Qualitative Model

Ibn Gabirol's poem 'why are you frightened'¹ was written in the 11th century, it is a secular poem that deals with loneliness and conscious isolation and raises philosophical and social questions. There is a degree of Kabbalistic mysticism in the context of awakening and search and the relationship between the soul and God [Lord]. In the model that we will present, the focus will be on the relationship between body and mind

and less on the relationship between man and God, although this connection may be the solution to the paradox² that it raises.

The song presents a "discourse" between a person and her/his soul and refers to the duality of body and mind and the separation between "me" and "others". Two philosophical assumptions are inherent in it, one is that the soul belongs to its master - the owner of the body with a hint to the masters of all souls (i.e. God) the second, there is a separation between outside and inside or between the world and the individual. The call in the poem is a challenge- the soul develops self-awareness and embarks on an existential search or fight ["As a fortress city you will fall into your hands"]. The soul has no material manifestation and therefore this is a barren war somewhat reminiscent of Don Quixote's war³.

The song presents three scenarios in which the soul is supposed to make a decision:

- if the world is small and you go on a journey - because there is nowhere to go, it is better to sit in one place and not waste energy
- if you completely abstain from people - there will be a return without wasting energy
- if you barricade yourself - as a besieged city, in total control but dependent on inside and outside

	Scenario 3	Scenario 2	Scenario 1
Original- Hebrew	אם תאונת נפשך קעיר מבצר – הלא תפל בידך, אם מעט תצורי אין לך בקרב האדמה נחלה:	אם מאנוש תנזרי – תעזרי ושכר פעלתך אזי תשורי.	אם נחשבה מבל קטנה לך כבר, עניה סערה, תתורי? טוב מהלך אנה ואן כי תשבי לפני אדוניך ולא תסורי.
English translation	If your desire is like a fortified city, a siege will bring it down in time	If you distance yourself from others You will flourish and surely see your reward	Since the world to you is small as a hand, You won't my storm, get far. Better than pitching from court to court it is better sitting before the throne of your Lord;

Table 1 -Three scenarios as they appear in the song

The model follows two mechanisms: search and retention [configured of soul, loyalty⁴, and longing]. The model tries three scenarios in which the soul can be found. In any of them, the tension between chance and risk exists and is estimated through the soul's gain, whether leaving its safe zone or surrendering to body limitations (e.g. due to illness or necessities). Figure 2 shows the map of the model's concepts and Figure 3 the model with detailed connections and types of relationship, for example, fear⁵ is proportional to the number of events or places the person visits. If the soul seeks to go out "to see the world" (i.e. to doubt the existing state of faith) and the world is perceived as small⁶ then there is no point in going outside. If it remains in the same state, and the world is perceived as wide and multi-possibility, it will include the soul

and its solitude. We chose⁷ to represent the size of the world as a correlation to loneliness – therefore, the definition for this influence serves as a condition. In another way, loneliness could be defined as a function of the number of social connections, or as it is perceived qualitatively by the individual. Those alternate options bring back to the question of the relationship between a specific interpretation, the definitions embedded in the model, and the textual source.

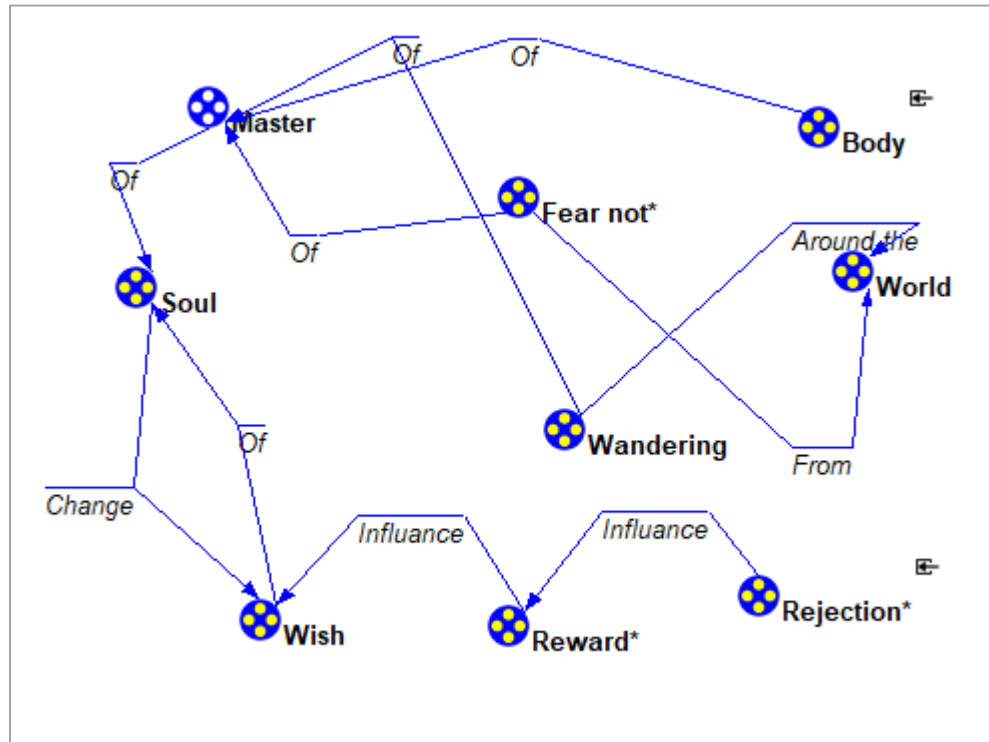


Fig 2- General concept map of the Qualitative model.

The identified component are represented as circles. The labeled arrows represent a form of connection [e.g. influential, ontological or hierarchy]. Relationships are the syntax of the model. The essence of a relationship can be understood by reading two linked components as a contextual phrase, for example, the component called ‘fear’ is ‘fear of the world’ or ‘fear from loneliness’ and the body and soul belong to the Lord [as shown in the poem], concepts from the poetic text such as migration, gift or storm[y] were used while building the model and some, embedded in the model.

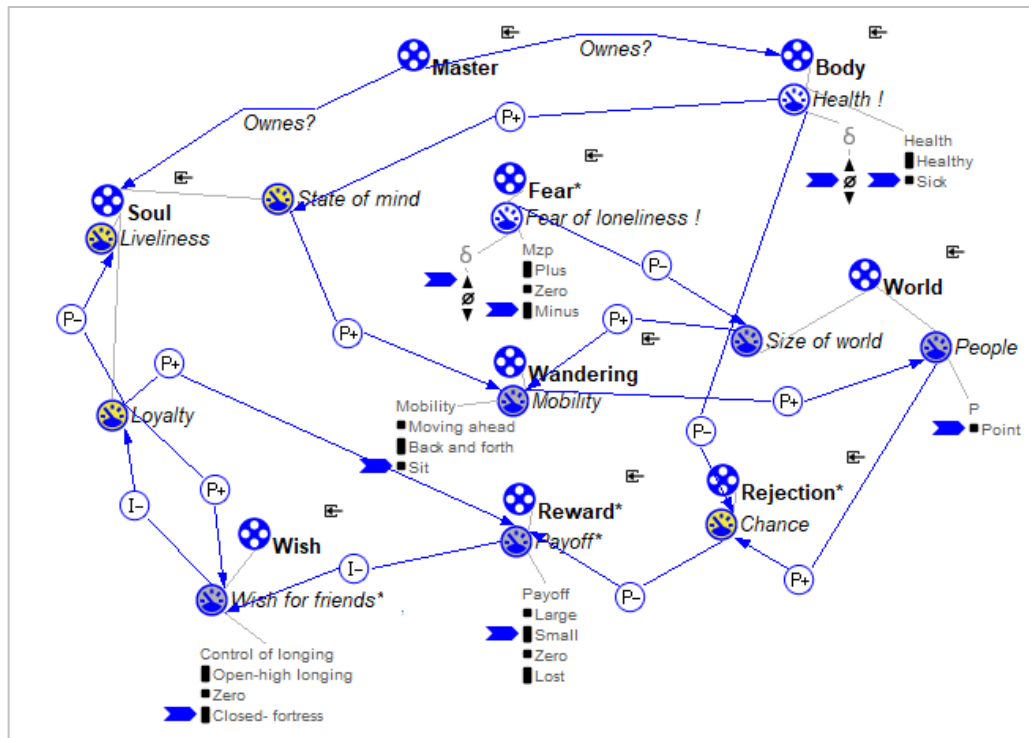


Fig 3- Extended map of the Qualitative Model

In the model, the components are represented as circles with four small circles inside them, the attribute is represented as a clock dial. The scale of values of an attribute appear as vertical list for example Reward is defined by payoff which ordered as large payoff, small etc. Variables that are independent like Fear and Body, is considered relevant, and exhibits the full hierarchy of an instance in this qualitative modeling tool. Connections are the arrows denoted with the letters P and I. For example, the 'Soul' is described using three variables: State of mind, loyalty to itself, and liveliness connected to Wish. Loyalty is connected to 'Wish' by two opposite influence connection: One is Proportional - the higher the loyalty to yourself the more you can control Wish, the other is direct Influence- the Wish lowers or increases the intensity of Loyalty. When the Wish is in a constant state, a decrease in loyalty is expected, like a hole in a bottom of a bucket. This kind of connection is example of a negative influence [noted as I-] and together, to a feedback loop. The decision to define Wish as a component and not another variable of the soul, is an informed decision that makes it possible to operate the model but also to represent the isolation of the Whole [body, soul, and master], because the song refers to the Wish as a driver for searching and exiting the "sitting" situation. The trait of loyalty to oneself represents self-confidence and the ability to a self-denial but in this model version, there is no expression for each of them separately.

Analysis and insights following the model's simulation:

The modeling tool allows running simulation according to an initial definition of values and performs it in two stages: a stage in which the simulation produces possible states results based on the selected assumptions and a stage in which each of the options can be examined separately, and observe variables behaviors obtained for each entity. The following table (Table 2) exhibits the three scenarios/ hypotheses we described earlier and their expression as an initial outcome in the simulation.

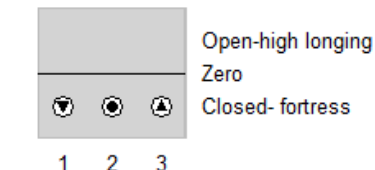
Initial key states-Scenarios	Assumptions
Wish: Wish for friends  1 2 3	a1- The ‘Wish’ variable scale of values [landmark]: 1. Great craving - open-high longing continuous state 2. zero-static state residues 3. Entrenchment and repulsion- Closed continuous state a2- Definition of the relationship changes the yearning is connected in a direct influence relationship to loyalty and a relative relationship to well-being

Table 2- Representation of qualitative model hypotheses.

The three hypotheses presented above [right column] refer to the variable of ‘Wish’ or control of the will (“Wish” in the model) – how much I want and need a company. This variable is defined in a hierarchy of three values [left]. The definition of values also represents the three hypotheses that appear in the poem. A low longing value is called ‘closed’ and defined as continuous. a value called zero represents a static state that does not change and a high longing value that is also continuous is called ‘open’. This hypothesis appears as a built-in part of the model (definition of the scale of values). The main simulation produces three possible modes of change. Each of the options represents the Initial value of the variable, i.e. 3 possible starting values represented as 3 circles with arrows. The ‘Wish’ variable will be in decline (denoted by a circle with an upside-down arrowhead), the longing will be in high control but will remain constant (denoted by a circle inside a circle) and a third option in which the control of the longing is on the rise, meaning there is a tendency to dare, go out and seek for company. The meaning of the value called ‘zero’ is a static state that does not change, representing the ‘sitting’ state which appears in the poem.

The results of the graphs simulation reveal that the fear variable remains at the established value - a state of increase. That is, with each simulation, it increases to the extent that the linked components allow it. Each of the scenarios examined (see examples in Table 3, Figure 4), results in several possible situations and several causal end-loops. In a Causal end loop, we refer to a state in which a variable returns to the same value and therefore it is a finite cyclical state. The model indicates that if it is assumed that the fear of loneliness is what influences the well-being (payoff) the degree of will control (wish), can lead to a concatenation of situations and perform as ‘sensitive points’ that omit signals. This may influence the result and serve as an emotional regulator, based on the assumption of feedback between loyalty and wish.

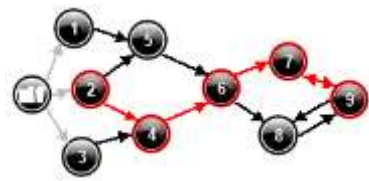
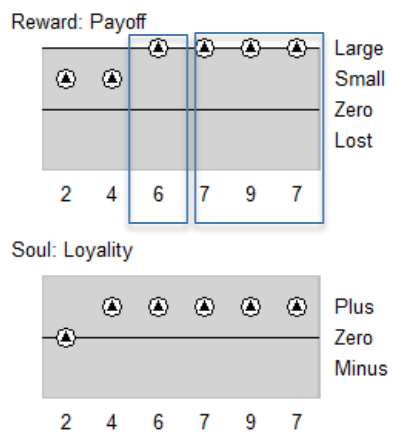
Definition of variables value	State Simulation	Variable State Graphs
		

Table 3- Behavior Graphs of variables after running the qualitative model.

The table shows the causal relationship between the intensity of ‘wishing’ and the choice of the soul to stay or go out. Wish is the variable and its initial value, selected to run the scenario (option 2 in table 2) is exhibited in the left Column. In the context of this scenario, the fear variable remains at the initial value, in this case, a state of increase [does not appear in this table]. On the right column is the result obtained for the dependent variables Payoff and loyalty. Each variable is represented in a state graph. The simulation produced a series of six possible states and this is considered a causality states-rout [e.g. the transition between state 2 to state 4 is allowed–Denoted as red circles in the middle column]. The question behind this simulation is about the gain of well-being. In this scenario, craving is in control, meaning that there is a choice in the entrenched, the loyalty to oneself is high and the reward goes through 3 distinctive phases: a small increase, transition [6], and continuous large increase. Phase 3 enters a loop between states 7-9, i.e., alternating between two possibilities - you can get from state 7 to state 9 and vice versa but you cannot go out to a new state.

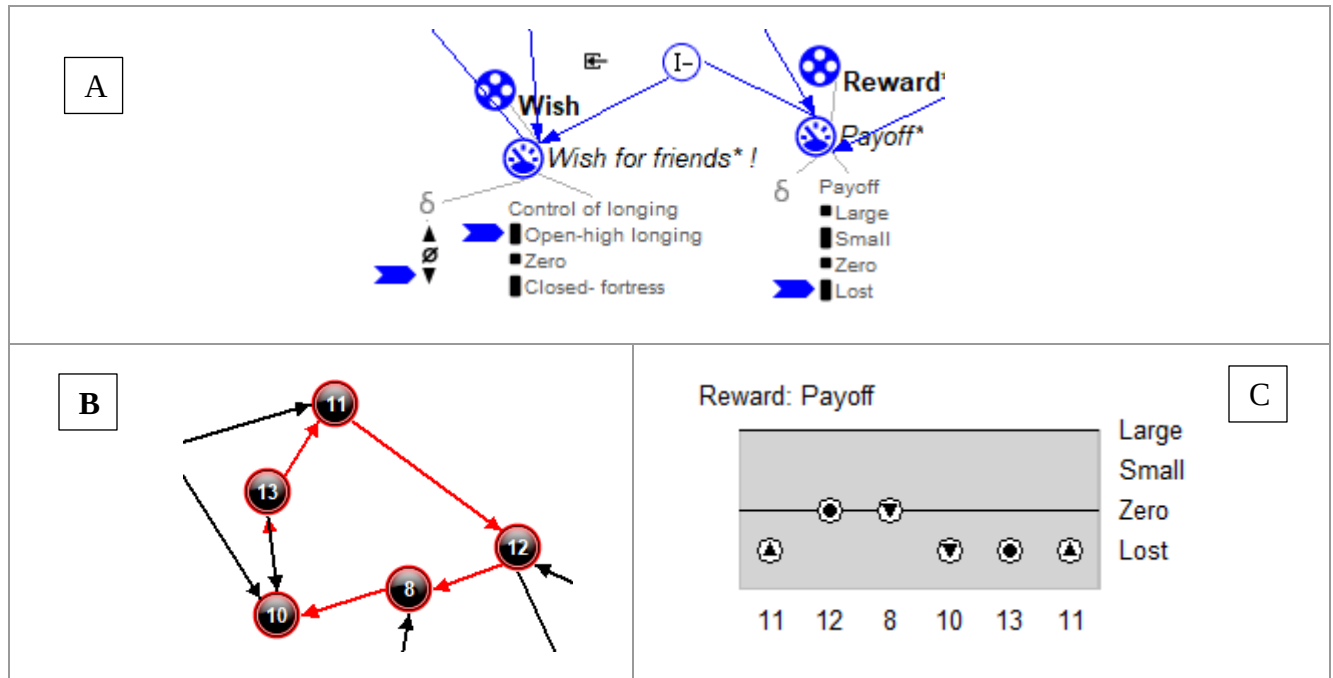


Fig 4- Representation of a scenario in the simulation stages of a qualitative model

The three figures show how a hypothetical scenario appears in the three operational stages of the model: a map, a network of states, and a behavior graph. (A) One of the scenarios- describes a situation in which a change of control over the desire for a companion [wish] is minimal, therefore we defined the change in the graph from high to continuous decline.[noted as the big horizontal arrow on the derivative scale under the delta sign]. As a result, we get a cyclical states-rout (B) in which the return or profit will rise, stabilize, decrease, and rise again (C). If we translate this into the concepts of the poem, if the soul dares and gives up control and the fear of loneliness prevails over loyalty to oneself - the mind won't necessarily depreciate from it. On the other hand, when there is distress or a feeling of loss, such a state is possible even when the mind is awake, sitting, or mobile, to some extent this is a form of high robustness.

In contrast to traditional analysis, the model makes it possible to examine the interpretation of the poem against extra-textual logic, to select states and configuration of variables, which may be correspondent to real situations, and to examine possible outcomes based on the logic of the model. The modeling tool built a granular-network of concepts that produces simulations, by using mathematical generators and a logical engine. The outcome graphs/plots are not self-explanatory and interpretation is needed. For example, if the graph of situations indicates the importance of a relationship between 'loyalty' and 'Wish' as a regulator, it cannot be said that it is responsible for the distress expressed in the poem. The theme of Wandering and Searching⁸ points to the conflict of God's choice versus existence and materiality, as appears in Kabbalistic mysticism (Levin, 2009; Kurzweil lexicon of new literature) either as a search for meaning, questioning the existing situation and abandoning faith, or questioning of the mind-body dualism.

The model also attempts to examine the conflict between the public and the private, whether there is a boundary between them and whether it is physical or mental. What is the price of seclusion, compared to

the price of friendship or dependence on others, and what is the connection between the definition of the limit and the definition of one's identity and self-awareness? According to the poem, because the soul cannot behave as a fortress city, because it lacks an "inheritance" or a material expression - it will fall⁹ from top to bottom or be suppressed, therefore, the preferred alternative is to remain in the current state. The model assumes a separation between mind and master as proposed in the poem, but the poet connects them by presenting the possibility in which the soul awakens to find its "end" – i.e. its limitations (the definition of self-identity). The paradox is represented by a feedback loop that exists between two variables – loyalty to oneself and the desire for friendship. See an explanation and example in Figure 5.

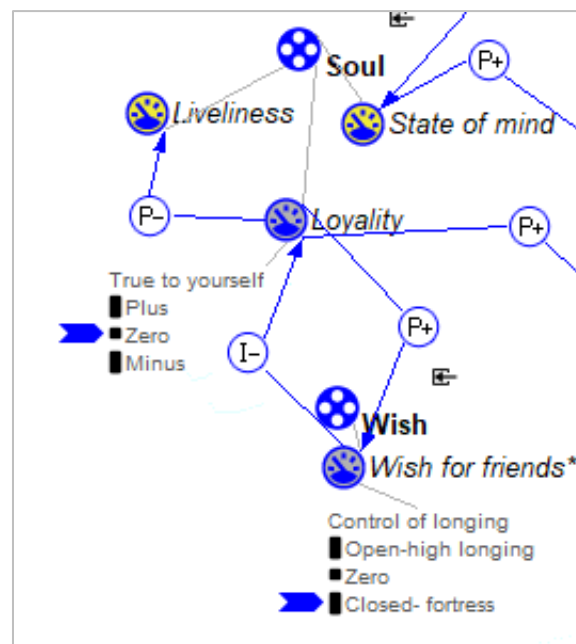


Fig 5- Example of Feedback loop in the qualitative model

A feedback loop between Loyalty and Wish – assuming loyalty is steady. In this model, the loyalty in general is a variable that is not constant and therefore there is a hierarchy of optional values [landmarks composed of min-zero-plus]. The thick blue arrow indicates an initial value assigned. In this loop, loyalty to oneself and the degree of ability to self-deceiving, indirectly affects the ability to control the 'impulse' of longing ['Wish'] which in return, will increase or decrease directly the loyalty (as part of a conscious choice). This means that the desire for friendship undermines self-confidence but at the same time is part of it - when a person is true to himself, he will be aware both the need for society and the degree of self-sustained ability [spiritually and physically]. In the scenario presented here –loyalty has a constant initial value but it can be continuous. In case we examine the loyalty in a plus or minus value, the loop can produce a state of delay when Wish value reaches zero [for example].

Other issues and questions that have arisen are equality of opportunities, social exclusion, and patronage as a condition for personal and general development¹⁰. A constant fear of rejection due to a personality defect or other rejection is recognized and known as a social phenomenon. The issue of patronage¹¹ that was practiced in the ancient world and the importance of social interaction for the construction of knowledge as an institution [e.g. Sanhedrin] and as a learning community, is a question that can also be extended to our day: How bodies of knowledge and content are created through communication and in what way it sustains the personal and the private mentally and physically.

Second example – System Dynamic Model

Chapter 4 of the book of Judges deals with the third round of the trust-faith relation between the people and God. The Book of Judges is a book of cyclical behavioral patterns, each chapter begins with a situation in which the people are stressed or distressed as a result of an external enemy. When the people break down and call for help, the help comes in the form of a judge or a leader who, unlike previous prophets or leaders, has no direct relationship and “personal channel” with God. They have foresight and leadership ability expressed in daring and wisdom. The judges carry out a daring act or send someone else with leadership characteristics to salvage the people. In chapter 4, the battle is between Sisera and Barak, but the battle has two fronts: the war between the sexes [male-female] and the dynamics of faith between the people and their God.

Based on the three opening verses of the chapter, we can learn about the dynamics that appear throughout the book of Judges – the people continue to disobey the commandments [interpretation], and God in response sells¹² them to the enemy -Javin, king of Canaan, who uses his power over the people, "And he pressed the children of Israel", The people cry to God believing and hoping for help. From the general mapping, four modules can be identified – the people, God, an enemy, and a judge or an alternate ally (Fig. 6). Preliminary questions for preparing the model were:

- a) Why does the cycle of trust-breaking between the people and their God take place?
- b) What does it mean to "quiet the country forty years"? Does “quiet” indicates full trust expressed in action or imply on Status-quo or temporal state?
- c) How does personal trust affect actions and what is the connection between action and sincerity in terms of the result? Is there an attitude in which the degree of trust does not depend on the acts [blind faith] and is it possible to reach a similar situation randomly [without bias or conscious preference]

- d) Does the breaking point due to a critical mass [overload of discontent/doubt] or does the quality of the ‘cry for help’ (intention and action) play a role in the dynamic relationship between the people-god?

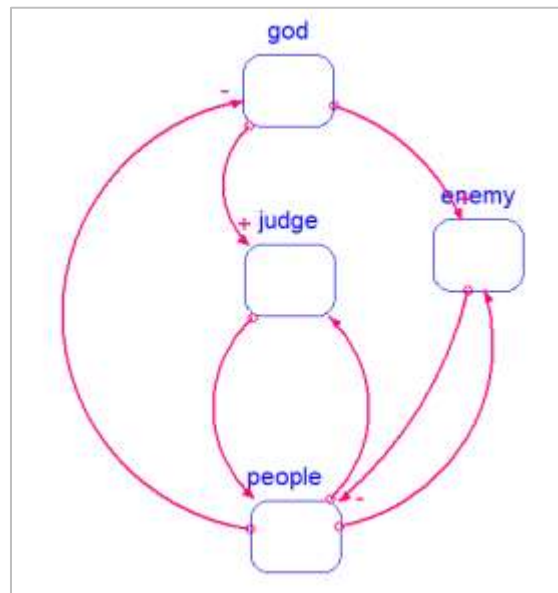


Fig 6- Dynamic Model for “Book of Judges”

Each significant element is represented on the map as a square. Influence relationships are represented as arrows their direction indicate the source of influence and his target. The signs +- represent the vector of the change - a plus sign indicates a relationship in which the change will always be the same on both sides (positive linearity) A minus sign indicates inverse changes - when one increase the other decrease and vice versa(negative linearity).

The model consists of two dyadic subsystems (i.e. two pairs of characters influencing each other). Both subsystems feed the bond between the people and God. This relationship is captured as systemic because it relies on the dyadic systems and contains a feedback loop. Each character receives values according to pre-defined attributes, for example, gender, trust, resistance/resilience, and two cooperative traits which are honesty and doubt. Honesty is the degree of adequacy between the act and the statement [manifest of intent] and doubt is the sum of the acts and the ability to believe and foresee (to anticipate the moves of the other in varying degrees). The doubt variable was created to sharpen the trust component and refine the distinction between the two dyadic relationships, with the idea being that wherever there is doubt there is a potential for trust [doubt is either discredited or verified]. Doubt consists of the degree of familiarity between two linked characters and the character’s unpredictability, which is represented as a ‘blind spot’ analogy. Another common feature is Accreditation. The word "your glory" is understood as the degree of credibility that should be simulated in the system and is a weighting of consciousness, trust, actions, and strategies ("way") as they exist in the system (Table 4).

Dyadic system1- Yael and Sisra	Dyadic system2-Deborah and Barak
Implicit gain-lose	Explicit gain-lose
וַתֵּצֵא יַעֲלִי, לִקְרֹאת סִיסְרָא, וַתֹּאמֶר אֵלָיו סוּרָה אֲדֹנִי סוּרָה אֵלַי, אֶל-תִּירָא. ” (פס' 18) And Jael went out to meet Sisera and said unto him, Turn in, my lord, turn in to me; fear not. And he turned in unto her into the tent, and she covered him with a rug.	”אִם-תֵּלְכִי עִמִּי וְהִלַּכְתִּי; וְאִם-לֹא תֵלְכִי עִמִּי, לֹא אֵלֶךְ -וַתֹּאמֶר הֲלֹךְ אֵלַי עִמָּךְ, אֲפָס כִּי לֹא תִהְיֶה תַפְאֲרְתְּךָ עָלַי-הֲדָרְךָ אֲשֶׁר אַתָּה הוֹלֵךְ--כִּי בְנִד-אִשָּׁה, יִמְכַר יְהוָה אֶת-סִיסְרָא ” (פס' 9) And Barak said unto her, If thou wilt goes with me, then I will go; but if thou wilt not go with me, I will not go. And she said I will journey that thou takest shall not be for thine honor; for Jehovah will sell Sisera into the hand of a woman. And Deborah arose and went with Barak to Kedesh¹³.

Table 4- Two textual sources representing the two modules

Despite the use of possessive in the word "your glory", we referred to it as a systemic attribute (accreditation) and not private (reputation). Reinforcement for this can be drawn from other sources¹⁴: "In the midst of the righteous, there is great glory, and the wicked shall seek a man" (Proverbs chapter 20, verse 12); "Rabbi says, What an honest way for man to break, all that is glory to his doers and glory to him from man." (Tractate Avot, chapter 2 of Mishnah 1). The definition of a model's concepts is a personal preference and therefore debatable. In the system between Deborah and Barak, everything is overt and known, emphasized by the word "zero"- i.e very identifiable. On the other hand, in the system between Sisera and Yael, the intention and profit are implicit and embodied in the calling's form i.e. repetitive and seductive: "Come, sir, Come to me, do not fear" as done while addressing naïve recipient or someone perceived as an influenced (a child or a drunk /distressed/disabled person, etc.)

Insights from simulation

Despite the missing information [Yael's motives], the model manages to show that within the discrete and symmetrical system of the biblical story, it is possible to identify behaviors and mechanisms at the micro level that affect the macro level, and to define the system's features, for example, personal doubt translates into credibility [the concept of "your glory"] and faith through the relationship between an act and intentions within a constraining situation (external pressure). The Graph plot of the Belief-Trust and the degree of stress (Table 7) shows that the behavior obtained has a distinct change point. The graphic behavior shows four trend areas - there is an increase in pressure, static trust, and a decrease in pressure - probably due to the acts that have occurred - and then stabilization, as the biblical story describes "and the land will be quiet". The model can represent the original textual source but at the same time, it is not possible to see periodicity because the story ends and there is no amplification of the pressure. The derived assumption is that if we increase the pressure, we may see a decrease in faith – this will lead us back to the source's narrative framework.

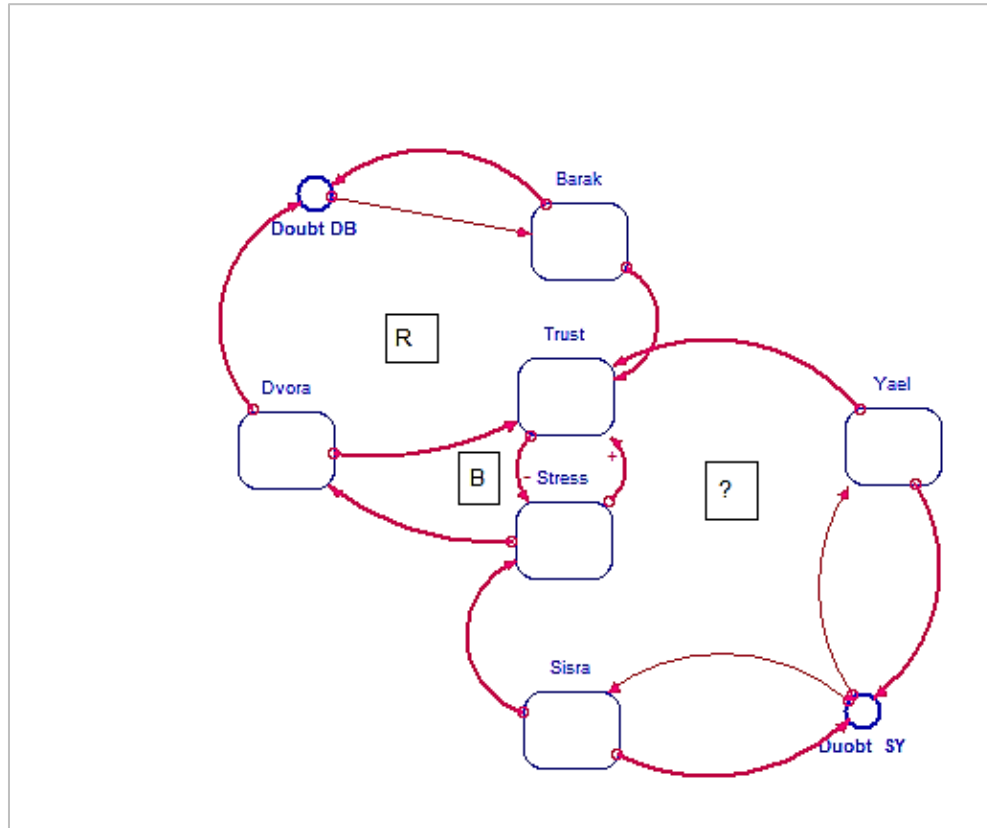


Fig 7- The model image - abbreviated without values

Map of the two dyadic dynamical systems of the model. The main circle is between the degree of stress and trust, it is a balancing loop that is located within the two dynamical Sub-systems/Module. The Barak-Deborah in the model 'DB' in the model] has a reinforcement impact [denoted R], it means that action strengthens the trust - as a prophecy that comes true. In contrast, the loop between Yael and Sisera ['SY' in the model] remains in question even though it has a catalyst impact. It can be seen that between Yael and Sisera there are mutual feedback processes [denote as 'doubt_sy'] while in contrast, in the relation between Deborah and Barak, only Barak is affected by the doubt. Access to full model: <https://exchange.iseesystems.com/models/player/sheli/dvora>

The discussion about faith is aroused by the fact that the feedback or reward for being faithful (as a believer or conduit of god's will) is not necessarily well-known or insured as in the case of Yael. According to Maimonides, "One does truth because it is true" (Halachot Teshuvah to Rambam, Chapter 10, 3) and not to receive remuneration. If it is assumed that the conception in the biblical story is theocentric, God is the purpose of everything, and glory belongs only to God as expressed in faith. According to the story, Yael betrays her trustees and close relatives (there is a contract between the Caini tribe and King Javin). In her decision, she bets "on the jackpot", but remains anonymous and does not receive credit (it is said, "In the hand of a woman" and not in the hand of Yael). The choice to defect from an existing contract is a natural choice – our mental model is to choose our interests over altruism ¹⁵(Mankiw, 2020; "prisoner dilemma, n.d."). The logic implied by this is that even if the person goes against the current, takes a risk consciously,

	Plot Graph	explanation
1		Dyadic system – Yael Sisera It is possible to identify the blind spot and her influence on the actions of Sisera [6-9 times intervals]. the blind spot of Yael is defined randomly because her motives are unknown – in her case a tendentious positive curve is obtained
2		A correlation graph - trust and pressure [distress] shows that at some point the pressure decreases as the phrase says: and "the country will be quiet for forty years" while the belief increase, which indicates that this is a reinforcing feedback loop [16]

Table 5- Graphs of the dynamic model variables

The relation between Deborah and Barak and between Sisera and Yael [1]. Two systems' properties -trust and pressure [2]. According to preliminary assumptions applied in the model. The 'blind spot' attribute serves as an analogy that we have used. It represents the ability to see and receive information despite limitations such as selective vision and range of vision. In the model, there is no representation of these two indicators individually but as general behaviors, for example, if Sisera trusts Yael and she hides her true intention (covers it literally), this feature is represented as a graph ascending to a high point and then, decline. Deborah, by being a judge, always sees the present and the future and therefore receives a fixed and high value. A visual example can be seen in Table 9. Other options for testing in the model: check what would happen if we reversed the blind-spot graph of behavior assigned to the two "men"; What happens if we change the gender values from binary to a scale between 0-1; What will happen if external pressure will be exerted or the pressure will be increased due to a decrease in faith[not listed in the model]; What will happen if we define Yael's choice as an oriented [i.e. not random] by assigning a graph of behavior with a change point of decline (straight-point-decrease).

The logic implied by this is that even if the person goes against the current, takes a risk consciously, or behaves unpredictably (expressed in the model as a random choice), this will be expressed in faith and will increase the power and freedom to choose¹⁷. In Yael's realm, it is possible that she remained anonymous after the event¹⁸. The builder of the model as an observer, has information about her and at the same time, her motives are not stated, and it is possible that this is the intention of the biblical writer – to use the missing information as an argumentative tool, and turn the spotlight on the unknown, represented as blind faith (Person) and hidden ways (God). This logic also appears in the predictive capacity of Deborah- As her prediction fulfills itself. Based on partial knowledge, a desirable result is still obtained and becomes a piece of evident information (the original biblical story), as an interpretation, or in our case, as a model.

Third example – Agent-Based Model

The text source is a children's poem written by Levin Kipnis that describes the formation of a cooperative /temporary clique that helps overcome specific difficulties. Unlike the two previous examples, the model is less close vis-à-vis to the song and has a more general and insinuating essence. This may derive from the nature of the Agent-Base modeling and the adjustment needed in the modeling process.

The song describes a situation in which one of the children initiates going out into the rain with a large umbrella and on the way, children join him. The hosted children are hiding and avoiding the rain. Each meeting starts with a personal call initiated by the children under the umbrella. The song ends when the whole group arrives safely and happily at the kindergarten. This real, personal and social situation arouses the issue of anxiety, which can also be examined from a psychological-evolutionary perspective (Kannier, 2007). The situation can be seen as a survival strategy against "rain" when everyone has a degree of fear. In exposure to rain, there is a danger but unlike predation or exposure to fire, this fear is not primary - we instinctively move our hand from a flame but we do not flee from rain -exposure to rain has a complex effect. In this model building, we took inspiration from two existing models. One is a model built according to the idea of the brave cowards¹⁹ (Wilensky & Rand, 2015), and the second deals with the formation of single-cell clusters (Keller, 1983; Keller 2009; Wilensky & Rand, 2015). The former relates to herd phenomenon and social pressure effect and the latter to the convergence of organisms in dire and the role of rhythm-setting cells.

	Hesitate-type: the umbrella's guest	Brave-type: the umbrella's carrier
Hebrew	"והנה אילנה, שאוהבת בננה, מציצה אליו מן החלון. קרא אליה: "אל תביטי בחלון, בואי איתי לגנון!"	אמרה אמא של טל: "היום לא תלך אל הגנון, הגשם דופק על שמשת החלון!" "הגשם דופק – שידפוק לו! אני אקה את המטריה הגדולה של אבא." מיהר טל, שתה, אכל, לבש, חבש. את המטריה הגדולה לקח - והלך.
English	"And here is Ilana, who loves a banana, peering at him from the window. He called out to her: "Don't look out the window, come with me to Ganon"!	"Tal's mother said: "Today you will not go to the garden, the rain is knocking on the window pane!" "The rain is knocking—let him knock! I'll take daddy's big umbrella." Tal quickly drank, ate, wore, and dressed. The big umbrella he took - and left."

Table 6- An example of the system components in the source song "dad's big umbrella"

To build the model,²⁰ we defined several pre-questions:

- Does individual satisfaction depends on direct or indirect protection[i.e. via personal relationships]
- What is the cooperativeness time-dependent nature? (Occasional, Cyclical, Pattern-like, or fixed)?
- Can optimal satisfaction be obtained exclusively in a time frame?
- Do survival mechanisms [fear /information processing] affect the formation of patterns in the model environment?
- How do inner processes and interactions with others [e.g. word-communication-thought-action cycle; word-emotion-action] mold and explain the behaviors in the song?

In the model's world, umbrellas of various sizes wander around and the umbrella holders are called Braves. A limited number of children can fit into the umbrella, this number is correlated to the size of the umbrella. The umbrellas cover a limited number of patches [a patch is a model object, equivalent to a pixel in a picture] and each patch serves as a factor in the value of exposure to rain. Each character decides to enter the umbrella according to two rules:

- Dependence on the structured character - the hesitant type will linger, and the innocent type will behave in a probabilistic unpredictable way
- Dependence on the situation - the density/entropy of each umbrella is known - according to this information, it is possible to choose shelter during a simulation. The model-user can monitor the content (satisfaction) and fear of the individuals in the system. Satisfaction is influenced by friction and entropy. Under the umbrella, combinations of strings²¹ are formed. When a string is created, it is measured by entropy. High entropy represents a state of uncertainty and low entropy represents

static and fixation. In this sense, entropy can imply a degree of variance. Entropy is not constant because the combination changes. When entropy²² is high, motility and uncertainty increase from here that the probability of feeling dissatisfied increases. Satisfaction is influenced by other variables: the degree of exposure to rain [according to physical index], natural hesitation, and the ability to control social anxiety, for example, by hiding fear (Gilbert, 2001; Kannier, 2007). Overcrowding lowers satisfaction [more space] and controlling anxiety increases satisfaction. The value of fear varies according to physical and behavioral traits such as the threshold of sensitivity to stimuli (Friedman & Thayer, 1998) and level of exposure. Figure 8 shows the interface of the model and Table 7 plots of two possible scenarios.

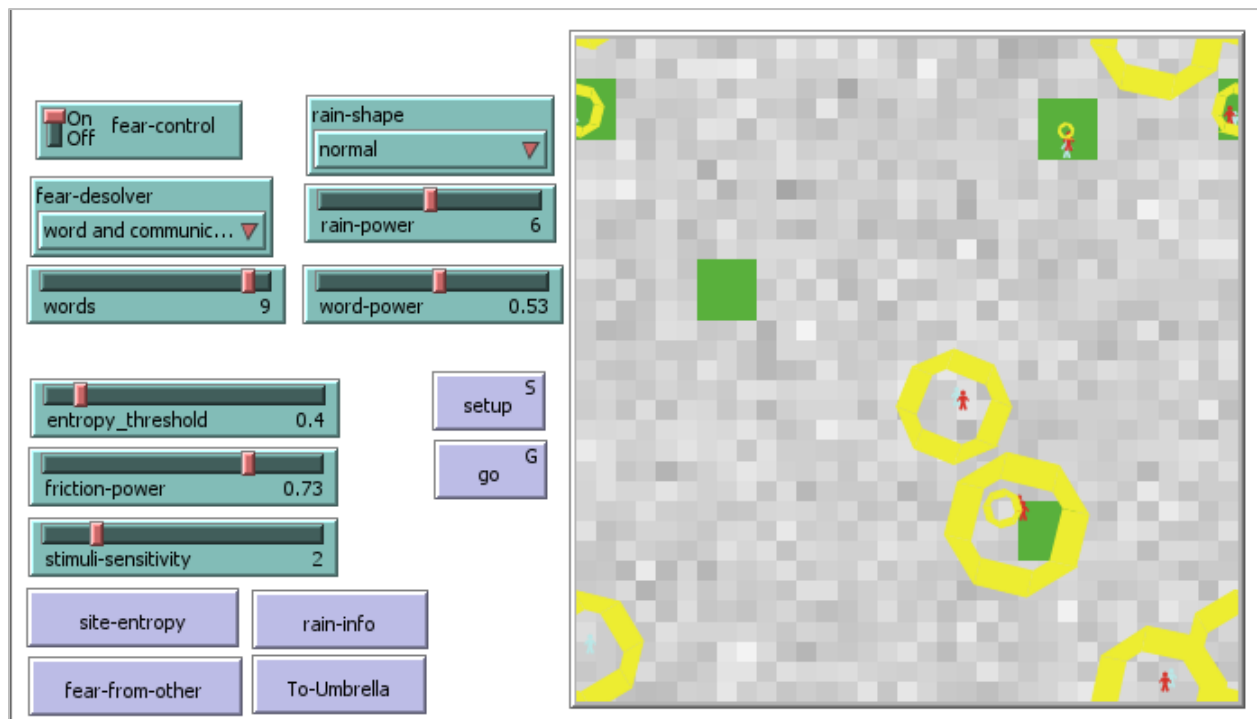


Fig 8- Simulation's image and the Agents-Based Model Interface

The model consists of three groups - typical brave children who carry an umbrella, naïve and skeptical. The yellow circles represent the subjects of the umbrella and the area it covers. The green patches represent the permanent kindergarten or shelter and the grayscale patches represent the areas of rain exposure. The model monitors the relationship between the variables fear of exposure and satisfaction [dryness-less wetness] and the social situation that accompany walking from home to kindergarten [green rectangles]. Here is the model's infrastructure: 1. Each character represents a behavioral type on the axis between innocent-coward-suspicious-brave. In order to simplify the model, two categories of suspicion [hesitation] and naivety were selected because the brave are the ones who hold the umbrella [and less interesting] and therefore the type is defined in a binary value 0-1 so that under the umbrella a binary string of 0-6 characters is created [the expansion of the model can define instead of a single binary value a greater number such as 2-4]. 2. The environment consists of two macro levels, which is the children's or neighborhood's environment, and an intermediate environment, which is the umbrella. 3. The solution is temporary - depends on the time or the way and therefore, the behavior is measured in relation to time or cycles of action - "ticks" in the modeling tool language. 4. The state of the rain does not change during a run it is determined at the beginning.

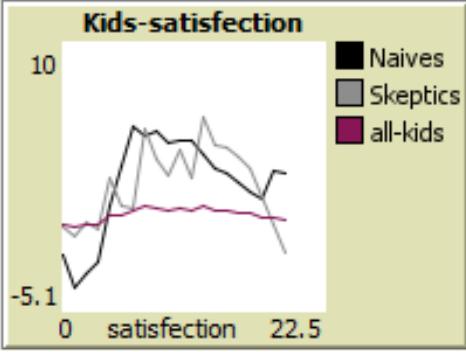
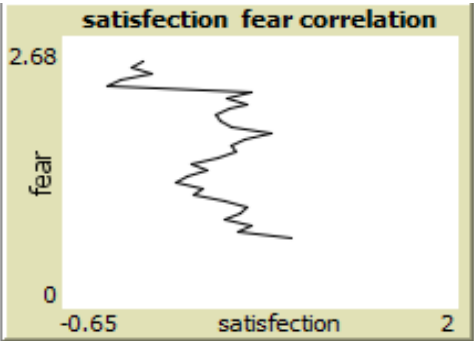
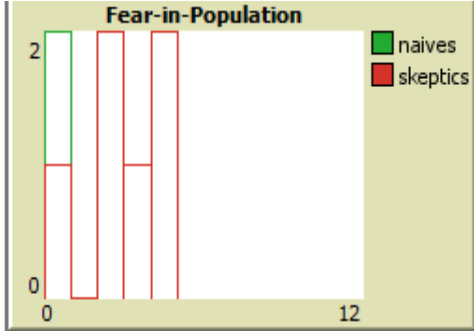
1		Scenario B – Given the fear control effect- Word and communication Low entropy or low friction 
2		Correlation between fear and satisfaction medium entropy [1.4] and friction of 0.48
3		variable distribution graph of fear- in the innocent group, it is uniform but in the group of skeptics it diverse

Table 7- Agents-Based Model's Scenario [B] results In Graphs

Despite the relative variability in the degree of fear in the population [3], it is possible to find situations with high entropy and friction that lead to a decrease in fear and an increase or stabilization in the degree of satisfaction [2], which can be translated into a feeling of security or trust. In general, the model and simulation show that even with environmental changes, such as the shape of the rain scattering, the two populations complement each other[1] in terms of the ratio between the degree of fear and satisfaction, which corresponds to the logic behind the model's construction (pointing to the poem's intent).

Insights from the Agent-Based Model

In the model, the population of braves is not tested because communication acts as a reverse trigger on them. The mother asks Tal [brave] not to go to kindergarten Tal initiates an act, and once it is performed, he is protected and dictates a path to which others join. Building the model sharpens the relationship between fear and desire. The ability of communication to influence and dissipate fear and the distinction between the forces of thought (rationale) versus the power of the word (communication) was also expressed in the model. Apart from this, several unforeseen situations have been detected, such as the fact that one umbrella can collide or be simultaneously under another umbrella. This situation initially appeared as a malfunction - the model stopped because the Observer (a built-in global component in the Netlog code) did not know which umbrella to call. The solution was to insert the option to choose one of them in the code. In retrospect, this can be used as a mechanism that increases entropy and therefore affects satisfaction.

During the construction of the model, the question of how to create a different delay for each breed arose. To produce a pause effect, we added local behavior, similar to what happens in reality - such as spinning around or counting to ten, that will delay the skeptical child. This is a simple example of creating a local mechanism that does not depend on an external clock. A more elaborate option is using a regulator mechanism controlling the level of exposure. In the song, the rain or water is the object of fear. Exposure can be used as an inhibitory element-The longer the child lingers ("watching the window") the habituation to the stimulus increases, the anxiety threshold should decrease and the need for a 'word' or other external stimulus decreases. Alternatively, this may have the opposite effect that causes the child to stay in place, move less and then get stuck in place²³. This case represents non-intentional control as a result of a feedback loop. Applying the function of a simple Counter-loop in the code, exposed the fear control scale and the resulting amplification effect. The use of consciousness manipulation, such as counting, to control responses can lead to a state of prolonged exposure to a stimulus affecting the threshold of apathy and activating ancillary mechanisms such as self-awareness to behavior visibility²⁴ (Kurosawa & Harackiewicz, 1995; Friedman & Thayer, 1997). The model environment and coding raised the idea of assimilating and identifying feedback as a behavioral mechanism.

Another circular influence is the relationship between social anxiety [exposure] and fear of loneliness [rejection]. In the song and model, a temporary society is created within a defined area. The situation generates some feedback circles that are measured at the levels of individual and society, for example, when a socially rejected person and a temporal surrounding are found in an imposed situation²⁵ - society rejects the outcaste which is separated from the rest. In a closed environment, the conditions of the excluded individual can be improved and maximize personal gain which causes the environment to "heat up" and the resentment to grow out of jealousy. When it comes to a temporary situation or a closed system, the profit exceeds the loss [because it takes longer to adjust conditions]. This element of profit and loss from the

social situation, has been assimilated in the degree of satisfaction but is absent from the original text and could be considered as a conceptual extension.

Looking Through a scientific prism, the group of skeptics is the experimental group while the innocent type constitutes a control group²⁶. The force that acts on the hesitant is rationality [sensitivity to information]. The model uses entropy as a variability measure, tracing changes in the temporal intermediate environment [the umbrella], but it is not an ultimate representation because, in an umbrella populated by only one type, the satisfaction index is not necessarily the highest – this possibility is testable in a new model and even reality.

Some questions about interactions within the umbrella and the nature of gain-loss via cooperation remain open. Does cooperation exist in the space between the meso-level and the macro, i.e., between umbrellas, similar to biological or social phenomena such as the creation of cancerous sub-nodules (Axelrod, Axelrod & Pienta, 2006) or cliques between children (Levi & Wilensky, 2008)? The characters in the model do not maximize the gain by consciously choosing cooperation under the umbrella and there is no expression of dependence or advantage, resulting from a previous familiarity, as appears in other models of cooperation (Axelrod & Hamilton, 1981). The poem presents one-way communication, which can raise a new question for examination: How the communication networks affect the outcome either from the individual point of view and the system and how to identify and measure this- additively (e.g. summing up satisfaction) or dynamically i.e. by tracing equilibrium in which no one can change anymore (Cooper et al., 1989).

Summary of the examples

A summary of the three modeling processes exhibiting the value of modeling as a building knowledge tool, focusing on systems thinking skills is organized in the two tables below. Table 7 presents detailed modeling skills corresponding to the map we introduced in the former chapter (Figure 1). Table 8 presents analogies compliant with other formal representations from each modeling environment.

Skills	General description	Qualitative Model	Dynamic model	Agent Base Model
Questions- Formulate and define	Formulate general questions for examination through the source; Choosing a question to examine by the model	General question - is there a separation between mind-body Model question - what is the connection between worldview and desire/ need for company and society	General question - Is faith in God, blind? Model question - what is the connection between social trust and faith and between sincerity and action?	General question- Is cooperation a strategy or value Modal question- What is the effect of communication on anxiety and satisfaction?
Process and Mechanisms- Identify and test	Identifying components and variables of the model; What are the relationships of influence between them and what are the resulting outcomes ?	Variable- person (fear) Interconnection- person(fear) person (wellbeing) Mechanism- the person goes out and meets with people to satisfy a spiritual or physical need Result- the person is compromised the security descending leads to prefer seclusion	Variable- Yael (acts) Interconnection- Yael (acts) Sisera (acts) Mechanism - Yael misleads Sisera to bring the war to a decisive end (consciousness) Result- Sisera is dead, and The people are informed (e.g. Deborah's song) The pressure goes down and faith in God becomes stronger	Variable- child(fear) Interconnection- child(fear) umbrella(size) Mechanism- counting delay up to ten The child enters under the umbrella crowded but there is enough protection Result- fear decreases; The satisfaction increases
Assumptions and Scenarios Raising assumption And conjunct outcomes	Raising assumptions before model construction and speculations during construction; Viewing possible scenarios and predicting appropriately to the scenario	Hypothesis- fear is a continuous state; The perception of space affects daring relatively; The craving changes in many scenario situations Scenario - low longing value and the world perception set to 'small' - the well-being will decrease and the fear will increase	Hypothesis - Yael's betrayal is random; Yael's betrayal is A conscientious choice Scenario - belief variable set to random values - a stabilization is obtained in stress and general distress	Hypothesis - hesitation is a relative variable; Time perception and communication are independent variables Scenario -if the Preferred strategy is time perception and the sensitivity is set to 'high stimuli' then satisfaction will vary respectively
Formalization Construct represent and analyze	Construction of the model , formulation of logic rules and constraints , use of supporting representations	Logic and rules- fear of loneliness is inverse to fear of people Representation- fear trait is an entity variable with a values hierarchy of minus-zero-plus Derived law- fear can change; Security and well-being depend on the unity of the soul-God	Logic and rules- doubt is the product of two linked components; Leadership is a sequential feature Representation - Doubt between Yael and Sisera converts values as a function of visual abilities[absorbing information] $Y(action) * S(action) b(s)/b(y) *$ Derived Law -" blindness" or conscious faith and leadership ability strengthen confidence	Logic and rules - a string of types is created according to the hesitation attribute Representation - the hesitation attribute in a binary value: Naïve(hesitate) [0]; Skeptics(hesitate); [1]; Umbrella(entropy state [001010]) Derived Law- Communication reduces fear but doesn't exclusively ensure security; homogeneity doesn't guarantee satisfaction
Real-world connection Sourcing and parallels to any form of knowledge	Relating known issues or problems (day-to-day or other); identification and use of parallels, analogies , and fragments; Use of examples from life and general knowledge (common knowledge)	Problem - Quarantine, social isolation as a result of epidemic Analogy - stationary animals versus migratory animals in nature; fortress wall; valve faucet Example - "My world is narrow as an ant world"(Rachel Ha'Mesoreret);"	Problem - breaking the status quo; Analogy- blind spot, range of vision, dark area; two symmetric dyadic systems - Example- women are unpredictable-hysterical; "Blind faith" "	Problem- stage fright of artists; social pressure Analogy- cancer cells; Three example types Examples- the case of Pablo Rosenberg, "better be safe than sorry"; Emotion stronger than thought
Extension Formulating new knowledge	Formulating new questions for the test in the existing model, raising questions for the test in a new model, searching and using external information	New question- What happens in changing health conditions throughout life? New model - how are bodies of knowledge and content created through communication and how does it finance and sustain the person in different periods (past and present)? Information - singing wandering in the desert; "Seeing the world" (idiomatic phrase)	New question - whether the quality of the outcry (intention and action) has an impact on the relationship between the people and God as appears in other sources New model - a comparison between equality relations and preference as an individual case and as a society. Information - "the tent opening pillar" - hastened; 'Glufkarin'[cubicularia-Rashi] - a thick wooly blanket used by Yael	New question - whether optimal satisfaction is obtained only in a time frame; New model - whether there is cooperation that takes place at intermediate levels/transitions; What is the effect of early familiarity or bidirectional communication? Information - sensitivity to smell and fear as an evolutionary adaptation in mice; Physiological indicators of fear

Table 8- Modeling skills from the modeling processes

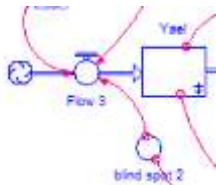
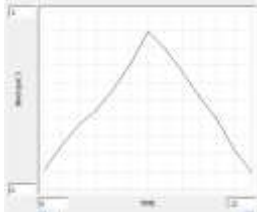
	A	B	C	D
	Analogy/ Borrowed idea	Visual representation of the model component	Mathematical/graphical representation of the values in the model	the equation in the model language
QR model	-Valve- 'wish' function like a changeable gate		Loyalty (Soul): Zero, + Mobility (Wandering): Sit, - Payoff (Reward): Small, - People (World): ?, - Size of world (World): Interval	$\frac{dx}{dy} = \text{size}/\text{mobility}$ Effects on mobility_1 are : state_of_mind_1 -- P+ --> mobility_1 size_of_world_1 -- P+ --> mobility_1 d(state_of_mind_1) is equal to zero. Effect is zero/nil d(size_of_world_1) is below zero. Effect is negative Negative resulting effect: d(mobility_1) = min
SD model	Blind- spott" -Trust of Sisera and Yael		Yael's blind spot RANDOM(0,1.0,0.1) Sisera's blind spot 	$\text{blind_spot_3}/\text{blind_spot_2} * \text{percent}(0.2) * \text{Yael} * \text{Sisra}$ $\text{Yael}(t) = \text{Yael}(t - dt) + (\text{Flow_3} - \text{Flow_10}) * dt$ INIT Yael = 1 INFLOWS: Flow_3 = Yleader*blind_spot_2^gender[female] OUTFLOWS: Flow_10 = 1/doubt_SY
AB model	Friction and Entropy Umbrella's state		entropy_threshold 0.6 friction-power 0.25	<pre>if [entropy] of self > entropy_threshold ask myself [back size / 2 * friction-power rt 10 set satisfaction 1 - ([entropy] of ume / dry-here'</pre>

Table 9- Examples of analogies and their representations from the three cases

This table demonstrates three analogies and their representations in the 3 models. Analogies [A] relate to components [B] represented and implemented algorithmically [D] as a combination of text, numbers, and operators in the modeling tools language. For example, the analogy of 'trust is like a physical neural blind spot', manifests itself in the variable denoted as '**blind_spot_3**' which is the state of Sisera's trust. By operating the model, this variable gets input values according to a pre-defined graph [C] while Yael's blind spot is predefined by a built-in random function. This graph and function are embedded in the model's equations as seen in the right column [D].

Insights and Discussion

Using three textual examples and three approaches to building models, we have shown how principles of scientific thinking and the use of mathematical representations are applied in analyzing literary works. One example deals with a medieval poem, the second refers to a chapter from the Bible, and the third refers to a modern children's poem. The examples range from the isolated case, through two dyadic systems, to a clique. All share an element of typicality and lack a central element or a key figure. The typicality is genotypic inherent but traits can be adapted²⁷. For instance, a skeptical child or hesitation as a trait is influenced by confidence and satisfaction. The motive was not to focus on literary plot generators and how they serve an idea, but to examine through a scientific and mathematical prism, what issues arise from the texts and how combining different thought processing, enables internal discourse and meta-cognitive vision. Each text is a junction point for interpretations²⁸. The models aren't external axioms but possibilities mining tools that don't necessarily rely on the "poet's intention" nor were an integral part of their construction (Leech, Mareschal & Cooper, 2008 p. 361-362). This process is free from absolute result obligation as hard science requires. The tension between the model and reality exists because the model is partial and doesn't copy reality. The objectification and idealization (Ben-Menachem, 2000) made through the mathematical representation in the model serves as a grounding layer that allows interpretation evolves to understanding, then transform into a testable validated explanation²⁹ (Gonzalez, F. J. 2006).

A mathematical representation should produce a graphic plot, which corresponds to the hidden logic behind the model architecture, and light-up externalities, paradoxes, and contradictions. In the qualitative model example, the paradox between fear and faith is revealed, in the dynamic model –the tension between doubt and gain involving sacrifice is addressed, and in the algorithmic model, is the issue of space allocation and fear control. The mathematical model enables representing the subjective interpretation³⁰ by metrics and iconic representation of the mechanisms and processes [using analogies and simulations] and rephrasing key questions and arguments. The approaches we used for demonstration allow a circular transition from seeing a single situation to specifying multiple situations, examining scenarios, reaching generalizing, and confronting the original scenario.

Integrating system thinking skills

In a dynamic and systemic world, the line of thought is not Euclidean (i.e. straight line between two points), and the way of thinking "who preceded what" is not the focal point but the causal feedback relationships, their influence on the system, on the creation of structural and behavioral patterns and their role in the system's functionality. As befits the spirit of this article, we used two quotes from classical literature to illustrate the difference between the two schools of thought- linear and dynamic (Table 10).

Poe-Linear Thinking	Rabbit-Dynamic thinking
“If Rabbit Was bigger And fatter And stronger, Or bigger Than Tigger, If Tigger was smaller, Then Tigger's bad habit Of bouncing at Rabbit Would matter No longer, If Rabbit Was taller.”	“Tiggers never go on being Sad,” explained Rabbit, “They get over it with Astonishing Rapidity. I asked Owl, just to make sure, and he said that that's what they always get over it with. But if we can make Tigger feel Small and Sad just for five minutes, we shall have done a good deed.”

Table 10- Linear thinking versus dynamic systemic thinking

Both examples above are taken from the book "The House on Poe Street" by A.A. Milne, p. 83. In the first example, the thinking is component-dependent, concatenating, hierarchical, and size-dependent (if Tigger was smaller...), whereas in the second example the emphasis is on rhythm, control, and relative change (astonishing rapidity).

Through the models and the modeling process, which requires constant verification and confrontation with ideas (i.e. is the result obtained coherent with the entering idea), we’ve shown how a feedback loop³¹ that usually expressed itself as an element of doubt, served as a regulator or as a behavior inhibitor.

Perceiving change as an integral part and the identification of linear and nonlinear connections within a system has an impact on the textual-source understanding and intention. From a scientific-philosophical point of view, some would argue that this is an unavoidable tautological trap resulting from mutual bonds of influence. For example, in the qualitative model, mobility correlates to the perception of the world’s size as a given attribute logically derived from the song. Even so, the model allows this constraint to unravel into two variables: the probability of meeting people and world size, thus the explanation can rely on the connection between two components and its logical strength— since it is not only a physical dimension but also a perceptual one. Reciprocal relationships between people are easily recognized and perceived intuitively in real life, using a fictional point of view confirms those insights and enhances systemic concepts learning. This idea is demonstrated in the example below (Table 11) which shows another side of systemic concepts surfacing via investigating literature.

"At first I tried to be nice to him but it only made things worse. The more generous I was - yes, lord of Tapu, no lord of Tapu. I won't do it again, Mr. Tapu, I didn't do it on purpose, Mr. Tapo - that's how I missed him more [1]. Then I started filling it up. Every human being needs others, you cannot hate all life -only yourself. Chuck says that if the burglars stop attacking old men and women; if there are no Jews, and if the communists disappear and the foreign workers are expelled to their countries- the master Tapu will be found in an emotional desert [2]. I felt sorry for him and did all sorts of things just to motivate him [3] and to make him happy: I took out a metal rod from the edge of the carpet from wall to wall on the stairs, broke a windshield, and didn't close the elevator door. He was a man in need of relief. When you are full of vengeance that you don't know what to do with and as it develops into the sheer dimensions of the solar system, you get a better feeling when you find motivation, even if it's just a cigarette tail on the carpet or an elevator door left open. I needed him, he needed someone for his hatred, because otherwise he would have to hate the whole world and he was big on him[4] ”.

Table 11- Interrelationships in a sample textual system, “The Fear of King Salomon”

The quote is taken from the book "The Fear of King Salomon" by Emile Ajar: The passage describes a relationship between two characters from the narrator's point of view. We noted places where feedback and system characteristics implied: [1] negative feedback [2] linear impact relationship [3] mechanism of propulsion [4] regulation. This is an example of preliminary and qualitative analysis from a systemic perspective that can be implemented in the process of building a model and even help in this. This also demonstrates the conceptual branching and analogies that join the textual source and the theoretical space, which was created while busy building a model, and analyzing textual artwork

Model As a connections-identifier

Identifying connections and their role in the system was needed in the three approaches. In ‘identifying a connection and its role’ we imply another systemic thinking level. We will demonstrate this with the help of a simple mechanical system: a buoy at sea. it is a rod with a buoy attached to the end, when the rod descends or ascends according to sea level, you can see the water line from afar and the movement of the waves - the rod and the buoy are connected but the water, rod, and buoy are also connected by physical forces - this is a simple system used for indication. On the other hand, if we move this mechanism into a closed tank, when the water line reaches the open, the buoy will clog it, thereby changing the function of the connection. The role of the linked parts is not the role of the rod or the buoy – each individual has a different role. The link itself with the forces that sustain it, can either change or be replaced by alternative components or connections, capable of achieving the same goal. In the first poem "What will you be afraid of" The relationship between wandering, the world's size, and the probability of meeting people can be described physically depending on the size but in the context of fear or the control of the will it becomes a condition and serves as a regulator. In the dynamic model, the connection between Yael and Sisera serves as a catalyst and amplifier for processes that are ‘shapers of minds’ on the system level. With the help of contexts and their analysis, it is possible to deepen the understanding of the text following the interpretation and questions that the text raises. In a conceptual-textual system, the identification of the context and especially its role is a skill that requires more thinking.

It is difficult to identify the system at the functional level - what is the role of individual part in the overall system's functioning (Liu et al., 2005) i.e. we cannot reduce the functionality, and practicing model building can help with this. For example, in the second example we can't say that one of Yael's motives is to victoriously end the war, especially because the battle was decided before the scene with Sisera accrued, furthermore, Yael may lose out of it. We believe that defining the goal at an intermediary level can contribute to a further understanding of the conceptual system, for example, if the purpose of the relationship between Yael and Sisera is defined as a case that strengthens, brings closer, or increases the degree of doubt, it is easier to make the connection to the purpose of the system or in the textual case, to the intention³² of the original textual work.

Model as a tool for identifying mechanisms and behaviors

The models were built within the limits of the tools and their execution was made with the help of an algorithm. This limitation should be taken into consideration in the phenomenon explanation production. From this point of view, we use the model not as a guarantee but as an entering point for discussing and posing questions such as the relationship between knowledge, faith, friendship, and human behavior. The models allow distinguishing between structured elements such as independent properties, constraints and conditioning, laws of transition, and fundamental systemic mechanisms like synchronization, filtering, or delay. For example, to understand Yael's role in the equilibrium that the system has reached, we need to understand the connection between Yael and Sisera. We refer to these mechanisms as generators of behavior that derive from logic and interpretation. By that, we do not mean structural elements in texts such as line breaking, space, or circular rhyme, but rather behavioral structures and connections that can be deduced from the text. For instance, the 'counting till ten in the third example, is a behavior that does not appear in the children's song but has been embedded in the model. It is a mechanism of inhibition but at the same time causes an increase in resistance due to long exposure and the creation of a negative effect. The characterization of the mechanism and finding an equivalent in the model language can be assimilated into the study of other textual systems and harnessed into a toolbox of strategies and systems thinking skills.

The modeling process and relevance to learning and thinking

Model as an inferencing tool allows examining phenomena without relying only on chronology or simple logic. The question "What are you doing there?" as shown in the following example can be interpreted as "How did you get to the situation you are in" or "What are you trying to do", assuming that the obvious and trivial is not so obvious.

"Eeyore, what *are* you doing there?" said Rabbit.

"I'll give you three guesses, Rabbit. Digging holes in the ground? Wrong. Leaping from branch to branch of a young oak tree? Wrong. Waiting for somebody to help me out of the river? Right. Give Rabbit time, and he'll always get the answer." (A. A. Milne p.75)

It is allowing to address phenomena out of their context- even in daily life, we encounter situations in which the previous cannot explain the follow-up. Lack of information or unsolvable concealment makes it impossible to derive one from the other. Making assumptions by examining the obvious is important in the effort to understand, but we must take into account the limitations of the medium - if it is aesthetic artwork or textual, certain elements will be a trigger for thinking and others will be missing (Siegesmund, 2004).

The models are not schemes or protocols. They are inseparable from their modeler. The modeling creates interactive circular feedback between the thinker-builder-reader, in which several key points and questions should be considered frequently: Does the model correspond with the logic it is based on? What are the contradictions that emerge and whether they can be reconciled with the textual source? What new situations emerge from the model construction and what new questions arise³³ forcing references from other texts or analogies? The model serves as an interpretive tool (Gonzalez, 2006 p.337-338) and its construction constitutes a framework, focus, and anchor, which allows revision cycles of the source text, reexamining the initial questions and forming new ones.

The issues of fear, cooperation, and public versus private are common threads in the three examples, expressed as comprehensive questions that deserve attention. For example, in the interplay between social anxiety and isolation, fear is either an evolutionary mechanism or translates into awe and faith. The three case studies demonstrate how raising existential questions together with a model, intensifies the relevance and contribution of cultural origin.

The process of building models was accompanied by spontaneous analogies such as the structure of the human eye, fluid current, voltage in an electrical circuit, or entropy. These target areas helped define the components and the relationship between them in the models³⁴. For instance, the entropy in the agent model is a figurative idea. First, it has a mathematical formalization and can be applied to the model. Secondly, it is supposed to represent the variance between the umbrellas-populations, but it is probabilistic in its essence- it represents the degree of general order and not the importance of each individual. This attribute doesn't appear in the song itself³⁵, i.e. the specific location of each child is neglected during the short journey therefore using this analogy is suitable. As with any analogy, it has a degree of partiality in the level of correspondence between the source and the objective³⁶. In this article, we didn't aim to compare a literary analogy with a scientific analogy but to refer to the model construction as a perfect metaphor (Montuschi, 2000 p. 280) in a temporal way. These interdisciplinary transitions, fused by graphic and

mathematic representation, allow finding parallels³⁷ within and outside the system³⁸ hence, may be an indication of epistemological integrity.

Research aspects and further study

Preliminary observation shows that the qualitative model required fewer analogies while in the dynamic model, expression of analogies and fragmentation was abundant, and in the agent-based model expression of logic and rules, fragment use, and extensions were prominent (Table 8, Figure 1). The difference may result from the approach itself, for example, the reasoning qualitative approach requires less scaffolding because the use of intuitive language is immanent to the building process (Gentner & Stevens, 1983; Forbus, 2011). Another reason can be the genre of textual sources. Either way, it appears that this is an issue for further study in cognition and learning.

The issue of analogies and mathematical representation, their distance from the source, their influence, and their place in the processes of understanding texts as systems, requires continued research and refinement of parameters and a supportive digital environment for modeling with analogies.

Studying the impact of learning artistic work as an inherent part of learning scientific concepts and principles, physical systems, linguistics, and other theories should be conducted.

Issues like the competition between different semantic and mathematical representations or between selected ideas (Friedman et al., 2018), and the relationship between an artistic language and ‘modern languages’ such as coding and their different creativity power, can be studied in the mindset we introduced here. In that context, we assume that an external interactive object like a piece of code or a model, built according to an artistic source can serve as a trigger for a new creation, similar to what happens in the scientific realm, where a model lays the foundations for a new experiment or serves as a scheme by which a technological solution can be found. Empirical research can compare artworks created based on a model’s analysis by different disciplines students, or compare human art with learning machine products.

Summary

In this article, we show how modeling can be implemented to analyze literary work. There is a natural tendency to see models as a scale-down or simplified version of reality. But here we embraced the systemic and scientific view on modeling. Our entering point was scientific-addressing the textual source as a crime scene- as it was already sealed and happened. On one hand, we secluded the perimeter to keep all evidence intact and define the ‘whodunit’ strategy. On the other hand, we contaminated the original scene by using analogies and external contextual

references to enrich our ideas on the texts. To do so methodically, we used existing modeling approaches and tools that help to reframe our dynamic understanding of the original. Employing different way of thinking, borrowed from other disciplines and methods not only enable us to re-open our investigation but to adjust and tighten our system thinking perception in general.

In art, the message [covert] and medium [overt] transform into information. The tension between interpretation and source exists between model and reality. By using three examples of model analysis we illustrated how systems thinking and the use of representations from the mathematical and scientific domain, strengthen the understanding and expansion of a private body of knowledge, which is driven by model-building processes that enable capturing epistemological and cognitive aspects that arise from the textual landscape. Approaching the analysis of artworks as conceptual systems with principles and themes, similar to the analysis of physical or tangible systems is a powerful and important way of learning and thinking.

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Link to the Models:

1. The models[1,3] can be downloaded from here https://github.com/shelibenm/Models_22.git
2. Run Model[2]: <https://exchange.iseesystems.com/models/player/sheli/dvora>

Appendix: The three textual sources' English/Hebrew versions

Example 1- Poem by Ibn Gabirol

Why are you frightened /Ibn Gabirol	מה תפחדי- שלמה אבן גבירול
Why are you troubled and frightened, my soul? Be still and dwell where you are. Since the world to you is small as a hand, you won't, my storm, get far. Better than pitching from court to court, Is sitting before the throne of your Lord; If you distance yourself from others you'll flourish and surely see your reward. If your desire is like a fortified city; a siege will bring it down in time: You have no portion here in this world--- so wake up for the world to come.	מה תפחדי, נפשי, ומה תגורי? שכיני וגורי באשר תגורי! אם נחשבה תבל קטנה לך ככף, אנה, עניה סערה, תתורי? טוב מהלך אנה ואן כי תשבי לפני אדוניך ולא תסורי. אם מאנוש תנורי – תעורי ושכר פעלתך אזי תשורי. אם תאות נפשך קעיר מבצר – הלא תפל בידך, אם מעט תצורי אין לך בקרב האדמה נחלה: עורי לבקש אחרימה, עורי!

Example 2- The Book Of Judges-Chapter 4

<https://mechon-mamre.org/p/pt/pt0704.htm>

- א ויספו בני ישראל, לעשות הרע בעיני יהוה; ואהוד, מת. 1 And the children of Israel again did that which was evil in the sight of the LORD, when Ehud was dead.
- ב וימכרם יהוה, ביד יבין מלך-כנען, אשר מלך, בחצור; ושר-צבאו, סיסרא, והוא יושב, בחרשת הגוים. 2 And the LORD gave them over into the hand of Jabin king of Canaan, that reigned in Hazor; the captain of whose host was Sisera, who dwelt in Harosheth-goiim.
- ג ויצעקו בני-ישראל, אל-יהוה: כי תלשע מאות רכב-ברזל, לו, והוא לחץ את-בני ישראל בחזקה, עשרים שנה. {פ} 3 And the children of Israel cried unto the LORD; for he had nine hundred chariots of iron; and twenty years he mightily oppressed the children of Israel. {P}
- ד ודבורה אשה נביאה, אשת לפידות--היא שפטה את-ישראל, בעת ההיא. 4 Now Deborah, a prophetess, the wife of Lappidoth, judged Israel at that time.
- ה והיא יושבת תחת-תמר דבורה, בין הרמה ובין בית-אל--בהר אפרים; ויעלו אליה בני ישראל, למשפט. 5 And she sat under the palm tree of Deborah between Ramah and Beth-el in the hill country of Ephraim; and the children of Israel came up to her for judgment.
- ו ותשלח, ותקרא לברק בן-אבינעם, מקדש, נפתלי; ותאמר אליו הלא צוה יהוה אלהי-ישראל, לך ומשכת בהר תבור, ולקחת עמך עשרת אלפים איש, מבני נפתלי ומבני זבולון. 6 And she sent and called Barak the son of Abinoam out of Kedesh-Naphtali, and said unto him: 'Hath not the LORD, the God of Israel, commanded, saying: Go and draw toward mount Tabor, and take with thee ten thousand men of the children of Naphtali and of the children of Zebulun?
- ז ומשכתי אליך אל-נחל קישון, את-סיסרא שר-צבא יבין, ואת-רכבו, ואת-המונו; ונמתיחו, בנדה. 7 And I will draw unto thee to the brook Kishon Sisera, the captain of Jabin's army, with his chariots

and his multitude; and I will deliver him into thy hand.

ח ויאמר אליה בָּרַק, אם-תלכי עמי והלכתי; ואם-לא תלכי עמי, לא אלה. **8** And Barak said unto her: 'If thou wilt go with me, then I will go; but if thou wilt not go with me, I will not go.'

ט ותאמר ה'אלה עמך, אפס כי לא תהיה תפארתך על-הדרך; אשר אתה הולך--כי ביד-אשה, ימכר יהנה את-סיסרא; ותקם דבורה ותלך עם-בָּרַק, קְדֵשׁ. **9** And she said: 'I will surely go with thee; notwithstanding the journey that thou takest shall not be for thy honor; for the LORD will give Sisera over into the hand of a woman.' And Deborah arose, and went with Barak to Kedesh.

י ויזעק בָּרַק את-זבולן ואת-נפתלי, קְדֵשׁ, ויעל ברגליו, עשרת אלפי איש; ותעל עמו, דבורה. **10** And Barak called Zebulun and Naphtali together to Kedesh; and there went up ten thousand men at his feet; and Deborah went up with him.

יא וחקר הקניזי נפרד משונו, מבני חֶבֶן חֹתֵן מֹשֶׁה; ויש אֶהֱלֹו, עד-אֵילֹון בצענים (בְּצַעֲנָנִים) אשר את-קְדֵשׁ. **11** Now Heber the Kenite had severed himself from the Kenites, even from the children of Hobab the father-in-law of Moses, and had pitched his tent as far as Elon-bezaananim, which is by Kedesh.

יב ויגדו, לסיסרא: כי עלה בָּרַק בן-אֲבִינוֹעַם, הר-תבור. **12** And they told Sisera that Barak the son of Abinoam was gone up to mount Tabor.

יג ויזעק סיסרא את-כָּל-רֶכֶבּוֹ, תשע מאות רֶכֶב בָּרָזֶל, ואת-כָּל-הָעָם, אשר אתו--מִחֶרֶשֶׁת הַגּוֹיִם, אֶל-נַחַל קִישׁוֹן. **13** And Sisera gathered together all his chariots, even nine hundred chariots of iron, and all the people that were with him, from Harosheth-goiim, unto the brook Kishon.

יד ותאמר דבורה אל-בָּרַק קום, כי זה היום אשר נמן יהנה את-סיסרא בְּיָדָךְ--הֲלֹא יִהְיֶה, יָצָא לַפָּנִיךָ; ויֵרֵד בָּרַק מֵהַר תְּבוֹר, ויעשרת אלפים איש אחריו. **14** And Deborah said unto Barak: 'Up; for this is the day in which the LORD hath delivered Sisera into thy hand; is not the LORD gone out before thee?' So Barak went down from mount Tabor, and ten thousand men after him.

טו ויִהְיֶה, יהנה את-סיסרא ואת-כָּל-הָרֶכֶב ואת-כָּל-הַמַּחֲנֶה, לְפִי-חֶרֶב--לִפְנֵי בָרַק; ויֵרֵד סִסְרָא מֵעַל הַמָּרְכָבָה, ויָנֹס בָּרָזֶלִיו. **15** And the LORD discomfited Sisera, and all his chariots, and all his host, with the edge of the sword

before Barak; and Sisera alighted from his chariot, and fled away on his feet.

טז 16 But Barak pursued after the chariots, and after the host, unto Harosheth-goiim; and all the host of Sisera fell by the edge of the sword; there was not a man left.

וַיִּבְרַק, רֹדֵף אַחֲרֵי הָרֶכֶב וְאַחֲרֵי הַמַּחֲנֶה, עַד, חֲרֹשֶׁת הַגּוֹיִם; וַיִּפֹּל כָּל-מַחֲנֶה סִיסְרָא, לְפִי-חֶרֶב--לֹא נָשָׂא, עַד-אֶחָד.

יז 17 Howbeit Sisera fled away on his feet to the tent of Jael the wife of Heber the Kenite; for there was peace between Jabin the king of Hazor and the house of Heber the Kenite.

יָז וְסִיסְרָא, נָס בְּרַגְלָיו, אֶל-אֶהֱלָיָהּ, אִשְׁתִּי חֶבֶר הַקֵּינִי: כִּי שְׁלוֹם, בֵּין יָבִין מֶלֶךְ-חֲצוֹר, וּבֵין, בֵּית חֶבֶר הַקֵּינִי.

יח 18 And Jael went out to meet Sisera, and said unto him: 'Turn in, my lord, turn in to me; fear not.' And he turned in unto her into the tent, and she covered him with a rug.

וַיֵּצֵא יָעֵל, לִקְרַאת סִיסְרָא, וַתֹּאמֶר אֵלָיו סוּרָה אֲדֹנָי סוּרָה אֵלַי, אֶל-תִּירָא; וַיָּסֹר אֵלָיָהּ הָאֶהֱלָה, וַתִּכְסֶהוּ בְשֻׁמִּיקָהּ.

יט 19 And he said unto her: 'Give me, I pray thee, a little water to drink; for I am thirsty.' And she opened a bottle of milk, and gave him drink, and covered him.

וַיֹּאמֶר אֵלָיָהּ הַשְׁקִינִי-נָא מַעֲט-מַיִם, כִּי צָמָאתִי; וַתִּפְתַּח אֶת-נְאוֹד הַחֶלֶב, וַתִּשְׁקֶהוּ--וַתִּכְסֶהוּ.

כ 20 And he said unto her: 'Stand in the door of the tent, and it shall be, when any man doth come and inquire of thee, and say: Is there any man here? that thou shalt say: No.'

כ וַיֹּאמֶר אֵלָיָהּ, עֲמֵד פֶּתַח הָאֶהֱלָ; וְהָיָה אִם-יָבֹא וַשְּׁאֵלְךָ, וְאָמַר הֲיֵשׁ-פֹה אִישׁ--וְאָמַרְתְּ אֵין.

כא 21 Then Jael Heber's wife took a tent-pin, and took a hammer in her hand, and went softly unto him, and smote the pin into his temples, and it pierced through into the ground; for he was in a deep sleep; so he swooned and died.

כא וַתִּקַּח יָעֵל אִשְׁתִּי-חֶבֶר אֶת-יָתֵד הָאֶהֱלָ וַתִּשֶׂם אֶת-הַמַּקְבָּץ בְּיָדָהּ, וַתִּבּוֹא אֵלָיו בִּלְאֵט, וַתַּתְקֶע אֶת-הַיָּתֵד בְּרִקְתּוֹ, וַתַּצְנֶנּוּ בְּאָרְצָ; וְהוּא-נִרְדָּם וַיָּעַף, וַיָּמָת.

כב 22 And, behold, as Barak pursued Sisera, Jael came out to meet him, and said unto him: 'Come, and I will show thee the man whom thou seekest.' And he

כב וַהֲנִה בָּרַק, רֹדֵף אֶת-סִיסְרָא, וַתֵּצֵא יָעֵל לִקְרַאתּוֹ, וַתֹּאמֶר לוֹ לֵךְ וְאֶרְאֶךָ אֶת-הָאִישׁ אֲשֶׁר-אַתָּה מִבְקֵשׁ; וַיָּבֹא אֵלָיָהּ--וְהִנֵּה סִיסְרָא נָפַל מֵת, וְהַיָּתֵד בְּרִקְתּוֹ.

came unto her; and, behold, Sisera lay dead, and the tent-pin was in his temples.

23 So God subdued on that day Jabin the king of Canaan before the children of Israel. **כג** וַיִּכְנַע אֱלֹהִים בַּיּוֹם הַהוּא, אֶת יָבִין מֶלֶךְ-כְּנָעַן, לִפְנֵי בְנֵי יִשְׂרָאֵל.

24 And the hand of the children of Israel prevailed more and more against Jabin the king of Canaan, until they had destroyed Jabin king of Canaan. **כד** וַתִּגְדַּל יַד בְּנֵי-יִשְׂרָאֵל, הַלּוֹךְ וְקָשָׁה, עַל, יָבִין מֶלֶךְ-כְּנָעַן--עַד אֲשֶׁר הִכְרִיתוּ, אֶת יָבִין מֶלֶךְ-כְּנָעַן. {ש}

Example 3-Child poem by Levin Kipnis

Daddy's Big Umbrella/ Levin Kipnis [free translation]	המטריה הגדולה של אבא/לויין קיפניס
Tal, whose name is Taltal, got up in the morning and wanted to go to Kindergarten. But outside it was cloudy and rain was knocking on the window pane: tip-tip teff! Tip-tap-teff! Bag-bag-bag! Tak-tak-tak! Tal's mother said: "Today you will not go to the garden, the rain is knocking on the window pane!" "The rain is knocking—let him knock! I'll take daddy's big umbrella." Tal quickly drank, ate, dressed, wore. The big umbrella he took - and left. He went out into the street – and here is Ilana, who loves a banana, peering at him from the window. He called out to her: "Don't look at the window, come with me to The Ganon [kindergarten]!" The rain is dripping, the rain is pouring, under the umbrella who will get wet? They walk - and here Batya is standing in the stairwell. "Batya, Batya, are you afraid of a bath? Come with us to Ganon!" Batya quickly went under the umbrella.	טל, שקוראים לו טלטל, קם בבוקר ורצה ללכת אל הגנון. אך בחוץ היה מעונן וגשם דפק על שמשות החלון: טיפ-טיפ טף! טיפ-טיפ טף! תיק-תיק-תיק! תק-תק-תק! אמרה אמא של טל: "היום לא תלך אל הגנון, הגשם דופק על שמשות החלון!" "הגשם דופק – שידפוק לו! אני אקח את המטריה הגדולה של אבא." מהר טל, שתה, אכל, לבש, חבש. את המטריה הגדולה לקח - והלך. הוא יצא אל הרחוב - והנה אילנה, שאוהבת בננה, מציצה אליו מן החלון. קרא אליה: "אל תביטי בחלון, בואי איתי לגנון!" יצאה אילנה ונכנסה תחת המטריה. הגשם נוטף, הגשם שוטף, תחת המטריה מי יירטב? והנה בתיה עומדת בחדר המדרגות. הם הולכים - "בתיה, בתיה, את פוחדת מאמבטיה? בואי אתנו לגנון!" מהרה בתיה ונכנסה אף היא אל מתחת למטריה.

And the rain is pouring, the rain is dripping, under the umbrella, no one will get wet! They go - and here is Yosefa standing under an awning. They called out to her: "Yosefa, Yosefa, are you barefoot? Leave the awning and come with us to the garden!" The rain is falling, the wind is whistling, Tali is chatting, Ilana is screaming, Batya is laughing, and even Yosefa is not silent. The four of them went together. And here is Dror, beeping like a bird, standing outside shivering from the cold. They called out to him, "Don't get the ears of a donkey! Come with us to the Ganon" hurry Dror and also went under the umbrella. The lightning flashed, the thunder thundered. Went, the five of them together! And here is Ephraim, red-cheeked, locked in boots-and bouncing in the puddle of water. They called out to him, "Hey, lord, come to Ganon!" and he also got under the umbrella. They went six together. And here opposite is a puppy and a kitten howling by the fence, running around looking for a place to hide. Dror and Ephraim jumped up and took them in their arms. And carry them under the umbrella - Happy and joy all the members! In the meantime - the sky began to clear, and the children - a song in the mouth and light in the eyes! And so Bashir and Ron [in a song] came to the Ganon. Happy all the children made a big circle - the puppy and the kitten also participated in the dance	והגשם שוטף, הגשם מטפטף, תחת המטריה אף אחד לא יירטב! הם הולכים - והנה יוספה עומדת תחת גגון. קראו לה: "יוספה, יוספה, כלום את יחפה?" עזבי את הגגון ובואי אתנו אל הגגון!" נכנסה גם יוספה מתחת למטריה. הגשם יורד, הרוח שורקת, וטלי מפטפט, ואילנה צועקת, בתיה צוחקת ואף יוספה אינה שותקת. הלכו ארבעתם יחדיו. והנה דרור, המצפצף כציפור, עומד בחוץ ורועד מקור. קראו לו: "אל תזקוף אוזניים של חמור! בוא אתנו אל הגגון" מיהר דרור ונכנס אף הוא אל מתחת למטריה. ברק הברק, רעם הרעם הלכו חמישתם יחד! והנה אפרים אדום-לחיים, נעול מגפים- ומקפץ בשולית המים. קראו לו: "הי אדון בוא לגגון!" נכנס גם הוא אל מתחת למטריה. הלכו ששתם יחדיו. והנה ממול כלבלב וחתלתול מייללים ליד מתרוצצים ומחפשים מקום להסתתר. הגדר, קפצו דרור ואפרים ונטלו אותם על הידיים. ונשאו אותם אל מתחת למטריה - ששה ושמחה כל החבריה! בינתיים - התחילו מתבהרים והילדים - שיר בפה ואור בעיניים! וכך בשיר ורון השמים, באו אל הגגון. שמחו כל הילדים עשו מעגל גדול - גם הכלבלב והחתלתול השתתפו במחול
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¹Ibn Gabirol, S. (2016)- Cole's translation

² The Ibn Gabirol paradox as Luria calls it (1988) in which the soul lowers itself in front of God but is part of it

³ The mental-physical tension and fragility of being, expressed in another paradoxical circle - in order to be free, the mind needs to wake up and in order to awaken, it needs a stimulus, which is not external but internal ["why are you troubled and frightened, my soul?"]

⁴ In the models appears as 'Loyalty'

⁵ Fear can be a composition of fear of loneliness and fear of the world with a relationship between them In this model we simplified it and the variable "fear" receives only one qualitative value

⁶"My world is as narrow as an ant world" - an example from Rachel's poetry

⁷ Full disclosure – the model is constructed from an introverted point of view and it is not necessary that this is the poet's point of view. At the same time, the state of health that is a constraint can be used, in parallel with introverts, as

an innate personality trait. Additional and other points of view can be examined with the help of new models or as an adaptation of this model

⁸ In Hebrew- "Erut" means wakefulness-awakening-arousal but from the root Source of "e.r.r" it means disagreement, appeal or doubt

⁹ This fall can be implied in a mystical-kabbalistic sense from a high spiritual state to a low state or from an existential state "from Igra Rama to the Bira Amikta" from high hill to deep hole, i.e falling from grace

¹⁰ The relative open conditions enabled by the Muslim world in the Golden Age benefited the Jewish educated – such as Ibn Gabirol. Shlomo Ibn Gabirol suffered from a skin problem that also distanced him from the containing and supportive courtyards of his time (Ben Yehuda Project; Levin,2009)

¹¹ From Ibn Gabirol's patron Yekutiel through Baron Rothschild to academic support systems such as the Research Authority

¹² There is room for the question of why did the biblical author use the term economic as an indicator of a circle of bargaining or barter? In this model, we did not fully use the representation of cooperation with payoff as it appears in the prisoner's dilemma or similar models.

¹³ American bible translation <https://www.biblestudytools.com/asv/judges/4.html>

¹⁴ תַּפְאֲרֶת עֲזָמוֹ אֶתְּהָ וּבְרָצֶנֶד תִּרְוֹם קֶרְנֵנִי (תהילים פרק פט' פסוק יח); "בְּעֶלֶץ צְדִיקִים רַבָּה תִּפְאֲרֶת וּבִקְדֻם רָשָׁעִים חֶפֶשׁ - כִּי יִבְרָא אֱלֹהִים, אֵיזוּהִי דֶרֶךְ יִשְׂרָאֵל שֶׁיָּבוֹר לוֹ הָאָדָם, כֹּל שֶׁהִיא תִּפְאֲרֶת לְעוֹשֶׂיהָ וְתִפְאֲרֶת לוֹ מִן הָאָדָם." (משלי פרק כח' פסוק יב)

¹⁵ In this model, we did not use the representation of cooperation with the help of payoff as it appears in the prisoner's dilemma or similar models, but in equality-preference relations at the individual level. A parallel example from the Bible – in the story of Moses in the Book of Exodus "And he beat the Egyptian" the intention is to beat the Egyptian inside him. The first nature or instinct is to keep the self's well-being as an individual with privileges, the second nature is the belief and belonging to the people. Moses takes responsibility and turns against the current in which he witnessed the turning point and then becomes a persecuted lonely who is forced to regain esteem as the leader of a persecuted minority

¹⁶ Although the values on the Y-axis of Graph 2(trust) are very large, they can be considered as a qualitative measure and there is no obligation to stick to the mathematical meaning because it is a "non-measurable" attribute

¹⁷ The choice of man - the glory is God's

¹⁸ Perhaps she even entered the witness protection program as is customary today [Interpretation

¹⁹ Based on the social game experiment called Friends and Enemies or aggressive defenders game, see this Idea's Extension in Anderson, 2003.

²⁰ The model can be downloaded and run through the following related https://github.com/shelibenm/Models_22.git

²¹ A string is a concept in coding that refers to a series of characters- in this case it is a binary series of 6 characters an example "011011"

²² Entropy is a statistical and observed property of the system - not necessarily a cause. has argued in this paper, we took the 'liberty of 'creation' and adopted Shanon's entropy as an indicator of possible interactions

²³ A phenomenon known as psychological paralysis see Fear paralysis reflex (n.d.)

²⁴ Divided attention when performing a task affects results and is also expressed in awareness of external signals such as sweating, flushing movement or silence

²⁵ Witnesses who boarded the plane back to the U.S. after the trial of Ivan Demjanjuk in 1993, described an ironic situation in which, despite all their efforts to protest the space they were forced to share with Demjanjuk, their protest resulted in the crew moving him to business class and the front row to prevent the protest from escalating and harming the integrity of the flight and passengers - hence the individual's situation in terms of welfare actually improved (personal communication)

²⁶ The brave-the umbrella carrier also have a certain degree of stability and lack of dependence, but they are defined as influenced in the model.

²⁷ La'marc adaptation- See an example of this theory in a study on the sniffing system and fear in mice (Szyf, 2014).

²⁸ The Art of Interpreting Hermeneutics- According to Gadamer's school of thought, see Palmer, 1969

²⁹ According to J.P.Ricoeur's approach, the art of interpretation differs slightly from Gadamer's approach

³⁰ The issue of objectivity is debatable – here we pointing out a language that has dimensions, measures and scales in her syntax

³¹ In the field of engineering, it is common to call these balancing processes feedback or feed-forward also as a fit-back as occurs in an assembly line and emphasizes perfect or unusual fit

³² For example, the right or credit is reserved to God in the biblical story

³³ See an example of this idea as "assemble coherence- AC theory" in Friedman, Forbus & Sarine ,2017.

³⁴ Table 9 associates the analogy with the mathematical representation as expressed in models

³⁵ Perhaps importance can be attributed to the order of appearance in the song, but the question of the chosen model did not refer to this. A follow-up or extension question that deals with the effect of prior acquaintance in the clique, might answer this aspect

³⁶ We could just as well use a logical table of relationships or any other technique to represent variance

³⁷ Examples of parallels and analogies can also be found in table 9

³⁸ For example, in the semantic system, the words doubt and satisfaction in Hebrew [SAFEK-SIPUK] or slope and effect [SHIPUA-HA'SHPAA] are derivatives of the same root.