

## Illness as Metaphor? The Role of Linguistic Categories in the History of Medicine

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“Illness as Metaphor” is the name of a trope that has become commonplace ever since the publication of Susan Sontag’s book with the same title. The book is dedicated to a twofold but paradoxical objective: the elucidation of and the liberation from metaphors of illness (4). On the one hand, Sontag’s analysis distances itself from metaphoricization. It expressly disallows the notion of illness as metaphor: “. . . the most truthful way of regarding illness—and the healthiest way of being ill—is one most purified of, most resistant to, metaphoric thinking” (3).

On the other hand, the book devotes itself in large part to the description of metaphors of illness. Modern metaphors of illness, especially those based on descriptions of tuberculosis and cancer, Sontag believes, suggest “a profound disequilibrium between individual and society, with society conceived as the individual’s adversary” (73). Metaphors of illness are given such extensive scope and weight in Sontag’s work on the subject that any notion of an “appropriate” diagnosis and treatment is moved out of sight, her conclusion notwithstanding. Consequently, Sontag’s vision of a demystification of illness remains distant, if not vacuous.

In the following, I attempt to resolve the paradoxes arising from this apparent contradiction. In order to assess the ambiguous suppositions involved—the ubiquitousness of metaphoric constructions of illness on the one hand, and the liberation from metaphors on the other hand—the structures of metaphor would have to be identified and differentiated. These in turn would have to be analyzed within the framework of an archaeology of knowledge. Thirdly, and this is probably the most intriguing question, one would have to inves-

tigate how certain metaphoric constructions can arise from superseded knowledge formations and resurface in peculiarly modern functions. Finally, we would have to address the question thrown up by Sontag's account of illness-as-metaphor: namely how the role of metaphor can be conceptualized, both in its mythical functions and in its occurrence in scientific statements.

Only a historically and structurally differentiated account of metaphor would, I would argue, allow us to explain how metaphorical language can function both in a "pre-scientific" and in a scientific context, as well as in the context of pre-critical or uncritical modern mythologies—namely in those instances where sciences or cosmologies have not been able to formulate precise causal connections. It is particularly in these contexts that metaphor offers unique linguistic possibilities for causal explanations, whose different structures would have to be determined more specifically.

The different possibilities offered by metaphoric constructions have been the subject of philosophical debate since the 1960s, especially in Anglo-American philosophy. Analytical philosophy usurped the task of semiotics and rhetoric in developing the theory of metaphor and analogy. Classical and medieval systems of logic, while providing analyses of types of analogy, have not attempted a justification of the validity of analogical arguments (Hesse 63). More specifically, the type of semiotics that informs Susan Sontag's treatise on *Illness as Metaphor* cannot fully account for the complex requirements and functions of metaphor. This, however, is not a new insight. As early as 1756, the German philosopher Ernst Anton Nicolai (1722-1802) lashed out polemically at a comparable type of medical semiotics, which had solidified into an institutionalized academic discipline. Nicolai acknowledges that medical semiotics devoted itself to the study of the "facts and processes of the human body" but criticizes the semioticians' incapability of explaining or causally analyzing those facts and processes. A causal explanation, according to Nicolai, would fall into the domain of philosophical knowledge. In his critique, which seems equally relevant today and which could be made to pertain to Susan Sontag's description of *Illness as Metaphor*, Nicolai calls for philosophical inquiry as a condition for the discovery of causality essential for medical diagnosis:

Philosophical inquiry enables one to apply historical insights in select cases, and indicates the conditions under which this

or that comes into effect. Any particular process, changes in the human body, for instance, any accidental occurrence, can indicate something good or bad, depending on circumstances. But this is an insight that is lost on the semioticians; they do not bother to consider or understand this type of knowledge. They take recourse to mere words and attribute something bad or dangerous or good to this or that thing or process. But this remains nondescript and cannot yield useful information for any given case. . . . Is it not more advisable to refrain from saying anything than to say something like that? Oh ye semioticians, if only you would bother to learn the rules of logic! Why not summon logic to expel the hazy darkness which pervades the entire realm of semiotics, so as to bypass the labyrinths of error and to formulate your *sentences* with the requisite degree of precision! And *do not hide behind the words* in which you seek refuge, and *do not apply screws to your words*. (qtd. in Eckart 4; my translation and emphasis)

This remarkably early critique of a one-dimensional concept of the linguistic sign already indicates a dualistic definition and function of the sign which is to become pathbreaking for both linguistics and medicine: that is, the lexical-semiotic and the syntactic-semantic determination of the sign. As early as 1756, Nicolai formulates a concept of the sign which is comparable to both that of the Stoa and that of modern linguistics:

That through which we can recognize the existence or the reality of something is what we call sign, *signum*, and that whose existence or reality we recognize through the sign is what we call the signified, the signified thing, *signatum* . . . and the link between the signified thing with the sign is what we call meaning. (qtd. in Eckart 5; my translation)

This is what defines the signifiatory model of eighteenth-century semiotic medicine: all signs, being of equal value, interact within a system. Within this model, no distinction is being drawn between sign and symptom: every manifestation of disease could, without essential modification, take on the value of a sign, provided that an informed medical reading could place it within the chronological totality of the illness. Every symptom is a potential sign, and the sign is simply a read symptom (Foucault 159).

Nicolai challenges this view of illness. The illness itself, he maintains, is not a signifying entity; it remains hidden to the senses. Contemporaries of Nicolai discovered the play of accidental randomness beneath the classification of characteristic signs of illness. Due to the role of accidental randomness, not every phenomenon of illness has a known semiotic meaning; not every co-incidence can be accessed as a sign (qtd. in Hess 60). The symptom can remain silent, its signifying function can be effaced, the sign is no longer the speaking symptom. Foucault quotes Condillac in stating that “ ‘every symptom is a sign’ by right, ‘but not every sign is a symptom’ in the sense that the totality of symptoms will never be able to exhaust the reality of the sign” (93).

The evidence and certainty of symptoms as indicators of illness becomes shaky. Diagnosis is determined probabilistically through the observation of a random configuration of signs in a converging series: coughing, chronic fever, expectoration, and hemoptysis make phthisis more and more probable. It becomes a matter of reading a particular pathological state in the course of its evolution, and of foreseeing its most probable development (Foucault 160-61). The nature of co-incidence is being determined more precisely, and is being brought into a causal relation with the illness in question (qtd. in Hess 55). The attempt of a causal determination of co-incidence becomes the foundation of a theoretically elaborated symptomatology; from a phenomenon of illness, its hidden cause is being inferred (qtd. in Hess 56). These developments deepen the legitimation crisis of a semiotic medicine. While semiotic medicine abstracts characteristic symptoms from a multiplicity of individual signs, diagnostic medicine relates the symptom as effect to a cause (Eckart 4). Hence it is no longer signs that form the basis of diagnosis and assessment of illness; the coterie of diagnoses shift to the role of temporally organized converging series (Hess 87). The notion of co-incidence introduces a temporal, historical, and causal dimension into the previously one-dimensional sign system. The new organizing principles are highlighted in Zimmermann's treatise *Über die Erfahrung in der Arzneykunst* of 1764. The illness in question, according to Zimmermann, is a construct which establishes temporal relations between various symptoms. The diagnosis can be stated only through knowledge of the historicity of co-incidences, not on the basis of the determination of essential characteristics of the illness (qtd. in Hess 85).

The theoretical approaches heralding this shift can be seen to anticipate or respond to the “crisis of medicine,” which is aptly summarized by one of Kant’s students, Johann Benjamin Erhard, in his publication entitled *Ueber die Medicin* (1795):

Medicine is commonly viewed as the art of genius, which does not understand its own subject-matter . . . which does not know how to conceptualize its proper object, and which remains uncertain about the effects of its own instruments. Medicine wants to assume the same place among the arts as among the sciences, namely that of a discipline which can defend its rightful place neither in terms of reason nor in terms of observation. (qtd. in Hess 128; my translation)

This criticism pertains not only to medicine, though; it points to the dilemma of the foundation of the life sciences *qua* sciences, which can no longer appeal to physical and mechanical laws in explaining the phenomena of life. This discontinuity comes to the fore in Kant’s philosophy of nature. Kant introduces the concept of the purposiveness of nature to provide a new type of explanation of cause-and-effect relations pertaining to phenomena of nature as a foundation for the emerging sciences of life.

The philosophical foundation of the sciences of life, with its method of showing causally conditioned functional relations, opened the way for new diagnostic, prognostic, and therapeutic possibilities and clinical methods in medicine. Physiologists of the nineteenth century turned against their natural historian predecessors with accusations of ontologizing illness and disease (i.e., of elevating disease to the status of an organism within an organism and, correspondingly, of viewing disease as proceeding according to its own laws), of confusing the cause or the *contagium* with the disease itself, and of engaging in unscientific classification of “species” of disease *more botanico* (Hess 258).

Thus the 1830s and 1840s mark a turning point in academic medicine. The term ‘semiotics’ is being eradicated from medical textbooks, and the concept of ‘diagnostics’ makes its entry (Eckart 11). In those isolated cases where a semiotic notion of the sign survives, it appears in the context of a static description or naming of states of illness or individual constitution, devoid of any reference to or proof of causal connections. Henceforth semiotics finds its place in eclectic practices which reject theorization. Incapable

of diagnosis, medical semiotics finds itself reduced to phenomenology (Hess 252).

This supersession of semiotic by diagnostic medicine does not, however, spell the end of the significance and modelling function of linguistics for medicine. In a move parallel to the paradigm shift in medical diagnosis, a purely semiotic concept of the sign becomes untenable in linguistics. The introduction of the temporal factor, which facilitates the conceptualization of causal relations, becomes the acid test not only for medicine, but likewise for linguistics and narratology. The mutual imbrication of temporal sequence and logical consequence, which the scholastics captured in the formula *post hoc, ergo propter hoc* (whereby what is temporally *post-* appears as the effect of a logically preceding cause), finds its systematic application here (Barthes 248). However, this mutual imbrication can be accounted for only at the cost of a dualism which makes its effects felt both in the history of medicine and in the history of linguistics: namely the dualism between synchrony and diachrony, which becomes definitive of both modern linguistics and diagnostic medicine. For the case of anatomico-clinical medicine, Foucault remarks:

The clinician's gaze was directed upon a succession and upon an area of pathological events; it had to be both synchronic and diachronic, but in any case it was placed under temporal obedience; it *analysed a series*. (162-63)

On the introduction of the temporal dimension into linguistics, Ferdinand de Saussure notes: ". . . if we considered the community of speakers without considering time, we would not see the effect of the social forces that influence language" (78).

The introduction of the temporal dimension, according to de Saussure, has the following effect:

Language is no longer free, for time will allow the social forces at work on it to carry out their effects. This brings us back to the principle of continuity, which cancels freedom. But continuity necessarily implies change, varying degrees of shifts between the signified and the signifier. (78)

The mastery of time as duration in medicine similarly changes the configuration of relations involved in signification. The sign in

medicine is no longer viewed exclusively as a semiotic sign with an unmotivated relationship between signifier and signified, but in terms of a syntactic combinatory. The sentence forms an order which is not reducible to individual words or the sum of individual words (see Barthes 239). The sense of a word cannot be considered in isolation from its integral position within a specific syntagm, and from its capacity to fulfill a specific syntactic function. The mastery of time becomes possible only through syntax, not only through verb tenses, temporal adjectives, adverbs, prepositions and conjunctions, and temporal, causal, and final clauses, but also through the logical-chronological (con)sequence of statements, which constitute predication. This would explain why, in Foucault's account of the emergence of the clinical method, the essence of the signified—the heart of the disease—would be entirely exhausted in the intelligible "*syntax of the signifier*" (91; my emphasis).

The division between synchrony and diachrony characteristic of the modern critical human sciences and of the modern sciences of life effects a breakup of the monistic concept of the sign. In relation to metaphor, this would entail that an exclusive focus on the word does not offer an appropriate framework for the analysis of metaphor, for the operation of metaphor is not confined to the model of the word. To generate a metaphor, we minimally need a sentence-framing predication. This interaction of metaphor modeled on the plane of the word and metaphor modeled on the plane of predication can be thought of as two vectors which cross each other's paths in the word as site of the metaphoric effect combining the semiotics of lexical elements and the semantics of the sentence. Metaphor is situated at the interface between the plane of words and the plane of sentences. It arises from an interchange between denomination and predication (Ricoeur 172). This interaction produces a tension between semantic pertinence and semantic impertinence. A living metaphor, in bringing together two different, hitherto distant fields, violates semantic pertinence in its predication, which pertains to two different fields. But it is precisely its semantic impertinence that allows it to arrive at a new description; it dissolves one order in order to find another one (Ricoeur 22).

These properties of metaphor have led Max Black, Mary Hesse, Richard Boyd, and other theoreticians dealing with the logic and structure of scientific discovery and revolution to equate the role of metaphor in poetic language with that of the model in science: the scientific model is treated as a more general kind of metaphor

(Black 236). Like metaphor, the scientific model serves minimally as a heuristic instrument, but more likely as one that explodes traditional interpretations and paves the way for new, more adequate interpretations. The model in science is considered an instrument of finding a new description or theory, and this is what locates it properly in the domain of the logic of scientific discovery. Viewed in this role, it is again the semantic operations of metaphor that are being emphasized:

the employment of metaphor serves as a *nondefinitional mode of reference fixing* which is especially well suited to the introduction of terms referring to . . . *complex relational properties, rather than to features of internal constitution.* (Boyd 358; my emphasis)

Metaphors fulfilling this function, termed “theory-constitutive metaphors” by Boyd, are non-semiotic and therefore do not allow for exegesis. Any attempt to decode them is misplaced. Instead, they lead readers to discover a terminology for theory-constitution (360-61).

Considering the paradigm shift dividing semiotic from diagnostic medicine, and the paradigm shift breaking up a monistic semiotic concept of the sign, Susan Sontag’s description of illness in terms of a semiotic understanding of metaphor seems puzzling. The most common description of metaphors of illness as expression of a disturbed social order is based on a homologous correlation between signifier and signified, and in an extended sense between denotation and connotation. The description of the function and *modus operandi* of modern myths merges with the description of the object of myth-making. This procedure presupposes what it sets out to explain, thereby creating a *circulus vitiosus*, based on the notion of metaphor as the transposition of meaning confined to the word. Where the word is chosen as basic unit of a tropology, the transposition characteristic of metaphor is limited to substitution. Metaphor utilized for purposes of substitution produces zero information value. Where the tension between the literal and the metaphorical is missing at the outset, substitutive metaphors contribute to mythologization, rather than critically unpacking it. In the process, substitutive metaphors reveal themselves as dead metaphors, which cancel themselves out as metaphors, as they are taken up by everyday language.

Considered under these aspects, common descriptions of metaphors of illness, as they find mention in Susan Sontag's work and in cultural histories of illness and disease generally, do not escape the suspicion of mythologization. Not venturing a philosophically founded critique, they immerse themselves in the logic of their object. They are satisfied with stating pseudo-etiologicals, which attempt to refer (constructs of) illness to general individual or societal conditions without attempting to explain illness by specific causation or within particular paradigms. In this way, the descriptions of illness-as-metaphor establish precisely the generalized connections which the recourse to metaphor invokes, and which they are supposed to specify and explain but end up reproducing instead. These descriptions cannot formulate a critique, never mind develop or describe new theory-constitutive metaphors.

On closer inspection, pre-critical and theory-constitutive metaphors have one thing in common, though. As Max Black states, "we need metaphors in just those cases where there can be no question as yet of the precision of scientific statements" (37). Paul Feyerabend, likewise, makes a case for the legitimacy of taking recourse to "religion, mythology, . . . the ideas of incompetents or the ramblings of madmen" (47, 68) for purposes of either counterinduction or falsification indispensable for establishing the validity of a theory, or for purposes of clarifying meaning-terms or observation-predicates in statements that are only incompletely understood. However, learning to argue with unexplained terms and to use sentences for which no clear rules of usage are as yet available calls forth the problem of incommensurability in turn. The incommensurability problem is compounded if an attempt is made to explain the unexplained meaning-terms or observation-predicates by invoking myth and metaphor, as the latter stand in a relation of incommensurability to scientific statements; although there might be similarities in structure or content-classes, the universal principles of the one framework are suspended by the other (Feyerabend 271). This leads the Campbellian (in Mary Hesse's construed dialogue about "The Function of Models") to stipulate that if the observation-predicates in the theory are uninterpreted, the interpretation given by the model (or metaphor) must conform to the terms of the theory: the whole theory must have a model interpretation, which also provides an interpretation of the theoretical predicates through the correlation of (interpreted) observation-predicates with the theoretical predicates. (Otherwise one could not explain how

the observation-predicates get into the theory, to enable it to make predictions [Hesse 45].)

The circularity which results from the tenet that models/metaphors have an explanatory or heuristic or filling-the-gap role in cases of incommensurability between or within theoretical statements and are yet subject to an incommensurability in relation to scientific theory, is evident in both Feyerabend's and Hesse's accounts of the role of models and metaphors in science. The resulting dilemma can be characterized in other words as follows: if incompletely understood meaning-terms are clarified by recourse to existing notions from a different domain, treating the new as a special case of things already understood (as is the case with substitutive metaphors), then the possibility of conceptual discovery is considerably reduced (Feyerabend 256). This dilemma, arising from the circularity in the interarticulation of incommensurability and the role of models/metaphors, leads both the Duhemist and the Campbellian in Mary Hesse's construed dialogue to address the type of analogy/model/metaphor in terms of which one can draw one-to-one correspondences between models and observation-predicates before one has elaborated the theory, by positing some kind of prescientific recognition of analogies (Hesse 47-48).

This dilemma provides good reason to unravel Susan Sontag's reflections on illness-as-metaphor once more instead of relegating them to the sphere of ideological mythmaking (albeit at a meta-level). It turns out that the metaphors of illness described by Sontag arise largely as a result of precarious causal relations due to the fact that the etiology of the diseases concerned was not understood. This is acknowledged by Sontag for the case of tuberculosis in the last century, and for cancer and HIV today (5, 86-88). Sontag distinguishes between traditional and modern metaphors of illness, which correspond to a distinction between more and less dead metaphors:

Illnesses have always been used as metaphors to enliven charges that a society was corrupt or unjust. Traditional disease metaphors are principally a way of being vehement; they are, compared with the modern metaphors, relatively contentless. . . . Disease imagery is used to express concern for social order, and health is something everyone is presumed to know about. Such metaphors do not project the modern idea of a specific master illness, in which what is at issue is health itself. (72)

Traditional metaphors of illness, according to Sontag, generally arise in cases where there was no possibility as yet of specific diagnosis and treatment. Research into the historical spread of epidemics could only be undertaken once medicine had attained clarity about the specific causes and effects and modes of transmission of individual epidemics. This in turn presupposed that notions of epidemics and contagia were separated from their natural history context; recourse to the orders of botany and zoology had to be given up in favor of the recognition of the significance of temporal, historical, and causal relations (Bleker 196, 200, 203).

By way of adducing examples of modern metaphors of illness, Sontag mentions cancer, tuberculosis, and HIV. What all of these have in common is the fact that their etiologies have either not been fully established in modern biomedicine or have remained contested over a long period of time. These disease constructs show in an exemplary way that a theory linking causes and effects has remained the weakest spot of pathology over the last 150 years. This is evident especially in the case of tuberculosis. Koch's postulates of specific causation of infectious diseases require a combination of necessary and sufficient causes for the diseases concerned. Weakly sufficient causes dominated the explanations until the middle of the nineteenth century: diseases were vaguely related to miasmata, humors, vapors, etc. Koch and Pasteur, however, did not content themselves with these explanations. To provide a scientific basis for therapeutic interventions, criteria of necessary causation were required: the occurrence of a disease was to be led back to the presence of a specific causative agent, and the absence of the causative agent was to correspond to the absence of disease (Robert Koch's second paper on "The Etiology of Anthrax," 1881). Through establishing criteria of necessary causation, Koch attempted to formulate a stronger notion of sufficient causation, which at the same time prefigured the methods of diagnosis. After several theoretical and experimental attempts, Koch presented the requirements of sufficient causation: the micro-organism had to be isolated from the diseased body, cultivated in the laboratory, and another organism inoculated with it, which then had to present the same symptoms (Robert Koch on "The Etiology of Tuberculosis," 1884). It is this criterion that turned into the Achilles heel of all theories of specific disease causation. For it turned out that an organism may have tubercle bacilli without necessarily developing the symptoms of tuberculosis; and that which Koch termed tuberculosis included

other diseases which, as far as Koch could make out, arose from the same causative agent. In the case of other infectious diseases, Koch could not find micro-organisms as causative agents (Robert Koch on "New Investigations on the Role of Micro-Organisms in Infectious Diseases," 1877). Similar results were found in relation to the cholera bacterium (as in Pettenkofer's famous self-experiment), as well as in relation to diphtheria. Early bacteriologists came to rely for diagnosis largely on the criterion of necessary causation.

In the face of the problems surrounding diagnostic causality in bacteriology, Koch and other bacteriologists were inclined to have recourse to metaphors. In the name of specific disease causation, bacteria were imbued with an essential identity. Thus, Koch celebrates his discovery of the tubercle bacillus in 1882 in the following terms:

in the battle against this terrible plague affecting humankind, we will in future no longer be dealing with an *indefinite something*, but with a *tangible parasite* . . . (I 1: 444; my translation)

In 1890, Koch proclaimed that a cure for tuberculosis was in sight. In his lecture on this occasion, Koch spoke of bacteria in terms of "the smallest but most dangerous enemies of the human race," which had to be combated (I: 660; my translation). Koch's speeches abound with a combination of military and organicist metaphors:

Even during times of peace the military diseases are stalking the army and gnawing at its marrow. But when the torch of war is ablaze, they come crawling out of their hideouts, raise their heads to gigantic heights, and destroy everything in their way. (II 1: 298; my translation)

Specific diseases were being identified with the bacteria linked to them; and bacteria, in turn, were personified as "the enemy." The dialogue between medical theory and the respective contemporary political jargon is one of the factors accounting for the rapid success and growing popularity of the new science of bacteriology (Gradmann 44). Gradmann summarizes his observations on the notions of illness promulgated in the process of the popularization of bacteriology as follows:

1. No distinction is made between disease and its causative agent.

2. There is no notion of an independent process of the disease . . . . Instead, infection and therapy are foregrounded, mostly in the terms of . . . an attack (of bacteria), followed by a counter-attack (by medical practitioners). Causative agents of disease are personified and elevated to subjects endowed with agency. "Disease" appears as a confrontation between bacteria and doctors.
3. The patient is effaced along with the process of disease, or (s)he is identified with the disease itself. In the absence of the patient, the disease is viewed as a duel between doctors and bacteria. (Gradmann 43)

The metaphoricization identified here largely involves dead metaphors or substitutive metaphors which can fulfill only a limited heuristic function, if any. What is evident in this type of metaphoricization is the convergence of the attempted establishment of causal relations needed for the foundation of bacteriology as science, and its justification and popularization. The substitutive metaphors employed here have a persuasive rather than a predicative function. This becomes clear if we take a closer look at the dyadic relations—the pairs of corresponding terms—within analogies, which the metaphors gamble on. On a horizontal level we find correspondences in terms of similarity, identity, and difference. On a vertical axis, we find causal relations. The substitutive metaphors abounding in the history of early bacteriology largely establish analogies between four terms already known, e.g.:

<u>bacteria</u>	:	<u>invasion/war</u>
sick person	:	nation

The vertical relations in this case are not specifically causal. There also does not seem to be any horizontal relation of similarity between the terms, except by virtue of the fact that the two pairs are related by the same vertical relation. Thus, there is no horizontal relation independent of the vertical relation. In contrast to predicative analogies, the analogies/metaphors mentioned here serve to bolster an argument which implicitly passes from asserting relations which are already recognized to persuading the listener/viewer/reader that other relations follow from these (Hesse 69-70).

The metaphorically construed (pseudo-)causality was bolstered by recourse—condemned as retrogressive by the contemporary crit-

ics of bacteriology—to a refunctionalized semiotics of medicine based on a monistic concept of the sign. By a reversion to an Aristotelian tradition, disease causation (*causa morbi*) was conflated with the “essence” (*ens morbi*) of the disease. Bacteriological etiologies could only be formulated at the cost of returning to the ontologization of illness, as was common in pre-critical natural history.

The newly found possibilities and alleged dangers of bacteriology were the subject of heated debate at the time. For Rudolf Virchow, what was at stake was nothing less than “freedom of science in modern societies” (the title of his speech presented to the Congress of the Association of German Physicians and Scientists in Munich in 1879). Virchow contrasts the “freedom of scientific teaching” with a certain “speculative expansion,” which “prematurely formulates a series of theses which have as yet to be proved . . . but which are being adduced probabilistically in order to fill certain gaps in our knowledge.” Virchow adds by way of a cautionary note:

We must not forget that there is a distinction to be drawn between the speculative and the fully established fields of natural sciences. People ask of us scientists not only to designate this distinction with the greatest possible clarity but to fix it to such an extent that the individual scientist can ascertain with ever greater clarity where the distinction lies and to what extent he can be asked to acknowledge that what is taught is the truth. (Virchow 186; my translation)

Virchow made it clear that he was highly sceptical about the refunctionalization of the doctrine of the *contagium animatum* by bacteriologists of the late nineteenth century. This contentious issue reached its climax in the debates between Virchow and Edwin Klebs. The *contagium animatum*-doctrine—i.e., the notion that infectious diseases are transmitted through living organisms and that these constitute the essence of the disease—can, according to Virchow, be traced back to the sixteenth century:

Nonetheless people battled for a long time to find the living causes of illness. The sixteenth century did not find them, nor did the seventeenth and eighteenth. It was only in the nineteenth century that people started actually finding out bit by bit

about *contagia animata*. But . . . the evidence has not been completely established by a long shot. . . . It turned out that a doctrine dating as far back as the sixteenth century, and occupying the imagination of men time and again ever since, gradually found more and more positive proof for its correctness from the second decade of the (nineteenth) century onwards. One could on those grounds be tempted to conclude that one is obliged to think along the lines of the inductive expansion of our knowledge to the effect that all *contagia* and *miasmata* are living organisms.

Virchow, however, opposes this conclusion by urging caution:

We must not forget that the history of our sciences offers a great number of facts which teach us that appearances of striking similarity can act in very different ways and achieve very different effects. (Virchow 194-95; my translation)

What Virchow voices here is his suspicion that the monocausal explanations of bacteriology are untenable. Without wanting to question bacteriology's discovery of specific disease causation, the physiologists mooted their assumption that the infected organism itself might have a role to play in process of the disease. The principles of conditionalism arising from this assumption were formulated by Max Verworn (*Causal and Conditional World View*, 1912) and David von Hansemann. Quite independently, a concept of multifactorial causation came to be accepted as a principle of immunology. At the same time, the notion of the specific effectivity of antibodies was retained. In his textbook on *The Methods of Immunodiagnosics and Immunotherapy* (1910), Julius Citron elaborates on these principles:

We know now that the progress of an infectious disease depends not only on the type, the quantity, and the virulence of the disease germ, but also on the behaviour of the organism. *The disease must be seen from the viewpoint of the reciprocal effect arising from these two groups of factors, although it is impossible to determine in detail the specific effect of the causative agent and its products, and that of the reactive power of the organism.* (qtd. in Fleck 55)

This new version of the concept of causality shows a closer correspondence to the Kantian notion of "purposiveness of nature" (Kant 313-93) than to the monocausal explanations of the early bacteriology at the end of the nineteenth century; for Kant's rejection of purely mechanistic models of causation applied to natural phenomena emanated precisely from the insight that the organic is not subject to a linear, homologous cause-effect relationship.

On the basis of these considerations, we could chart a path towards the transcendence of the dead metaphors and their semiotic descriptions. Ludwik Fleck, in his study on *Genesis and Development of a Scientific Fact* (1935), is concerned, among other things, with doing precisely that. The military metaphors of early bacteriology, which attempted to explain infectious diseases by invoking the notion of an "attack" by a bacterial "enemy" against the closed unit of the organism and the resulting battle against and triumph over the bacteria, are contrasted by an alternative metaphor which can better illustrate the multifactorial processes involved in disease causation. Fleck explains why the metaphor of a military attack by external organisms is inappropriate:

Most infectious diseases belong to [the class of pure changes within the constellation of reciprocally acting parts of the unit]. It is very doubtful whether an invasion in the old sense is possible, involving as it does an interference by completely foreign organisms in natural conditions. A completely foreign organism could find no receptors capable of reaction and thus could not generate a biological process. It is therefore better to speak of a complicated revolution within the complex life unit than of an invasion of it. (61)

Neither are war metaphors and the substantialization of the causative agent as enemy, tenable in the context of chemical terms and their conceptual transformation. In this case, likewise, Fleck attempts to formulate a new terminology:

Toxins, amboceptors, and complements were treated as chemical entities, with such adversaries as anti-toxins and anticomplements. This primitive scheme based upon activating and inhibitory substances is being progressively discarded in accordance with current physico-chemical and colloidal theories in other fields. We now speak of states of structures rather

than substances, to express the possibility that a complex chemico-physico-morphological state is responsible for the changed mode of reaction, instead of chemically defined substances or their mixtures being the cause. (63)

The history of bacteriology offers numerous examples of reversions to substitutive metaphors as well as their revision. The initial search for *syphilitic substances* in the blood of supposed syphilitics contributed to the mistaken assumption of the specificity of the Wassermann reaction. The frequency of the (false) positive reactions was invoked in declaring syphilis a national pandemic—a “national enemy” which had to be combated. The chemotherapeutic discoveries at the beginning of the twentieth century were similarly substantialized and metaphoricized. Salvarsan was labeled either “magic bullet” or “devil’s stuff.” The former label was applied in the hope of killing the specific causative agents of syphilis with a single injection without impairing other bodily functions. The latter label was invoked in the scandalizing of the new chemotherapy which became a media event, especially with reports about the allegedly lethal side effects of Salvarsan. These particular metaphors belie the fact that the successes of Paul Ehrlich and his collaborators were based on the systematic utilization of the affinities of chemical dyes for the production of synthetic antigens. Ehrlich himself, in taking up and simultaneously countering the then common metaphor of syphilis as “Amor’s poisoned arrow,” consequently coined an alternative metaphor (or, in this case, a simile incorporated into an analogy), namely that of a poisoned arrow:

The more complex structures of chemical therapies may be likened to a poisoned arrow. The amboceptor is equivalent to the tip of the arrow, the antigen to the poison, and the complement to the arrow shaft. . . . Now certain primitive peoples paint their arrows . . . with several different poisons, in order to attain their end; there is the analogous possibility of applying two or three different poisons to the chemotherapeutic arrows. (qtd. in Cushing n.p.; my translation)

Both Fleck’s and Ehrlich’s reformulations of common metaphors show a reorientation from a lexically based to a semantically based construction of metaphor, which not only places the word as sign in a lexical code but effects an extended predication. Analogies of

the type adduced by Ehrlich infer certain properties as effects of a causal relation based on the prior and independent construction of horizontal relations of similarity. The resulting extended predication, which can be predictive in a scientific context, thereby approximates Ricoeur's criteria for a "living metaphor," which is conducive to a higher level of conceptualization (303).

Susan Sontag's vision of a liberation from metaphoricization of illness, which does not as yet inflect her method of description of metaphor, would have to be redirected in the search for living metaphors which could facilitate new connections, instead of assuming a substitutive relationship to some antecedently established monocausal correlation (Black 37). The search for living metaphors, or for their description and (historical) explanation, poses a challenge to semiotic readings of illness-as-metaphor. The latter approach can come dangerously close to reproducing dead metaphors. The history of bacteriology provides numerous examples of such an intertextuality of dead metaphors. A particularly striking example is featured in Gradmann's account of the popularization of bacteriology: "The popularization of a science which viewed bacteria as enemies was followed by an ideology which portrayed its enemies as bacteria in turn . . ." (51). This is all the more reason to approach the explanation of these metaphorical transpositions not only by way of a cultural-historical description but by way of a theoretical-critical intervention.

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