

Beneath Thy Protection: Portrait of the Holy Virgin as a semantic operator

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Abstract. Starting from the third century, many songs, prayers, and icons testify to the way the Virgin Mary – Mother of God – has been attributed the role of protecting the community. Examples include the Akhathist hymn traditionally dated to the siege of Constantinople (626), the Polish anthem “*Bogurodzica*”, associated with the battle of Grunwald (1410), the icon of Częstochowa that protected Poland from the Swedish invasion (1655), and numerous others. The role of menace is embodied by different enemies: infidels, heretics, or atheists. The Virgin watches over the frontier between two cultural spaces: the inside and the outside of the semiosphere. A case study will provide insight into the function played by the Madonna at the border: the Madonna of the Rocciamelone, the highest sanctuary in Europe, founded by the crusader knight Rotharius (1358). A bronze statue of the Virgin was placed in the sanctuary in 1899. A small corpus of pastoral letters written by blessed Edoardo Rosaz, bishop of Susa (Piedmont), expresses the hope that the Virgin will protect Catholics from liberal heresy. Plastic oppositions such as top/bottom, resulting from the relationship between the Virgin and the landscape, are used to manifest abstract oppositions such as reason/passion, order/disorder, and Church/revolution. This homologation helps us understand how the Virgin, placed in upper space, embodies knowledge and cognition: she becomes a lookout, allowing a transfer of values from the semantic field of war to the religious one. The Virgin guards the border of the semiosphere, the border dividing the self from the other. Her function is the semiotization of incoming materials, transforming external non-communication into information and meaning. This article thus considers the Virgin as a semantic operator inverting the values of liberal discourse into information stored in Catholic cultural space. A mathematical model of the function played by the Virgin will be presented in the terms of quantum computing.

Keywords: typology; culture; semiosphere; religion; cybernetics; quantum semantics

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1. Research problem

In both Orthodox and Catholic cultures, the Holy Virgin frequently appears as a geopolitical actor, found in military contexts: she protects nations and borders and she is the dedicatee of hymns associated with warfare. The explanation is always *ad hoc*: for example, in Italy, the Virgin of Loreto is the patroness of military aviation because of the ‘flying’ isotopy.² In many other cases, the relationship is explained as the result of a given icon having been invoked during a siege or a battle. For this reason, a semiotic reading of this relationship should search for a deeper, structural relationship aiming to clarify the role played by the Virgin in the self-representation of culture. To this end, some examples from different cultures will be presented to locate the Virgin inside a topologic representation of culture as a model of the world, in line with Juri Lotman’s (1975[1969]) framework. The model will then be tested on a case study provided by the sanctuary of the Madonna of Rocciamelone in Piedmont, Italy. To do so, the study conducts a structural semantic analysis of a corpus of texts written by Mgr Rosaz, who placed a statue of the Holy Virgin in the sanctuary in 1899, so as to reconstruct the Catholic culture of the epoch and understand the transfer of military values to the religious semantic field. This will allow the formalization, in terms of quantum information, of the Virgin’s role as a semantic operator translating external elements into the internal language of the semiosphere.

2. The Holy Virgin and protection of the semiosphere

The Madonna’s role of protecting a given community has given rise to a specific iconographic type, the oldest example of which was painted by Duccio di Buoninsegna. This work is known as *Virgin of Mercy*. In the painting, a collective actor (a religious order, city, people) is represented as being under Mary’s *maphorion*. The first association between the Virgin and the isotopy of ‘protection’ is represented by the hymn “*Sub tuum praesidium*”, dating to the 3rd century AD and used in the Coptic, Oriental Orthodox, Eastern Orthodox, and Catholic Churches (Budwey 2014: 11–14). There are also ancient Syriac and Armenian versions of the text, albeit not used in current liturgy apart from the Uniate churches. In each language the melody is different, depending on the musical

² Cf. https://www.difesa.it/Il_Ministro/sottosegretari/Stefania_Pucciarelli/Eventi/Pagine/Madonna_di_Loreto_2021.aspx.

semiotics adopted in the given culture.³ The Virgin is addressed here by the title *Mother of God* (*Theotokos*) even earlier than this name was used by the Council of Ephesus (431). In the Roman Empire, the Virgin's intercession was probably implored to protect Christian communities from persecution.

The following sections consider different examples of icons and hymns involving the Virgin. Each of these examples is related to one or more military contexts in which the Virgin protected the border of culture from an external enemy. In fact, according to Lotman (1975[1969]), each culture is a model of the world (Fig. 1). It has a boundary, an internal space (I), and an external space (E). Each culture grants different semantic values to these spaces: for example, in some cases (E) is identified with /nature/ and (I) with /culture/, insofar as a given culture considers itself civilized and the other ones uncivilized. In other cases, however, a culture can identify (E) with /not nature/ and (I) with both /nature/ and /culture/: everything external to that culture is thus considered /contrary to nature/. Of course, Lotman went on to develop this seminal model in the direction of the *semiosphere* (Lotman 2005[1984]).

In short, the examples cited here will show how the Virgin is considered an operator placed at the border between I and E, defending the former space from enemies who belong to the latter space and endanger the community's survival. The following sections of the chapter will further detail the function of this operator.

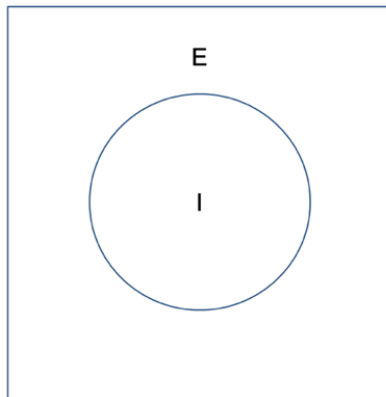


Figure 1. The topological representation of culture according to Lotman (1975[1969]). The culture in question is a model of the world and subdivides this world into one or more external spaces (E) and an internal space (I).

³ For example, the Gregorian version is in the seventh tetrardus or mixolydian mode (finalis: G, repercussio: D).

2.1. Icons

The black Madonna of Częstochowa is one of the best-known icons geopolitically associated with a nation. She protects Poland from various external enemies: in particular, protestants (Hussites in 1430, Swedes in 1655) and Communists. The icon is *humanized* thanks to semantic choices found in Polish texts and discourses. For example, since the canvas was slashed by Hussite soldiers, the Madonna is often described as “scarred”; when the Communist government seized a copy of the icon during an unauthorized pilgrimage in 1966, the opponents of the regime said that the Virgin was put under “house arrest” in the curia in Warsaw.

A Russian equivalent of the icon of Częstochowa, the Mother of God of Kazan, was miraculously found after the conquest of Kazan by Ivan the Terrible: at that time, the Mother of God protected Moscow from the siege of the Polish armies in 1612. She was considered the cause of the Russian victory over the Swedes in the battle of Poltava in 1709 and invoked against the Napoleonic invasion in 1812. During the Communist revolution She was lost again, then found in 1950 and returned to Patriarch Alexy II by Pope John Paul II in 2004. In this case as well, the Virgin protects the homeland from external enemies: Polish Catholics, Swedish Protestants, and Communists. In both cases, the role of Communists is important: the external world – where heretics and atheists are located – is primarily a cultural space and not necessarily a geographical one. At the same time, the Madonna represents the identity of the nation, merging the religious and the political semantic field (see Eade, Katić 2016: 87; Pelenski 1974).⁴

2.2. Hymns

The Akathist hymn is a long poem used in the Orthodox liturgy in which the Archangel hails the Virgin by different titles. Each of the 12 sections of the chant presents a short introduction, 12 ever-changing acclamations plus a fixed conclusive one (“Rejoice, o bride unwedded!”) and a hymn (*kontakion*). The poem has been the model for the Catholic Litanies of Loreto (Italy) based on an early-9th-century Venetian translation into Latin (Meersseman 1958; Persic 2004; Sadowski, Kowalska, Kubas 2016). In the Greek version, the last *kontakion* recalls the defence of Constantinople when it was besieged in 626 by Sassanids and Avars:

Unto the Defender General the dues of victory,
and for the deliverance from woes, the thanksgiving
I, Thy city, ascribe Thee, O Theotokos.

⁴ The separation between these two fields is indeed a recent and never entirely consolidated cultural innovation of the Enlightenment.

And having your might unassailable,
 deliver me from all danger
 so that I may cry unto Thee:
 Rejoice, O Bride unwedded.⁵

A second case in which the association between the Virgin and military isotopy is manifested by litanic structures – as in the case of the Akathist hymn – is represented by the title “Mary, Help of Christians” (“*Sancta Maria Auxilium Christianorum*”). This title was inserted into the Litany of Loreto by Pope Pius V after the Battle of Lepanto (1571). The Pope believed the intercession of the Virgin had ensured victory by the coalition of Christian fleets (including most of the Italian states and Spain, which ruled over Naples and Sicily) against the Ottoman fleet.

In the case of the Akathist hymn and the Litany of Loreto, the enemy, located in the external world, is non-Christian. In contrast, the relationship between the Polish anthem “Mother of God” (“*Bogurodzica*”) and protection of the border is not as straightforward. This song is attributed to Saint Adalbert of Prague (956–997). Its association with military isotopy dates to the Battle of Grunwald (1410), in which the Poles defeated the armies of the Teutonic knights. The Poles were led by Władysław II Jagiełło, whose recent conversion to Christianity was reputed to be insincere by the Monastic state; both sides were thus Catholic. Furthermore, the Crusaders and Poles contended over a pagan territory, the land of Samogitia (see Davies 1981). In this case, the enemy was ethnic and political, and the Madonna was not granted any pretensions of religious supremacy. The Polish victory entrusted the newly formed Polish-Lituanian State to the Virgin, and “*Bogurodzica*” became the coronation anthem of the first Jagiellonian kings.

Another interesting case was brought to my attention by Franciscu Sedda: the national anthem of Corsica is “God save you Queen” (“*Dio vi salvi Regina*”).

Over our enemies,
 Give us the victory
 And the eternal glory
 In paradise.

Paradoxically, the original text was written in Italian by Francesco de Geronimo in 1676 as an adaptation of the religious Latin hymn “*Salve Regina*”, which might be explained by analysing the island cultures in more depth (see Sedda

⁵ Τη υπερμάχῳ στρατηγῶ τα νικητήρια ὡς λυτρωθεῖσα των δεινῶν ευχαριστήρια αναγράφω σοι η Πόλις σου Θεοτόκε. Ἄλλ' ὡς ἔχουσα το κράτος ἀπροσμάχητον εκ παντοίων με κινδύνων ελευθήρῳσον , ινα κράζῳ σοι. Χαίρε νύμφη ἀνύμφευτε.

2020). In comparison to the original text, the anthem introduces an important variation. In fact, while the national anthem implores her to defeat enemies of the independentist movement, the original prayer requests the protection of the Virgin against *her* enemies.

3. Our Lady of the Rocciamelone

The sanctuary on the top of Rocciamelone mountain and its role in the culture of the valley of Susa is analysed in Ponzio, Galofaro 2021. In this section, I briefly revisit some of the analysis presented in that paper, based on structural semantics, in order to discuss the function of the statue of the Virgin from the perspective of the semiotics of culture.

The sanctuary known as *Our Lady of the Rocciamelone* is the highest of its kind in Europe (3538 m). It is located in Susa, Piedmont, and represents the identity of the valley community there. It was founded in 1358 by a crusader from Asti, Boniface Rotarius, to fulfil a vow he had made when captured by the Turks. He also placed a triptych on the site, though this was removed during the 17th century and is now held in the diocesan museum. Boniface also founded a refuge halfway up the mountain, Ca' d'Asti, which is still active today. The association between pilgrimage and the ascension is testified to in the culture of the epoch by Francesco Petrarca's ascent of Mont Ventoux, described by the poet as a spiritual journey. This place thus became a pilgrimage destination. After a period of decline during the 18th century, the pilgrimage drew new life from the colossal statue of the Virgin placed on the site on 15 June 1899 by Blessed Edoardo Giuseppe Rosaz, the bishop of Susa (1830–1903). The meaning associated with this statue, as well as the cultural features of its epoch, can be reconstructed from Rosaz's writings contained in the Archive of the diocese.

3.1. Rosaz's writings

During his long life, Mgr Rosaz witnessed an important change in Catholic history: the fall of the Papal State and foundation of the Kingdom of Italy, governed by liberal prime ministers. In Rosaz's writings, the Catholic Church is represented as under attack by the Devil, embodied by Protestants, freemasons, and liberals. Rosaz uses this term to indicate the political leaders and electors of the *historical right* and *historical left* whose policies were inspired by liberal conservatism and reformism. The two political families unified Italy and put an end to the Papal State.

The Catholic perception in that period, shared by Pope Leo XIII (1878–1903), was that the Church was besieged by its adversaries and these enemies were in turn inspired by the Devil.⁶ At the same time, Rosaz's activity paralleled that of the social saints of Piedmont, such as Don Giovanni Bosco or Giuseppe Benedetto Cottolengo, who worked helping and educating the poor and needy. According to Rosaz, Charity and External Worship (Zeal, Devotion) were the proper means to fight the war against liberalism. The former does indeed underline the intense inequalities characterizing post-unification Italian society, despite the rhetoric of Italian unification. The colossal statue erected to the Virgin on Rocciamelone can be read in this historical context. Its semantic value and the meaning associated with the pilgrimage and the Holy Virgin did of course go on to change over time, as this pre-conciliar Catholic stance was substituted by the new religious excitement giving rise to the Second Vatican Council.⁷

3.2. The 'up/down' topological opposition

In the following examples, Rosaz's writings homologate a topological opposition (up/down) with a religious opposition (divine/human) and regime of visibility (to see/to not see).

Homologation is an operation of semantic analysis, applicable to all semiotic domains, that forms a part of the general procedure of structuration. It is to be considered a rigorous formulation of reasoning by analogy. Given the structure

$$A : B :: A' : B'$$

A and A' are said to be homologous by comparison with B and B' (Greimas, Courtés 1984: 144).

As we will see, the first homology appearing in Rosaz's writings is:

$$\text{up} : \text{down} :: \text{divine} : \text{human} :: \text{to see} : \text{to see not}$$

For example, Rosaz (1895: 2–3) writes of the Virgin that:

She is queen of Heaven and Earth, she continues to exercise in Heaven the empire that she had on earth, where the divine Son was subject to her. Mary's empire over us is a true empire, because she is the mother of Jesus, true king, indeed king of kings, Lord of Lords.

⁶ According to Young 2018, during Leo XIII's pontificate fear of the devil and exorcism became central in pastoral activity. This topic had been previously marginalized by Enlightenment theological thought.

⁷ See Magdalena Maria Kubas' paper in this issue (Kubas 2023).

Heaven is topside and constitutes the space of the divine, whereas – by antonymy – the earth is downside and is a human space. Furthermore, in this example, heaven is modalized as a space of competence and power:

[...] every sensible behaviour or every sequence of behaviour presupposes, on the one hand, a virtual narrative program* and, on the other, a particular competence which makes its carrying out possible. Competence, thus conceived, is a modal competence which can be described as a hierarchical organization of modalities* (it will be based, for example, on a willingtodo or a havingtodo, governing a beingable or a knowinghowtodo). (Greimas, Courtès, 1984: 45)

In this perspective, from a modal point of view, Mary's empire can be considered willing-to-do and being-able-to-do. In the following passage, this hierarchical organization of modalities also involves knowledge:

Elevated above the high mountain, which is the Church, he [sc. the pope, F. G.], sees better than us the plots of his enemies, and therefore as a vigilant guardian of the flock entrusted to him by God does not cease to raise his voice to warn us and make us careful to avoid them. (Rosaz 1884: 1)

The Holy Father is thus also placed in an upper space. He is the first to see the dangers that are approaching. This conclusion seems relevant to a semiotics of culture:

Semiotics is thus brought to construct models of modal competence, which, based on the analysis of narrative discourses, are applicable to the nonlinguistic semiotics of the natural world* (on the plane of "psychosocial reality") and must serve as premises for a semiotics of action. (Greimas, Courtès 1984: 45)

Consequently, it can be argued that heaven, in the Italian Catholic culture of the beginning of the 20th century, was considered the space in which the competence of the faithful is assembled and transferred to them so that they can act in the secular world. The Virgin Mary is an operator capable of transferring this competence to worshippers. The consequence is a resemantization of the world, considered as a semiotics: from the point of view of its meaning, the world of Catholics is a different one from that of non-Catholics, to paraphrase Wittgenstein (2002, 6.43).

Some writings of Rosaz's homologate the up/down opposition to two other ones as well. For example, 'above' is the mind that controls the passions. Without exercising control over the senses, there is no real freedom but only disorder:

What does mortification consist of? To understand well what mortification consists of, we must distinguish two parts, the upper part which is reason, and the lower part which is the sensitive appetite. Before the sin these two parts got along well with each other so that the superior commanded the inferior, and the inferior, that is the sensitive appetite, was entirely subject to the superior part. (Rosaz 1885: 3)

Thus, the new homologation

up : down :: reason : senses :: exercise of virtues : moral freedom

is superimposed on the first one. In both cases, indeed, ‘up’ is the place of a *cognitive investment* (knowing-how-to do or to be).⁸ The homologation establishes intertextual relations between Rosaz’ discourse, the biblical episodes he quotes to justify it from a theological point of view, and the colossal statue of the Virgin he places on the top of Rocciamelone.

3.3. The military metaphor

The chain of homologations presented reveals the value of knowledge associated with the upper space. This value is the isotopic connector between the two isotopies, military and religious, allowing the reader to neutralize any contrast between them and engage in a metaphoric exchange of semantic values. In structural semantic terms (Rastier 1997: 33), //lookout// and //pilgrimage// represent two semantic fields, two *taxemes*, i.e. “the minimal class where sememes are interdefined: for example, ‘cigarette,’ ‘cigar,’ ‘pipe’ are contrasted within the taxeme //tobacco//” (Rastier 1997: 34). In particular, //lookout// and //pilgrimage// share some semantic values: /knowledge/ and /search/. They are also associated in their respective contexts with a /euphoric/ valorization. In particular, the lookout keeps the community safe from the enemy. This allows and helps the /military/ semantic value to be transferred from //lookout// to //pilgrimage//: as a lookout, from above, the Virgin protects the border between faith and its denial and is the source of the competence which allows Catholics to fight against liberals, Protestants, and freemasons:

⁸ While the top/bottom opposition is widespread in the Christian tradition, it should not be considered universal or taken for granted; in the mystical tradition, for example, the applicable homologation is instead external : internal :: human : divine (e.g. Teresa of Avila, *The Interior Castle*).

To the public recitation of the Rosary prescribed by the Holy Pontiff Pius V is attributed the victory that the Catholics united in league achieved over the Turks in the Gulf of Lepanto in October of the year 1570, and with this victory the Christian nations saw themselves freed from the imminent danger that dominated them by the Muslim power. Nowadays we have other more dangerous enemies to fight than the Turks, because they act with great cunning in the darkness, so it is difficult to recognize and fight them; and these enemies are the acolytes of the Masonic sect. (Rosaz 1896: 1)

As we can see, the same structure, relating the title *Mary, Help of the Christians* to the defeat of Catholic enemies, can also be reactivated in a different historical and political context. In this vein, conducting a pilgrimage to the sanctuary of Rocciamelone – as an act of external cult – enables worshippers to acquire the modal competence and makes them able to fight. This meaning is not confined to Rosaz's texts; it is transferred to pilgrimage as a practice more broadly:

The Holy Father smiled at the idea of erecting a statue of the Madonna on the highest mountain in Italy, in which the great Virgin is perpetually honoured, as protector of the Alpine passes and therefore of Italy, and here you deign to leave us as certificate of his love for our Madonna of Rocciamelone: *Alma Dei Mater – Nive Candidior Maria – Lumine benigno Segusiam respice tuam – Ausoniae tuere fines – Coelestis patrona*. Leo XIII. The Supreme Pontiff in the dedication addressing Mary says to her: O great Mother of God, Mary – Whiter than snow, with a kind eye look at your Susa – Defend the Italian borders – Heavenly Patroness. (Rosaz 1898: 13)

4. The border

With reference to Lotman's notion of culture as a model of the world presented in Section 2 (Fig. 1), we can now delve more deeply into the function and semantic value of the Holy Virgin, starting from the case study of the pilgrimage to Rocciamelone presented in Section 3. First of all, Lotman describes the space inside culture as follows:

We have in mind a specific sphere, possessing signs, which are assigned to the enclosed space. Only within such a space is it possible for communicative processes and the creation of new information to be realized. (Lotman 2005: 207)

Here, Lotman introduces the notion of information – a notion that represented a bridge between semiotics and cybernetics during the 1970s. From a point of view located in the internal space of *semiosphere*, external space appears as a space of disorder and noncommunication:

The sphere of extra-cultural nonorganization may sometimes be constructed as a mirror reflection of the sphere of culture or else as a space which, from the position of an observer immersed in the given culture, appears as unorganized, but which from an outer position proves to be a sphere of different organization. (Uspenskij *et al.* 1973: 3)

Uspenskij *et al.* present two examples, both referring to the *Tale of Bygone Years*, compiled in Kyiv around the 12th century. In the first example, a pagan sorcerer taking part in a religious debate with Christians describes his gods as black, winged, possessing tails, and dwelling in abysses. The external space is thus described through an inversion of the internal one, and gods are described as demons. In the second example, the annalist describes the old Slavic world as subdivided into two tribes: Poljans (inhabitants of the plains) and Drevljans (living in the woods). Drevljans are considered uncivilized. For example, according to the annalist, Drevljan families are not formed on the basis of marriage. However, relationships between Drevljans nonetheless appear to constitute real marriages in the eyes of a modern reader, belonging to a different semiosphere and equipped with basic ethnological notions. From a different point of view, therefore, external space is not completely unorganized; rather, its different form of organization must be translated into the codes of the internal space in order to be understood. From this point of view,

The definition of culture as the sphere of organization (information) in human society and the opposition to it of disorganization (entropy) is one of the many definitions given “from within” the object being described, which is further evidence of the fact that science (in this case, information theory) in the twentieth century is not only a metasystem but is also part of the object described, “modern culture”. (Uspenskij *et al.* 1973: 2)

To return to Rosaz’s writings, the (E) world is the space where the enemies of religion – Protestants, freemasons, and liberals – are located. It is described as a place of disorder where occult forces act; it is a space of war, revolution, extermination; poverty and exploitation; and rebellion of the flesh, lust, and disordered self-love. Thus, the (E) world is characterized by a lack of information or by the destruction of information. It is the opposite of a rationally ordered Christian society, and the latter can therefore be identified with (I) space. In this framework, the Virgin preserves the internal space (I) from external dangers and can thus be positioned at the border of the semiosphere. According to Lotman,

[t]he function of any border or film – from the membrane of a living cell to the biosphere as a film (according to Vernadsky) covering our planet, to the delimitation of the semiosphere – comes down to a limitation of penetration, filtering and the transformative processing of the external to the internal. At different levels this invariant function is manifested in a variety of ways. At the level of the semiosphere it represents the division of self from other, the filtration of external communications and the translation thereof into its own language, as well as the transformation of external non-communication into communications, i.e., the semiotisation of incoming materials and the transformation of the latter into information. (Lotman 2005: 210)

By marking the boundary between (I) and (E), the Virgin carries out a transformation from a state of disorder in input to one of greater information in output: by virtue of being a source of knowledge, she represents the competence of Catholics. In fact, “the mechanism of culture is a system which transforms the outer sphere into the inner one: [...] sinners into holy men, entropy into information” (Uspenskij *et al.* 1973: 2). Semioticians’ interest in information is related to cybernetics. However, the creation of information is the core of the notion of semiosphere. In view of this, one might ask: is this creation of information simply a metaphor? A close reading of Lotman’s texts reveals that he interpreted information as a diminution of entropy, caused by culture:

Back in 1929 Leo Szilard had published a work under the declarative title “On the decrease in entropy in the thermodynamic system under interference from the thinking being”. History is a process which takes place ‘with interference from a thinking being’. This means that at the bifurcation points what comes into action is not only the mechanism of chance but also the mechanism of conscious choice and this becomes the most important objective factor in the historical process. (Lotman 1990: 232)

The opposition entropy/information, disorder/order, allows Lotman to distinguish the centre and the periphery of the culture on the basis of their internal organization. While the former is composed of hierarchically interconnected texts, generating a structural model of the world, the latter is a special archive of anomalies, delineating a picture of the world in which randomness or disorder predominate (Lotman 1990: 162–163).

To return to the semiosphere, Lotman describes the function of the border as a “translation”. However, from his point of view, translation cannot be considered a mechanical process that acts to preserve information:

Since the image of the external world, which is translated in the texts of one or other language, is subject to the modelling action of that language, the system, as a single organism, has at its disposal for each outside object a whole set of models, and this fills up the incompleteness of its information about it. (Lotman 1979: 90)

Lotman instead considers semiotic translation to be a process in which information is created. However, the notion of “extra-semiotic” space raises a second problem:

The border of semiotic space is the most important functional and structural position, giving substance to its semiotic mechanism. The border is a bilingual mechanism, translating the external communications into the internal language of the semiosphere and vice versa. Thus, only with the help of the boundary is the semiosphere able to establish contact with non-semiotic and extra-semiotic spaces. (Lotman 2005: 210)

The world of our daily experience normally appears to be a meaningful world, from a phenomenological point of view. Does metaphysical pre-semiotic reality exist before it is observed by us, and how might this be proven?

As soon as we move into the realm of semantics, we have to appeal to an extra-semiotic reality. However, let us not forget, that this reality becomes for a given semiosphere “a reality in itself” only insofar as it has been translated into the language of the semiosphere (in the same way that external chemical materials may be adopted by a cell only if they have been transformed into the internal biochemical structures characteristic of it: in both cases — these are particular manifestations of one and the same law). (Lotman 2005[1984]: 210)

In this passage, Lotman clearly states that the cybernetic analogy between biologic and semiotic systems in light of the notion of information is not a metaphor (“one and the same law”). Non-semiotic and extra-semiotic reality is described as a sort of noumenon by virtue of its being unknowable in the absence of translation. Furthermore, we should recall the thesis on the semiotics of culture quoted above, according to which the “non-semiotic” appearance of the (E) world is not absolute, but rather relative to an observer belonging to (I) space.

4.1. How to create information

The Holy Virgin is thus an operator located at the border of the Catholic semiosphere who translates the absence of information of (E) space into information in (I) space. To represent this situation, some tools can be borrowed from quantum computing. It is not the aim here to provide a replicable method of analysis; on the

contrary, semiotic analysis helps us to translate into computational terms Lotman's qualitative use of terms such as *information*, border, and model. The goal is to show how the Holy Virgin, understood as a cultural element embodied by icons or statues and addressed by prayers, can effectively work as a filter and create information if such information is identified with an operator.

In particular, quantum computing allows us to link the probability of a system being in a particular state to the observer's uncertainty about the state of the system (Nielsen, Chuang 2010: 510). The difference between classic and quantum information theory lies in the fact that the latter considers probability amplitudes, i.e. square roots of probabilities, which can also be negative numbers. This trait allows summation and subtraction between amplitudes of probability, representing phenomena of interference, whereas in classic information theory the expression "negative probability" has no meaning (Galofaro, Toffano, Doan 2019: 380–381). It is sufficient to square the amplitudes to obtain the respective probability values. In the following, information will be related to the *Von Neumann entropy* of the system (Nielsen, Chuang 2020: 510–511), replacing Shannon's entropy as formulated in *Quantum Information Theory*.

In order to represent the situation under consideration here, Catholic culture could be identified as a system which can be in two maximal states $|0\rangle$ and $|1\rangle$, used in this chapter to represent the down/up opposition to which all the semantic values identified in the analysis are homologated.⁹ The system can also assume all the complex intermediate states between $|0\rangle$ and $|1\rangle$, meaning that the system has a certain probability amplitude of being in the respective states. For example, the state $|+\rangle$ will represent the equiprobability that the system is in the state $|0\rangle$ or $|1\rangle$. In this situation, there is a 50% probability that q_0 , i.e. the (E) space, is in the state $|1\rangle$ or $|0\rangle$. The same can be said about the (I) space. The observer's uncertainty regarding the state of the world is maximal, as will become clear in the discussion of Fig. 3 below. However, first it is necessary to introduce two *qubits* to represent information about the (E) and (I) space: the qubit q_0 will represent the state of external space (E), while q_1 will represent the information that (I) has about (E) in terms of the semiotic codes that apply inside Catholic culture. Qubits are basic units of quantum information, corresponding to classic *bits*. A *qubit* can be in a maximal state $|1\rangle$ or $|0\rangle$; furthermore, it can be in a coherent superposition of both states simultaneously.

In order to provide the reader with a better understanding of the notion of qubit, Fig. 2 represents this unit as a Bloch sphere the poles of which are the

⁹ A complete overview of formalism is beyond the scope of this paper. The reader can find a clear explanation of its application to Information Retrieval in Rijsbergen 2004.

maximal states $|1\rangle$ and $|0\rangle$. The qubit can assume all the other possible complex mixed states between $|1\rangle$ and $|0\rangle$, each associated with a point inside the sphere. At the equator, the equiprobability state $|+\rangle$ is occurring, representing the minimum possible amount of information (i.e. maximal entropy). For the sake of simplicity, no other possible states will be used in the model presented below.

The gates of a quantum circuit perform geometric operations on the sphere. For example, some operators will be introduced below that perform simple rotations of the state along the Y axis of the Bloch sphere.

As the reader can see, the state $|+\rangle$ is located at the equator, in correspondence to the X axis of the sphere. With reference to the base $|1\rangle$, $|0\rangle$, the equatorial section of the sphere marks all those states in which $|1\rangle$ and $|0\rangle$ have the same probability of occurring: uncertainty is maximal and information is minimal. However, among the other possible equatorial states, $|+\rangle$ has been chosen on purpose: in fact, looking at the Bloch sphere, it is easy to see that $|+\rangle$ is one of the maximal states of a different base $|+\rangle$, $|-\rangle$. In this manner, what might appear to be a maximum of uncertainty and minimum of information in the base $|1\rangle$ or $|0\rangle$, i.e. the cultural code prevailing inside the Catholic semiosphere, can be a maximum of information in a different cultural code featuring space (E), as in the example of Drevljan familial composition mentioned above. Therefore, the base $|1\rangle$, $|0\rangle$ will represent the cultural code of the Catholic semiosphere, while the base $|+\rangle$, $|-\rangle$ will represent the cultural code of Protestants, freemasons, and liberals. In this way, formalism allows us to represent how ordered structures belonging to a certain culture can appear unstructured and disordered from the point of view of another culture.

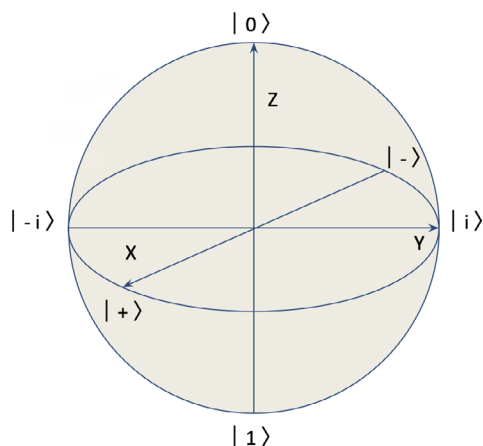


Figure 2. A qubit represented as a Bloch sphere.

In Fig. 3, a basic quantum circuit is displayed. To be clear, this circuit does not describe Rosaz’s writings: it is a very simple circuit the purpose of which is to introduce and explain this kind of graph and how it will be used here in relation to Lotman’s notions. The two wires represent the q_0 (top) and q_1 (bottom) qubits, which will store the information about Rosaz’s top/bottom opposition. The two wires are not related by gates and both the qubits are in the equiprobability state $|+\rangle$ representing the minimum possible amount of information (i.e. the maximal entropy). Proceeding from left to right, the green bars represent the system’s probability of being in state $|1\rangle$. It is then possible to see the two Bloch spheres corresponding to the qubits and a graphical rendering of the matrix that stores the probability amplitudes of the whole system being in state $|00\rangle$, $|01\rangle$, $|10\rangle$, or $|11\rangle$. In this case, there is a 25% probability respectively: the entropy of the system and uncertainty of the observer are maximal, and information is minimal.

This circuit represents a model of the world in which there are no relationships between (I) and (E) space, i.e. between the two wires of the circuit. The border of the semiosphere filters everything and observers located in the internal space cannot know anything about the external one. For this reason, remembering that $|+\rangle$ is a maximum of incertitude in the base $|1\rangle$, $|0\rangle$, both $q_0 = |+\rangle$ and $q_1 = |+\rangle$ hold. From the point of view of the (I) world, the Catholic culture measures information in the base $|1\rangle$, $|0\rangle$, therefore, uncertainty about the (E) world – i.e. the freemason, liberal, Protestant world – is maximal, and information is minimal.



Figure 3. A basic quantum circuit. Source: [https://algassert.com/quirk#circuit={%22cols%22:\[\[%22•%22,%22•%22\]\],%22init%22:\[%22+%22,%22+%22\]}](https://algassert.com/quirk#circuit={%22cols%22:[[%22•%22,%22•%22]],%22init%22:[%22+%22,%22+%22]}).

To adapt the circuit to Rosaz’s writings, two gates will be introduced to link the (E) and (I) worlds (Fig. 4). These gates translate the state of the external world in terms of the semiotic codes characterizing the internal world. These operators are, respectively, the *anti – controlled* $Y^{\frac{1}{2}}$ and the *anti – controlled* $Y^{-\frac{1}{2}}$ gates. The former performs an action on q_1 when $q_0 = |0\rangle$, while the latter performs an action on q_1 when $q_0 = |1\rangle$. Looking at the Bloch spheres, we see that the first has the function of rotating q_1 of 90° around the Y axis, while the second rotates q_1 of

-90° around the same axis. In this situation, the system is in the state $|01\rangle$ or $|10\rangle$ with a 50% probability of each, while there is no possibility that it is in the state $|00\rangle$ or $|11\rangle$. For this reason, in comparison to the system represented in Fig. 3, uncertainty is significantly reduced and information has been created.

The circuit represents a situation in which the state of the external world is always reversed in the semiotic code of the internal, Catholic world. For example, this happens when the protestant notion of God is interpreted as evil by Catholics. Thus, even without determining the state of q_0 , if the state of q_0 is $|1\rangle$, the first gate will translate it reversing his value. When q_0 is $|1\rangle$, q_1 will assume the value $|0\rangle$ and *vice versa*.

This particular model of the world reverses (E) and (I), as happens both in the case of the sorcerer who describes the pagan gods as demons and in the case of the Protestant, liberal, and freemason values accused by Rosaz of seeking to overthrow religion.

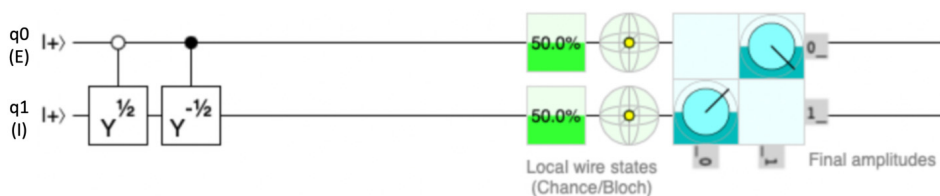


Figure 4. A quantum circuit representing two quantum gates acting on q_1q_1 . Source: [https://algassert.com/quirk#circuit={%22cols%22:\[\[%22%22,%22Y^%C2%BD%22\],\[%22%22,%22Y^-%C2%BD%22\]\],%22init%22:\[%22+%22,%22+%22\]}](https://algassert.com/quirk#circuit={%22cols%22:[[%22%22,%22Y^%C2%BD%22],[%22%22,%22Y^-%C2%BD%22]],%22init%22:[%22+%22,%22+%22]})

It is worth making a final remark about Fig. 4. Looking at the green bars, the reader can understand that uncertainty about the state of the (E) world has not changed in comparison to Fig. 3. The real change concerns information about the anti-correlation between the states of (E) and (I). Technically speaking, they are maximally entangled. It is possible to exclude that the system is in the state $|00\rangle$ or $|11\rangle$. Therefore, information has been created.

Finally, formalism can be used to represent diachronic change (Fig. 5). This is done by adding an $Y^{\sin(t)}$ operator to q_0 , where $t = \text{time}$. The new gate acts only on the qubit q_0 , rotating it along the Y axis in relation to time and modifying the probability that q_0 is in the $|1\rangle$ or $|0\rangle$ state. However, because of the two control and anti-control gates, the information gleaned by the observer inside the (I) world still mirrors the state of the (E) world.

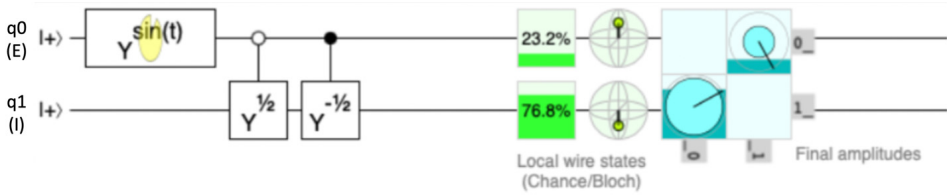


Figure 5. The quantum circuit in Fig. 4 is modified, allowing $q0$ to assume different superpositions between the states $|1\rangle$ or $|0\rangle$ as a function of time. The controlled and anti-controlled gates modify the state of $q1$ accordingly. The animation is displayed at the address: [https://algassert.com/quirk#circuit={%22cols%22:\[\[%22id%22:%22Y^ft%22,%22arg%22:%22sin\(t\)%22}\],\[%22%22,%22Y^%C2%BD%22\],\[%22%22,%22Y^-%C2%BD%22\],%22init%22:\[%22+%22,%22+%22\]}](https://algassert.com/quirk#circuit={%22cols%22:[[%22id%22:%22Y^ft%22,%22arg%22:%22sin(t)%22}],[%22%22,%22Y^%C2%BD%22],[%22%22,%22Y^-%C2%BD%22],%22init%22:[%22+%22,%22+%22]}).

Both in Fig. 4 and in Fig. 5, information is created by the control and anti-control gates: the closer the qubits approach to the pure states of $|1\rangle$ and $|0\rangle$, the lower is the *Von Neumann entropy* of the system (Nielsen, Chuang 2020: 510–511). In fact, by definition, the entropy of a pure state is 0. For example, when the state of the (E) space is $|0\rangle$, the state of the (I) space is $|1\rangle$ and the system has a 100% probability of being in state $|10\rangle$, representing certitude and a maximum of information. It is thus possible to interpret these gates as the Holy Virgin in Rosaz’s text. As a lookout, she views the danger approaching from the external world and *translates* it in the terms of the code being used within the Catholic semiosphere, thereby creating information.

5. Conclusion: Information and meaning

In the paper I have proposed to represent the Holy Virgin with a *model*. According to Juri Lotman, *models* mediate in the *translation* of material coming from the external region of a semiosphere into the internal codes. Models presuppose modelling systems, but they should not be confused with them. Models can be located at the border of the semiosphere insofar as the latter acts as a filter, preserving the semiosphere from any danger appearing in the environment. Viewed in this way, the Virgin – in Her form as an addressee of prayers, patroness, and icon – preserves the Catholic semiosphere from external dangers. In the selected case study of the Holy Virgin statue in the Rocciamelone sanctuary, the Catholic *weltanschauung* epoch identified the danger in question as lying in the activity of Protestants, liberals, and freemasons, as we saw in the writings of Giuseppe Rosaz, then the bishop of Susa.

In order to prove that the aforementioned function performed by the Virgin is not just a metaphor, the paper has focused on Lotman's perspective according to which translation consists in the creation of information. This operation can be illustrated by formalizing the way the Holy Virgin acts as a semantic operator thanks to quantum circuits, borrowed from quantum computing. The function of the Virgin is to create information about the (E) space of the world in a situation in which the faithful are experiencing uncertainty. In our example, the Virgin equates Protestants, liberals, and freemasons with the 'down' topological position. In Catholic culture, this position is associated with the earth, humanity, the senses, and moral freedom, which are opposed to heaven, divinity, reason, and the exercise of virtues. Following this act of translation, the faithful is able-to-act in the world, namely by fighting the enemy. In this perspective, 'information' should not be considered a metaphor; on the contrary, it has been used here in the technical sense established by quantum computing.

According to Eco (1976), the technical notion of information should not be confused with meaning. The former is a condition of possibility for the latter to exist, but a simple transfer of information does not assure the correct interpretation of the message, as proven by aberrant readings. In line with Jakobson, Eco considers information only in reference to the form of the expression plan. However, the opposition between (I) and (E) and the semantic values homologated to them by culture are to be considered the *form of the content*. If this is correct, it should – in principle – be possible to acquire information about it. For this reason, although the argument presented in this chapter does not abandon Eco's distinction between information and interpretation, it does distinguish between information about the form of the expression and information about the form of the content plan, in the hope that the latter notion will offer an interesting point of departure for pursuing further research about semantics.

Structural analysis has provided an interpretation of the widespread tendency to associate the Holy Virgin with military, geopolitical isotopies in both Orthodox and Catholic culture through icons, hymns, and prayers as seen over the last two millennia. According to this association, the Virgin embodies the competence that worshippers belonging to the internal space of the semiosphere need to acquire because of their uncertainty regarding the dangers and enemies located in the external one. The Virgin can be considered a semantic operator belonging to different modelling systems (verbal, visual, musical) who ensures the translation of elements belonging to the external space into the language of the Catholic semiosphere, thereby making up for possible incompleteness in the information available about such threats.

All this explains why *icons* of the Virgin are considered protectors of various countries such as Russia and Poland, particularly in terms of protecting them from each other. Leaving semiotic analysis aside for a moment, the almost ubiquitous chirality of this cultural model has the potential to help conflicting cultures engage in dialogue. In so doing, even in the troubled times we live in, the boundary between (I) and (E) can be abolished in favour of interconnection between different groups of semiospheres, each simultaneously participating both in the dialogue (as part of the semiosphere) and the space of dialogue (the semiosphere as a whole) – to use Lotman's (2005[1984]: 225) terms.

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References

- Budwey, Stephanie 2014. *Sing of Mary: Giving Voice to Marian Theology and Devotion*. Collegeville Minnesota: Liturgical Press.
- Davies, Norman 1981. *God's Playground: A History of Poland*. New York: Columbia University Press.
- Eade, John; Katić, Mario 2016. *Pilgrimage, Politics and Place-Making in Eastern Europe: Crossing the Borders*. London, New York: Taylor and Francis. <https://doi.org/10.4324/9781315600505>
- Eco, Umberto 1976. *A Theory of Semiotics*. Bloomington: Indiana University Press. <https://doi.org/10.1007/978-1-349-15849-2>
- Galofaro, Francesco; Toffano, Zeno; Doan, Bich-Liên 2019. Semantic quantum correlations in hate speeches. *RIFL* (2019) SFL: 370-383 DOI: 10.4396/SFL2019ES08.
- Greimas, Algirdas J.; Courtés, Joseph 1984[1979]. *Semiotics and Language: An Analytical Dictionary*. Bloomington: Indiana University Press.
- Kubas, Magdalena Maria 2023. The spatial representation of the Blessed Mary in Italian poetry at the time of the Second Vatican Council. *Sign Systems Studies* 51(1): 280–300.
- Lotman, Juri 1975[1969]. On the metalanguage of a typological description of culture. *Semiotica* 14(2): 97–123. <https://doi.org/10.1515/semi.1975.14.2.97>
- Lotman, Juri 1979. Culture as collective intellect and problems of artificial intelligence. *Russian Poetics in Translation* 6: 84–96.
- Lotman, Juri 1990. *Universe of the Mind: A Semiotic Theory of Culture*. Bloomington: Indiana University Press.
- Lotman, Juri 2005[1984]. On the semiosphere. *Sign Systems Studies* 33(1): 205–229. <https://doi.org/10.12697/SSS.2005.33.1.09>
- Meersseman, Gilles G. 1958–1960. *Der Hymnos akathistos im Abendland*. Fribourg: Universitätsverlag.

- Nielsen, Michael A.; Chuang, Isaac L. 2010. *Quantum Computation and Quantum Information*. Cambridge: Cambridge University Press.
- Pelenski, Jaroslaw 1974. *Russia and Kazan: Conquest and Imperial Ideology*. The Hague, Paris: Mouton. <https://doi.org/10.1515/9783111529899>
- Persic, Alessio 2004. Le litanie mariane 'aquileiesi' secondo le recensioni manoscritte friulane a confronto con la traduzione comune. *Theotokos* XII: 367–388.
- Ponzo, Jenny; Galofaro, Francesco 2021. Religion and the semiotization of space: The case of the Madonna del Rocciamelone. In: Van Boom, Jason Cronbach; Pöder, Thomas-Andreas (eds.), *Sign, Method and the Sacred: New Directions in Semiotic Methodologies for the Study of Religion*. Berlin, Boston: De Gruyter, 215–242. <https://doi.org/10.1515/9783110694925-013>
- Rastier, François 1997[1989]. *Meaning and Textuality*. Toronto: University of Toronto Press. <https://doi.org/10.3138/9781442664838>
- Rijsbergen, Cornelius J. van 2004. *The Geometry of Information Retrieval*. Cambridge: Cambridge University Press.
- Rosaz, Edoardo Giuseppe 1884. *Lettera circolare*. Susa: Tipografia Gatti.
- Rosaz, Edoardo 1885. *Lettera pastorale per la quaresima: mortificazione*. Susa: Tipografia Gatti.
- Rosaz, Edoardo 1895. *Lettera pastorale per la quaresima: divozione alla Madonna*. Susa: Tipografia Gatti.
- Rosaz, Edoardo Giuseppe 1896. *Lettera circolare*. Susa: Tipografia Gatti.
- Rosaz, Edoardo 1898. *Lettera pastorale per la quaresima*. Susa: Tipografia Gatti.
- Sadowski, Witold; Kowalska, Magdalena; Kubas, Magdalena M. 2016. *Litanic Verse I: Origines, Iberia, Slavia et Europa Media*. Warsaw: Peter Lang. <https://doi.org/10.3726/978-3-653-05749-2>
- Sedda, Franciscu 2020. *Isole: un arcipelago semiotico*. Milano: Meltemi.
- Uspenskij, Boris. M.; Ivanov, Viacheslav V.; Toporov, Vladimir N.; Pjatigorskij, Alexander M.; Lotman, Juri M. 1973. Theses on the semiotic study of cultures (as applied to Slavic texts). In: Eng, Jan van der; Grygar, Mojmír (eds.), *Structure of Texts and Semiotics of Culture*. The Hague, Paris: Mouton, 1–28. <https://doi.org/10.1515/9783110802962-002>
- Young, Francis 2016. *A History of Exorcism in Catholic Christianity*. London: Palgrave MacMillan. <https://doi.org/10.1007/978-3-319-29112-3>
- Wittgenstein, Ludwig 2002[1921]. *Tractatus logico-philosophicus*. London, New York: Routledge. <https://doi.org/10.4324/9780203010341>

“Sub misericordiam tuam”:

Ritratto della santa Vergine come un operatore semantico

A partire dal 3° secolo, molte canzoni, preghiere e icone testimoniano il modo in cui alla Vergine Maria, Madre di Dio, è stato attribuito il ruolo di proteggere la comunità. Gli esempi includono l'inno acatisto, tradizionalmente datato all'assedio di Costantinopoli (626), l'inno polacco *Bogurodzica*, associato alla battaglia di Grunwald (1410), l'icona di Częstochowa, che protesse la Polonia dall'invasione svedese (1655), e molti altri. Il ruolo della minaccia è incarnato da diversi nemici: infedeli, eretici o atei. La Vergine

veglia sul confine tra due spazi culturali: interno ed esterno alla semiosfera. Un caso di studio fornirà informazioni sulla funzione svolta dalla Madonna al confine: la Madonna del Rocciamelone, il santuario più alto d'Europa, fondato dal cavaliere crociato Rotario (1358). Una statua in bronzo della Vergine fu collocata nel santuario nel 1899. Un piccolo corpus di lettere pastorali scritte dal beato Edoardo Rosaz, vescovo di Susa (Piemonte), esprime la speranza che la Vergine protegga i cattolici dall'eresia liberale. Le opposizioni plastiche come alto/basso, derivanti dalla relazione tra la Vergine e il paesaggio, sono usate per manifestare opposizioni astratte come ragione/passione, ordine/disordine e Chiesa/ rivoluzione. Questa omologazione (Greimas e Courtés 1984: 144) ci aiuta a comprendere come la Vergine, posta nello spazio superiore, incarni conoscenza e cognizione: diventa una vedetta, permettendo un trasferimento di valori dal campo semantico della guerra a quello religioso. La Vergine custodisce il confine della semiosfera, il confine che divide il sé dall'altro. La sua funzione è la semiotizzazione dei materiali in entrata, trasformando la non comunicazione esterna in informazione e significato. Questo capitolo considera quindi la Vergine come un operatore semantico che inverte i valori del discorso liberale in informazioni immagazzinate nello spazio culturale cattolico. Un modello matematico della funzione svolta dalla Vergine sarà presentato in termini di computazione quantistica.

„Sinu kaitse all“: Neitsi Maarja portree kui semantiline operaator

Alates 3. sajandist annavad paljud laulud, palved ja ikoonid tunnistust sellest, kuidas Jumalaemale Neitsi Maarjale on omistatud kogukonna kaitsja roll. Näidetena võib tuua akhathistliku hümnid, mida traditsiooniliselt dateeritakse Konstantinoopoli piiramisega (626), Poola hümnid „Bogurodzica“, mida seostatakse Grünwaldi lahinguga (1410), Czechochowa ikoonid, mis kaitses Poolat Rootsi sissetungi eest (1655), ja paljud teised. Ohtu kehastavad erinevad vaenlased: uskmatud, ketserid või ateistid. Neitsi valvab piiri kahe kultuuriruumi, semiosfääri sisemuse ja välise, vahel. Juhtumiuuringuks, mis selgitab Madonna funktsiooni piiril, on Rocciamelone Madonna, Euroopa kõrgeim pühamu, mille asutas ristisõdijast rüütel Rotharius (1358). Neitsi pronksist kujud paigutati pühakotta 1899. aastal. Susa (Piemonte) piiskopi Edoardo Rosazi kirjutatud väikeses pastoraalkirjade korpusel väljendatakse lootust, et Neitsi kaitseb katoliiklasi liberaalse ketserluse eest. Plastilisi opositsioone, nagu ülemine/alumine, mis tulenevad Neitsi ja maastiku vahelisest suhtest, kasutatakse selliste abstraktsete opositsioonide nagu mõistus/ kirg, kord/korratus ja Kirik/revolutsioon väljendamiseks. See homologeerimine aitab mõista, kuidas ülemisse ruumi paigutatud Neitsi kehastab teadmist ja tunnetust: temast saab vaatlaja, mis võimaldab väärtuste ülekandmist sõja semantilisest väljast religioossesse. Neitsi valvab semiosfääri piiri, mis eraldab Mina Teisest. Tema funktsioon on sissetulevate materjalide semiotiseerimine, välise mittekommunikatsiooni muutmine informatsiooniks ja tähenduseks. Artiklis vaadeldakse Neitsit seega kui semantilist operaatorit, kes muudab liberaalse diskursuse väärtused katoliku kultuuriruumis talletatud teabeks. Neitsi täidetud funktsiooni matemaatiline mudel esitatakse kvantarvutuse abil.