

Nicotine as Sign: a Comeback with the COVID-19

Robert Marty, Ph.D. Mathematics, Ph.D. Humanities

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"Smoking kills" is written in all countries on tobacco packaging. Nicotine's image is firmly established in every conscience, including those of the smokers themselves. For several decades, it has carried the idea of death. But recently, in the search for a cure for COVID-19, it appeared that it could perhaps play a positive role. In France, in Israel in particular, teams have been mobilized. The media from all over the world have echoed this. A conflict of the images has opened up, and it is not the first one because Tobacco has not always been the wrong thing it is today. We analyze his comeback using Peirce's semiotics in the advanced formalization we have achieved ([1],[2]).

The first uses of Tobacco are ancient (6,000 BC). The Indigenous Americans used it in religious ceremonies and for medicinal purposes. Brought back to Europe by Christopher Columbus, its use spread worldwide. The French, Spanish, and Portuguese initially referred to the plant as the "Sacred Herb" because of its valuable medicinal properties. Introduced by Jean Nicot at the court of Catherine of Medici, it was called: "Herb of the Queen" (1560).

We begin by analyzing this initial status of Tobacco as a "sacred plant" in Peirce's semiotics. The name "tobacco" by which the plant refer to as a "Rhematic Symbol":

" A Rhematic Symbol or Symbolic Rheme [e.g. a common noun] is a sign connected with its Object by an association of general ideas in such a way that its Replica calls up an image in the mind which image, owing to certain habits or dispositions of that mind, tends to produce a general concept, and the Replica is interpreted as a Sign of an Object that is an instance of that concept [...] The Interpretant of the Rhematic Symbol often represents it as a Rhematic Indexical Legisign". ([3], CP 2.261).

Suppose we refer to the modern definition of a concept's intension (or understanding). In that case, we find that Peirce states in phenomenological terms how the perception of an element its extension (whatever its medium, verbal or non-verbal) produces the presence in the mind of the corresponding intension. He calls it his Replica. He also uses "Type" for the intention and "Token" for the reply. Our formalization -which is in full conformity with Peirce's text- shows that this Replica is a Rhematic Indexical Sinsign (a singular sign). However, it has the power to activate the presence in the mind of the concept, which also makes it a replica of a Rhematic Indexical Legisign, a sign of law. It thus reactivates in each mind a more or less exact equivalent of the scientific definition: "*Nicotiana tabacum, tobacco or cultivated tobacco, is a species of annual dicotyledonous plant*". All these signs are indexical; they direct attention, in a coordinated way, one to the individual plant, the other to the concept. We see on our lattice the three classes of signs relating to Tobacco that we have just mentioned are encapsulated like Russian puppets.

We can say the same thing about the term "Nicotine", a chemical substance defined as follows: "*Nicotine is an alkaloid with the chemical formula $C_{10}H_{14}N_2$ present in tobacco*". So, at one point, scientists identified the chemical formula of a substance considered to be the active ingredient of Tobacco. The plant is named with

Jean Nicot's name, who introduced Tobacco to France. It follows that the two concepts are intimately linked thanks to this name and the definition of Nicotine as above. From a linguistic point of view, this definition is an assertion concerning both concepts, i.e., a proposition. In Peircean theory, it is a Dicent Symbol: a sign of law that points to two concepts and provides information about the real connection between their Replicas, namely that "every tobacco plant contains Nicotine." As a result, the pair of three "Russian puppets" of each Rhematic Symbol are encapsulated by a fourth, as below:

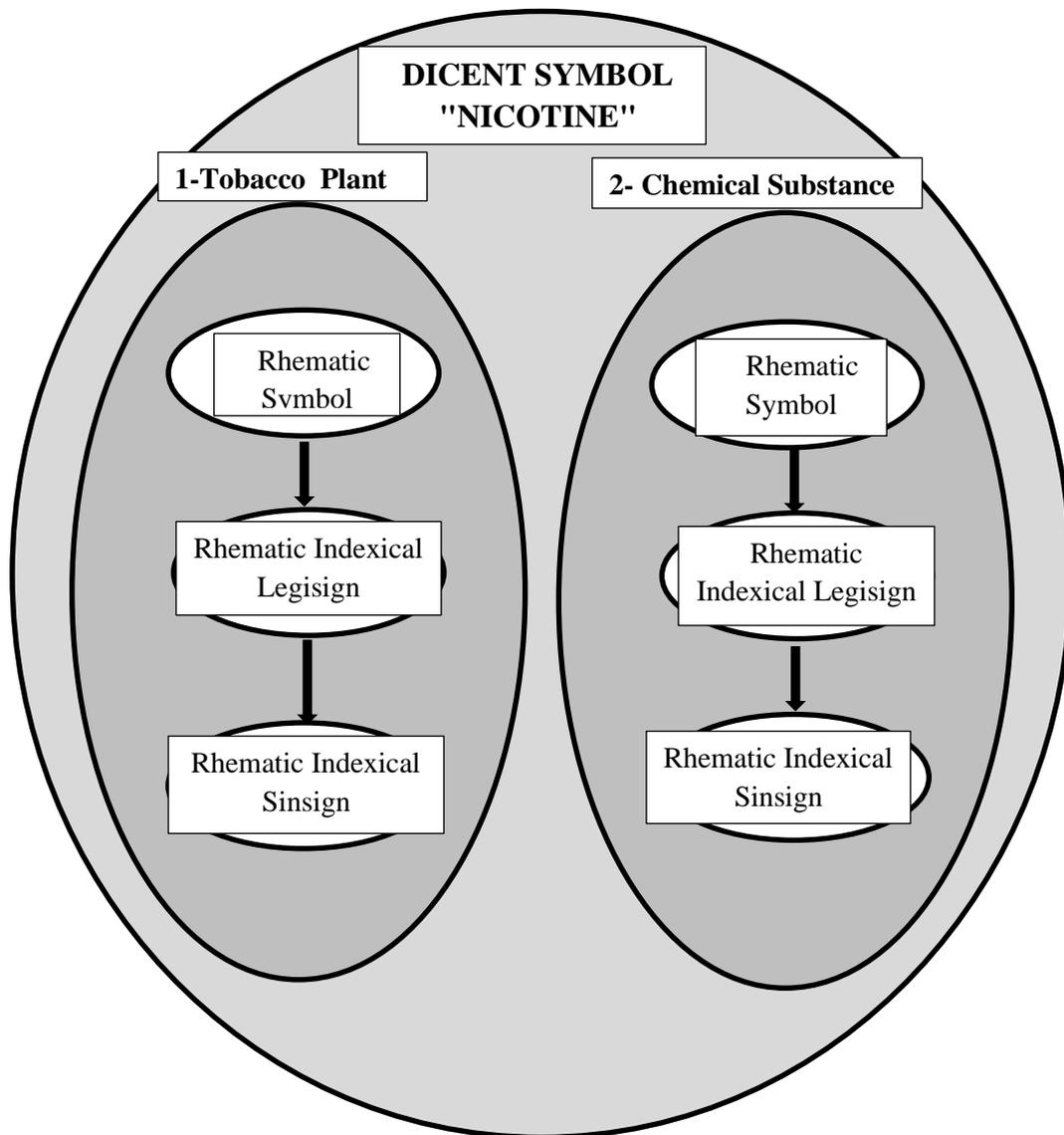


Figure 1: Diagram of the Nicotine as an active ingredient in a "Beneficial Sacred Plant."

We can see in this example how semiotics can produce a refined analysis of the structure of the meaning of a single term in the language. Not only is it a structural analysis, but it is also a historical analysis. History has really produced "the successive encapsulation of puppets" from the smallest to the largest. It is an analysis of the "progressive-regressive" kind that combines material elements (singular) with historically dated intellections of the overall scope.

1964, U.S. Surgeon General's Report on Smoking and Health [4] began to suggest the relationship between smoking and cancer. Scientists confirm 20 years later, in the 1980s. Nicotine is now identified as a new singular sign, another Rhematic Indexical Sinsign that tends to replace the one in Figure 1, creating a possible confusing image in public. The actors of the conflict are, on the one hand, the Public Health

institutions and, on the other hand, the tobacco manufacturers who make remarkable profits from the sale of Tobacco. The former's stake is to create the law according to which toxicity is an essential Nicotine property. For the manufacturers, the stake is to preserve the status quo by organizing addiction through the addition of various substances, by planning misinformation (minimizing the effects, financing of studies encouraging scientific doubt), by creating pseudo protections (multiple filters), by multiplying advertising seduction strategies (in particular with the figure of the Marlboro cowboy, bearer of virile values and initiator of rites of entry into the life of successive generations of teenagers and following teenage girls). It was later discovered that Robert Norris, the model who incarnated him, died at the age of 90; he was not a smoker at all and "He gave up his role in the popular tobacco advertising campaign after 14 years, saying he was setting a bad example for his children" revealed the New York Times in 2019 [5].

It took several decades to reach the Sign of the law established in everyone's minds, smoker or non-smoker, that Nicotine inhaled while smoking was a toxic substance (main thanks to the multiplication of mandatory warnings on tobacco packages). The rearguard battles over cancer statistics are won. A Rhematic Indexical Legisign is established, and the argued connections with cancer appear indisputable. After a short period of coexistence, the image battle is won. But the manufacturers do not give up. In 2016, for example, spending on nicotine marketing was in the tens of billions a year; in the U.S. alone, spending was over US\$1 million per hour! Despite this, smokers themselves have internalized the danger: the beneficial and sacred are now part of the concept's history. Manufacturers also invested in the e-cigarette recognizing the development of a potential new market sector that could render traditional tobacco products obsolete. They began to produce and market their brands of e-cigarettes and acquire existing e-cigarette companies. But despite their relentless resistance, "Toxical" replaced "Beneficial" in the diagram of the Dicient Symbol "Nicotine":

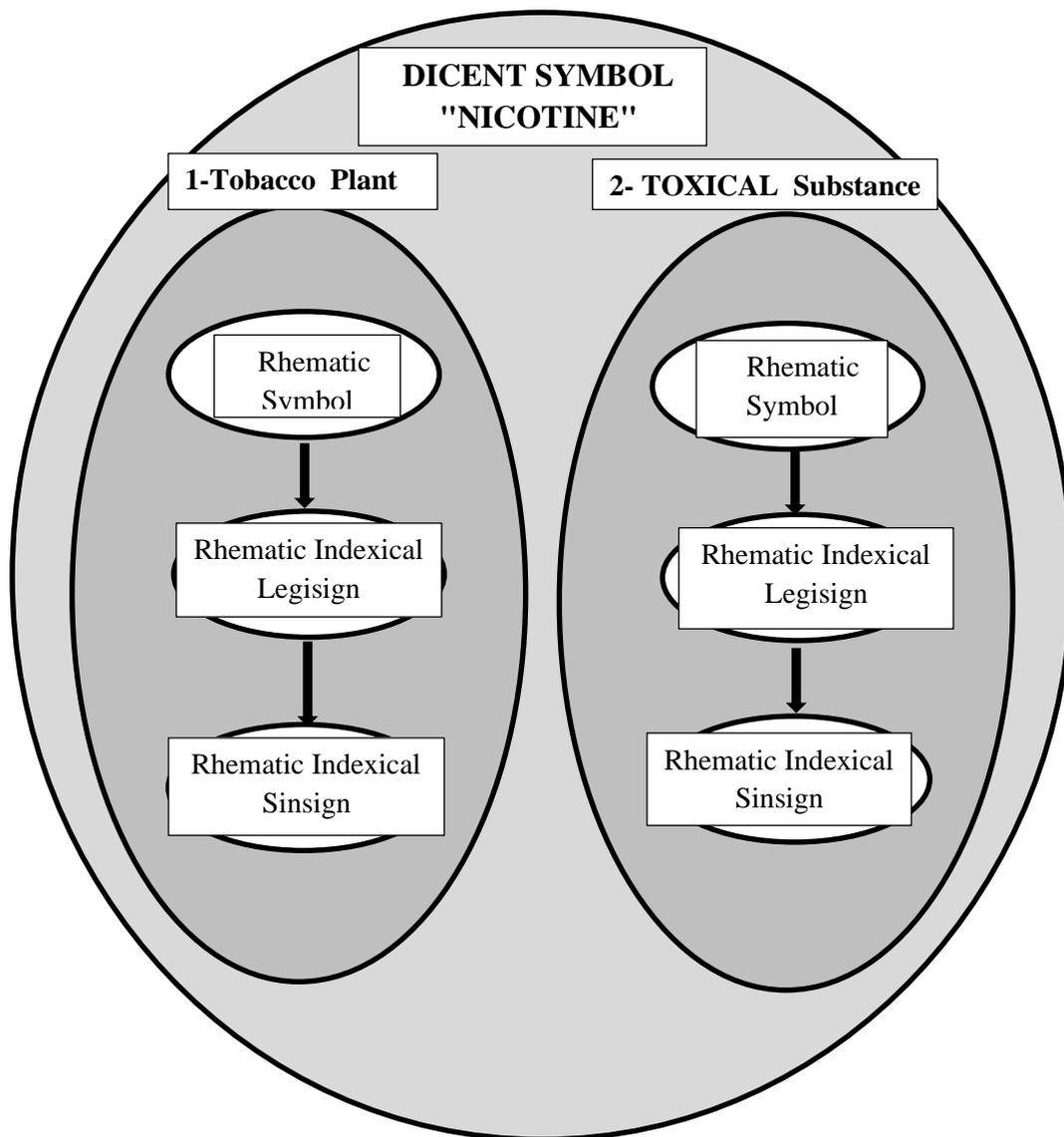


Figure 2: Diagram of the Nicotine as an active ingredient in a "Toxic Plant."

Very recently, however, the search for drugs to combat the COVID-19 virus has reintroduced the idea that Nicotine may provide benefits. Observations made by physicians on patient admissions to hospitals reveal an under-representation of smokers about their importance in the overall population. Statistical studies quickly verify this. The world press reports on this fact ([6], [7], [8], [9]). Public health agencies are even obliged to warn the public, as Nicotine patches intended to facilitate smoking cessation are misused without medical control. Smokers find some comfort in their addiction. It takes very little time for the Sign of law to take hold.

Moreover, the stakes are not the same. The conflict with the existing Dicent Symbol no longer concerns magical thinking but another scientific approach. This fact puts government institutions in an awkward position. Their communication, based on "Smoking kills," becomes contradictory with new scientific facts. Moreover, it is even pointed out (2010) that the tobacco plant, the other component of the Dicent Symbol, plays a significant role in virology and could even generate therapeutic substances:

"Tobacco, an experimental model, could succeed in its conversion from a serial killer and, thanks to transgenesis, become a culture adapted to the production of molecules with a pharmaceutical role and to treat patients. Tobacco also has benefited" [10].

A new diagram with two "Beneficial" co-exists with the "Toxical" diagram of figure 2 :

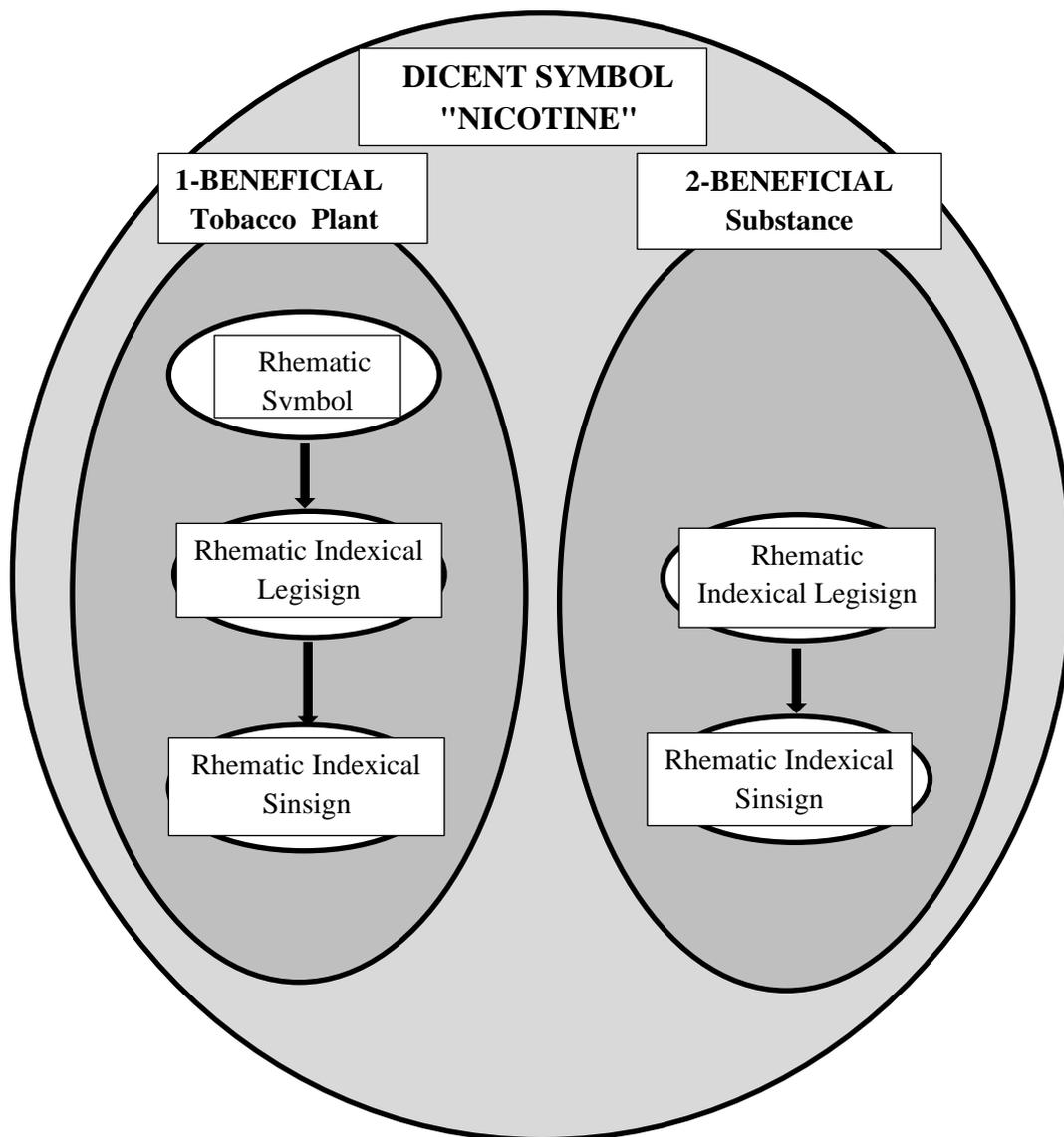


Figure 3: Diagram of the Nicotine as an active ingredient in an "anti-Covid Plant."

The existing diagram still has a certain "image semiotic advantage," visible on this diagram, pending the results of studies conducted worldwide that could put it on a par with its new competitor as Dicient Symbol.

Plant and Substance, Good and Evil, Life and Death ... Nicotine threatens to become a semiotic entity with two contradictory sides that will continue to make headlines.

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