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Form and Technology[1]

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I

If we judge the significance of the individual areas of human culture primarily by their actual effectiveness, if we determine the value of these areas according to the impact of their direct accomplishments, there can hardly be any doubt that technology claims the first place in the construction of our contemporary culture. Likewise, no matter whether we reproach or praise, exalt or damn this 'primacy of technology', its pure actuality seems to be beyond question. All the formative energy in contemporary culture is increasingly concentrated on this one point. Even the strongest counter-forces to technology, even those intellectual forces that are the most distant from technology in their content and meaning, seem able to actualize themselves only insofar as they become conjoined with technology and, through this alliance, become imperceptibly subjected to it. Today many consider this subjugation the ultimate goal of modern culture and its inevitable fate. Yet even if we think it impossible to constrain or stop this course of things, a final question remains. It belongs to the essence and determination of mind[2] not to tolerate any external determination. Even where it entrusts itself to a foreign power and sees its progress determined by it, the mind must at least attempt to penetrate the core and meaning of this determination. Thereby mind reconciles itself with its fate and becomes free. Even if the mind is not able to repel and conquer the power to which it is subjected, it nevertheless demands to know this power and to see it for what it is. If this demand is made in earnest, it does not possess a purely 'ideal' significance and is not limited to the realm of 'pure thought'. From the clarity and certainty of seeing follows a new strength, a power or efficacy, a strength with which mind strikes back

against every external determination, against the mere fatality of matter and the effects of things. Insofar as mind considers the powers that seem to determine it externally, this consideration already contains a characteristic turning back and turning inward. Instead of grasping outwardly at the world of things, it now turns back onto itself. Instead of exploring the depths of effects, it returns to itself and, by means of this concentration, achieves a new strength and depth.

Admittedly, we are today still far away from fulfilling this ideal demand, particularly in the realm of technology. A gulf repeatedly emerges that separates thinking from doing and knowledge from action. If Hegel is correct when he states that the philosophy of an age is nothing more than that very age 'grasped in thought', and if this philosophy, understood as the concept of the world, only appears after reality has completed this process of formation and so 'finished itself',[3] then we would have to expect that the incomparable development which technology has undergone over the course of the last century corresponds to a change in the way we think. However, if we look at philosophy's present situation, this expectation has been only incompletely fulfilled. Admittedly, from approximately the middle of the nineteenth century onwards, problems which had their origins in the area of technology have increasingly made their way into abstract 'philosophical' examinations, thereby giving them a new goal and direction. Neither the philosophy of science nor value theory has escaped this influence. The theory of knowledge, the philosophy of culture and metaphysics all attest to technology's breadth and growing power. This relation presents itself most clearly in certain currents of the modern theory of knowledge, which attempt to transform the traditional relationship between 'theory' and 'praxis' into its opposite, defining theoretical 'truth' merely as a special case of 'utility'. Beyond these properly 'pragmatic' trains of thought, the growing influence of technological concepts and questions on philosophy as a whole is unmistakable. Even modern Lebensphilosophie is often subject to it, though Lebensphilosophie believes it takes the most vigorous stand against it. It too is not free from the chains it mocks. But all of these inevitable points of contact between the realms of technology and philosophy in no way prove that an inner communality is being initiated and built up between the two. Such a community can never result from a mere sum of external 'influences', however manifold and strong we may think them. That philosophy and technology have jointly entered into the systems of positivism and empiricism – we need only think of Mach's principle of economy as the basis of a theory of knowledge – should not be taken as a certification proclaiming a true

unification of the two. Such a unification would be reached only if philosophy succeeded fulfilling on this point the general function that it has increasingly fulfilled with ever-greater clarity for the other spheres of culture. Since the days of the Renaissance, philosophy has brought all the powers of modern thought before its forum, questioning them about their meaning and right, their origin and validity. This question of validity, of the quid juris as Kant calls it, is directed to all the formal principles of thought; in posing this question, the grounds of their specific characteristics first become uncovered, their own proper meaning and value discovered and assured. Philosophy has achieved such assurance, such 'critical' consciousness and justification, for mathematics, the theoretical knowledge of nature, the 'historical' world and the humanities. Although new problems constantly arise here, although the work of 'critique' shall never come to an end, the direction of this work has been set since the days of Kant and his founding of 'transcendental philosophy'. Technology, however, has not yet seriously been integrated within this circle of philosophical self-reflection. Technology still seems to retain a singularly peripheral character. Even though technology has expanded beyond the periphery, genuine knowledge of technology, insight into its 'essence', has not kept pace. A fundamental motive for the inner tension and antagonism found in the formative tendencies of our epoch lies precisely in this disparity: 'abstract' thought is unable to penetrate into the core of the technological world. A resolution of this tension can never be hoped for or sought by adjusting the extreme points of the tension or effecting a mere compromise between them. Rather, a possible unity requires acknowledging that this particular case involves more than a mere difference. It is a genuine polarity. This fact determines the task that philosophy has to fulfil with respect to the current development of technology. The task cannot be limited to assigning technology a predetermined 'place' in the whole of culture and, therefore, in systematic philosophy that aims to be the intellectual expression of culture. Technology cannot simply be placed next to the other areas and entities, such as 'economics' and 'the state', 'morality' and 'law', 'art' and 'religion'. In the realm of culture, separate areas never stand simply together or next to one another. Here, the community is never spatially static but possesses a dynamic character. One element is found 'with' the other only to the extent that both assert themselves in opposition to each other and thereby mutually confront and determine each other. Thus, every introduction of a new element not only widens the scope of the mental horizon in which this confrontation takes place, but it alters the very mode of seeing. This formative process does not only

expand outwardly – it itself undergoes an intensification and heightening, so that a simultaneous qualitative transformation occurs, a specific metamorphosis. It is not enough for modern philosophy simply to find a 'space' for technology in the edifice of its doctrine. A space that is created in this way will always remain an aggregate space and never become a truly systematic one. If philosophy wants to remain loyal to its mission, if it wants to maintain its privilege, so to speak, of representing the logical conscience of culture, it must also enquire into the 'conditions of the possibility' of technological efficacy and technological formation, just as it enquires into the 'conditions of the possibility' of theoretical knowledge, language and art. Here too, philosophy will be able to ask the question of being and the question of validity only when it has clarified the question of meaning. However, this clarification cannot succeed so long as one's observations are limited to the circle of technological works, to the region of the effected and created. The world of technology remains mute as long as philosophers look at it and investigate it from this single point of view. It begins to open up and to divulge its secret only if we return from the forma formata to the forma formans, from that which has become to the very principle of becoming.

Today the need to return to this principle is felt much more by those who work in technological fields and are engaged in its productive labour than by those who work in systematic philosophy. In technology the power of 'materialistic' ways of thinking and questioning has been given up. The search for the purpose and legitimacy of technology requires posing this question ever more clearly and ever more consciously in reference to the 'idea' it embodies. 'The origin of technology', as expressed in one of the newest works in the philosophy of technology, 'lies in the idea'.[4] To cite another author: 'We will look at technology as the organic partial appearance of a larger phenomenon, the development of culture itself. We will attempt to understand it as the embodied expression, as the historical fulfillment of a basic idea required for a system of cultural ideas where the tangible material of technological creations comes to be inwardly mastered – regardless of how varied the expression of the idea is in the battle of motives and tendencies among those engaged in these activities. The task is to recognize the *transpersonal as an ideal unity* or joint effect that determines human actions – not as a kind of blind law, but as something they freely take up, in order to … become historically effective.'[5] Whatever the answer, the question itself is thereby transferred to the level where all genuine mental decisions belong. The question also leads the problem back to its initial historical origin and is linked to it in a

remarkable and surprising way. Just as a modern thinker standing in the midst of the concrete technological forms of life comes to see the crux of the problem, so too the discoverer of the 'idea' and the 'world of ideas' conceived it over 2,000 years ago. When Plato develops the relationship between 'idea' and 'appearance' and seeks to justify it systematically, he does not seek to ground it in the shapes of nature but in the products and organization of *τέχνη*.[6] The art of the 'craftsman', the 'demiurge', provides him with one of the great motifs with which he represents the meaning of the idea. According to Plato, this art is no mere imitation of something that is already simply present. This art is possible only on the basis of a prototype and archetype to which the artist looks in his creative work. The artist who first invented the loom did not initially find it as something given in the sensible world; rather, he introduced it into the sensible world by looking towards its form and purpose, to its eidos and telos. Today, the constructor of the loom still looks to the form. For instance, if a loom is broken and a new one must be constructed, the broken loom is not used as a model and pattern; rather, what gives direction to the constructor's new work is his gaze upon the original form as exhibited in the mind of the first inventors. Thus, this general form, not an individual thing existing in the sensible world, constitutes the actual 'being' of the loom.[7] Is it a coincidence, then, that this basic tenet of Platonism is also increasingly asserting itself in contemporary reflections on the meaning of technology? Dessauer, for example, remarks that, 'from a higher sphere of reality and power, through the mind and hands of the technician and worker, an immense stream of experience and power descends into earthly existence. A spiritual stream pours into the chaotic material world, and everyone, from the creator to the final worker, takes part: all are recipients.' Similarly, Max Eyth argues that, '*Technology is everything which gives the human will an embodied form.* Here, human willing coincides with the human mind, which contains an unending number of life-externalizations and life-possibilities. Technology, despite being bound to the material world, also received something of the boundlessness of the pure life of mind.'[8] Such remarks clearly illustrate that modern attempts to make sense of the basis and essence of technology are no longer satisfied to view it merely as an 'applied natural science' which is somehow harnessed and captured in the concepts and categories of natural science. What is sought, rather, is technology's relation to cultural life in its totality and universality. This relation, however, is to be found only when we focus on the concept of form rather than the concept of being as understood in the natural sciences, and when we

reflect on the ground and origin of the concept of form, its content and meaning. The concept of form first opens the expanses of thought to us and determines the horizons of the mind for us.[9] If, instead of beginning from the existence of technological objects, we were to begin from technological efficacy and shift our gaze from the mere product to the mode and type of production and to the lawfulness revealed in it, then technology would lose the narrow, limited and fragmentary character that otherwise seems to adhere to it. Technology adapts itself – not directly in its end result but with a view to its task and problematic – into a comprehensive circle of enquiry within which its specific import and particular mental tendency can be determined.

In order to penetrate this circle and truly grasp its core, another fundamental and purely methodological reflection is needed. The particular character of the question of meaning that confronts us here repeatedly threatens to become obscure; its borders repeatedly threaten to become blurred because of other motives that not only join it but also gradually and imperceptible lead to its displacement. Such a displacement has already occurred if we believe that the question of meaning can be equated with the question of value – and that such a starting point can bring about a genuine solution to the question. In this identification of 'meaning' and 'value', a deferral of the problem has already taken place. Admittedly, this logical lacuna not only goes unnoticed inasmuch as it is found in connection to the problem being investigated here, it also pervades the whole expanse of the 'philosophy of culture' and spans the totality of its tasks. So often in the history of thought, the 'transcendental' question is posed about the 'possibility' of culture, its conditions and principles; but rarely has this question been held onto and explored with great acuity, especially concerning its pure essence. It constantly flits away in two different directions: the question concerning cultural achievement has been subordinated to the question concerning its content. While we might like to measure this achievement according to different mental dimensions, this would not rectify the mistake already committed in the first formulation of the problem, no matter how high or how low we might estimate it. This state of affairs already emerges with the first real 'critic' of modern culture, Rousseau. When Rousseau placed the intellectual culture of his time before the real questions of conscience and destiny, the framing of his question was dictated by external sources, the competition sponsored by the Academy of Dijon in 1750. The question was whether the rebirth of the Arts and Sciences had contributed to the ethical perfection of humanity ('*Si le rétablissement des sciences et des arts a contribué à épurer*

les mœurs').[10] In the mind of Rousseau, which was in accord with the basic orientation of Enlightenment ethics, this perfection was reached by fulfilling desire and enjoying a standard of 'happiness' won through humankind's transition from the state of 'nature' to that of culture. 'Happiness' and 'perfection' are the two dimensions within which he seeks the answer to his problem. They provide the standards by which his responses are to be adjudicated. It was not until German Idealism that a crucial turn was brought about; German Idealism was the first to pose the 'question of essence' with great acuity and clarity, disengaging it from the additional questions of happiness and moral 'perfection'. Thus, for instance, in the *Critique of Judgment* the realm of the beautiful could be philosophically justified through the autonomy – the self-legislation and self-signification – of the beautiful, which is discovered and guaranteed in opposition to the feelings of pleasure and displeasure as well as the norms and rules of the ethical 'ought'. If we turn to the realm of technology and to the ever-intensifying struggle that goes on within it in order to understand its specific meaning and content, we discover that the struggle remains for the most part at a preliminary stage, a stage the other areas of culture have long since passed through. We may bless technology or curse it, we may admire it as one of the greatest possessions of the age or lament its necessity and depravity – in judgements such as these, a measure is applied to it that does not originate from it. Consciously or unconsciously, purposes are ascribed to it that are foreign to technology's pure formative will and power. And yet an authentic judgement can come only from within technology itself, that is, only from insight into its own inherent, immanent law. The philosophy of technology, at least, is tied to this demand. Admittedly, philosophy also confronts the contents of culture not only by observing and testing them but also by judging them. It does not want to merely know them, but also to acknowledge and dismiss, judge and assess, decide upon and direct them. This philosophy can and must do. Its intellectual conscience, however, forbids it to make a judgement before it has penetrated into the essence of that which is being judged, grasping it on its own terms. This freedom of the philosophical gaze, however, can hardly ever be found in modern apologies for technology and in the attacks and accusations that are directed against it. Again we are tempted to employ the maxim that Spinoza formulated in his political philosophy for both the accused as well as the plaintiff: '*[N]on ridere, non lugere, neque detestari; sed intelligere*.'[11] The determination of 'being' and 'being-such-and-such', the consideration of what technology is, must precede the judgement of its value. Here arises a new dilemma: the

'being' of technology permits itself to be grasped and represented in no other way than in its activity. It appears only in its function. It consists neither in its external appearance nor in what it externalizes; rather, it consists in the manner and direction of the externalization itself, in the formative impulse and process, which this externalization is subject to. Thus, being can become visible only in becoming, work can become visible only in energy – and this particular difficulty clears the way and indicates the direction for further consideration. Exactly here at this point, the affinity and internal connections that exist between technology and the pure form and principle of other basic powers of culture become clear, no matter how different they may be with respect to their content. What Humboldt has said and proven for language is also valid for these other powers: the genuine conceptual determination, the only true 'definition' that can be given for these powers, is a genetic one. They can and must not be understood as a 'dead product' but as a way and basic direction of production. It is from within this intellectual perspective that we should enquire into the essence of technology. Goethe says that when a human being acts meaningfully, he always and simultaneously acts as a law-maker. It belongs to the essential task of philosophy to penetrate into this human law-giving, to gauge its unity and internal differences, its universality and differentiation. Only through such a comprehensive endeavour can we obtain a secure basis for a detailed judgement; only then can we hope to obtain a norm raised above all merely subjective expressions of praise and reprimand, favour and displeasure, seizing instead the genuinely objective 'form' of the perceived object in its nature and in its necessity.

II

Max Eyth, one of the most enthusiastic and eloquent pioneers of the cultural autonomy of technology, begins his lecture 'Poetry and Technology' from the known kinship between the function of technology and the function of language:

> Two things essentially distinguish animals from human beings, understood from the perspective of their external appearance: the word and the tool. The ability to create words and tools has ... made the human being out of the animal. How these abilities have come into the world will undoubtedly remain an eternal puzzle that no theory of evolution will be capable of solving, because they originate in a wellspring from which no animal … has ever drunk. Both abilities were imperative for the survival of the human being in a hostile

> world in which he, physically more helpless, weaker, and less resistant than most animals, would undoubtedly have quickly perished. What saved him … in the sphere of knowledge was language; in the sphere of ability, the tool … The power that turned the mere defenseless human being into the sovereign over every living thing on Earth rests on knowledge and ability, on the word and the tool ... In prehistoric times, far from the beginnings of culture, the tool undoubtedly played the primary role in the formation of human existence ... Later … a decisive alteration in the relationship between word and tool emerged. Language, just because it can speak, knew how to create for itself an outstanding, one could even say unwarranted, significance. For mankind, mute tools were increasingly relegated to the background. Knowledge was master and ability served. This relation continued to intensify and has continued to be accepted until now. Today we stand amid a fierce struggle that is endeavoring, if not to alter, then to return the relation of the two to its proper foundation. In its growing domination, language … exalted its unwarranted claim to be the only 'tool of the mind'. … In general, language believes this still today. Concerning the 'tool of the mind', language forgets the mental aspect of the physical tool. Both word and tool are a product of the same fundamental mental force that has made the animal 'homo' into the human being, 'homo sapiens', as it is called by the scholars who, of course, allude only to the human being's knowledge and forget the skill that has rendered all his knowledge possible.[12]

I have singled out these sentences by a technician and a thinker of technology because a real philosophical problem is hidden in the parallel asserted here between language and tools. It is not merely wit, or an external analogy, that brings together language and tools and attempts to understand them by one principle. The idea of such an essential relation was not foreign to the first 'philosophers of language' within the sphere of our European thought. They did not believe that words and language were primarily means of representation, means for the description of external reality. Rather, they saw in language a means for the making of reality. For them, language became a weapon and tool human beings employed in order to compete in the struggle with nature and with their peers in social and political conflict.[13] 'Logos' itself, as the expression of the particular mental nature of the human being, appears here to have an 'instrumental' as well as a 'theoretical' meaning. Yet implicitly contained in this is the counter-thesis that the potency of logos also resides in every simple material tool, in every application of a material thing that serves the human will. Thus, the

determination of human essence, the definition of the human being, develops in this twofold direction. The human being is a 'rational' being in the sense that 'reason' comes from language and is insolubly bound to it; ratio and oratio, speaking and thinking, become interchangeable concepts. At the same time, and no less originally, man appears as a technological, a tool-forming being: 'a tool-making animal',[14] to employ Benjamin Franklin's words. The power with which man asserts himself against external reality, and by virtue of which he first gains an intellectual image of this reality, is determined by these two sides of his essence. All mental handling of reality is bound to this double act of 'grasping' – 'comprehending' reality in linguistic-theoretical thought and 'gripping onto it' through the medium of efficacy. This is true for both mental and technological forming.

In both cases it is essential to guard against a misunderstanding in order to penetrate into the actual sense of this forming. The 'form' of the world, whether in thought or action, whether in language or in effective activity, is not simply received and accepted by the human being; rather, it must be 'built' by him. In this respect, thinking and doing are originally united, they both stem from this common root of forming gestalts, gradually unfolding and branching off from it. Wilhelm von Humboldt[15] has shown this basic relationship in language. He demonstrates how the act of speaking is never a mere receiving of the object, a reception of the existing form of the object in the I. Rather, it contains in itself a real act of world-creation, the raising-up of the world to form. The notion that different languages only denote the same mass, independent of the objects and concepts available to them, is, for Humboldt, truly pernicious for the study of language. This view masks that which constitutes language's genuine meaning and values. It conceals language's creative role in the laying out, production and securing of the concrete view of the world. The difference among languages is not a difference between sounds and signs. Rather, it is 'a difference of world views'.[16] Correctly understood, what is said here about the use of language also holds for each use of the material tool, however elementary and 'primitive'. Here, too, that which is crucial is never found in the material goods that are gained through it, in the quantitative expansion of the sphere of influence through which, little by little, one part of external reality after another is submitted to the will of the human being. The will that initially seemed limited by its proximity to the human body, to the movement of its own limbs, gradually explodes and breaks through all spatial and temporal barriers. In the end, this overcoming would be fruitless if it contained and dragged along with it

only new world-matter. Here, a more genuine and greater profit lies in the gaining of 'form', in the fact that the expansion of efficacy brings about a change in its qualitative meaning, creating the possibility of a new aspect of the world. Efficacy, in its continuous increase, in its expansion and intensification, would finally have to be recognized as powerless, as internally aimless and weak, if an inner transformation, an ideal turn in its meaning, were not simultaneously being prepared and constantly carried out. What philosophy is able to achieve for technology, for its understanding and legitimacy in thought, is the demonstration of this turn in meaning. To do this, philosophy must grasp deep into the past. It must seek to penetrate back to when the secret of the 'form' first opens itself to the human being, when it begins to rise up in thought and deed – in order, admittedly, to cloak itself just as much as to reveal itself – so as to exhibit itself only as in a puzzling mist, in the 'twilight of the idols' of the magical-mythical worldview.

If we compare the worldview of various so-called civilized cultures to indigenous tribes, the deep opposition that exists between them reveals itself perhaps no more sharply than in the direction the human will adopts in order to become master over nature and gradually to take possession of it. A type of magical desire and efficacy confronts technological will and accomplishment. People have sought to derive this original opposition from the totality of differences that exists between the world of civilized people and indigenous people. Humans from an earlier time are distinguished from those of a later time, just as magic is distinguished from technology. The former may be denoted as *homo divinans* and the latter as *homo faber*. The whole development of humanity presents itself, then, as a completed process containing innumerable intermediary forms, through which the human being moves from the initial stage of *homo divinans* to the stage of *homo faber*. If we accept this distinction that Danzel has forcefully maintained and carried through in *Kultur und Religion des primitiven Menschen*,[17] we haven't reached a solution to the problem. We have only formulated it. For it would only be an assertion and extrapolation if ethnology, from which this distinction originates, attempts to explain it by attributing to 'magical' man a predominance of 'subjective' determinations and motives more than purely 'objective' ones. The worldview of *homo divinans* is supposed to come about through the projection of his condition onto reality; he sees in the external world what is going on within himself. Inner processes that take place entirely within the soul are transferred outside of the human body. Drives and wilful movements are interpreted as strengths that intervene directly into events, steering and

altering them. However, from a purely logical perspective this explanation is marred by a petitio principii – it confuses that which is to be explained with the ground of explanation. When we reproach indigenous peoples for 'confusing' the objective and subjective, for letting the borders of both areas flow into one another, we are speaking from the standpoint of our theoretical observation of the world founded on the principle of 'cause', on the category of causality as the condition of experience and the objects of experience. These borders are not 'in themselves' objectively before us; rather, they must first be set down and secured, they must first be erected by mental labour. The manner of setting these borders takes place differently according to the position in which mind finds itself and according to the direction in which it moves. Every transition from one posture and direction to another always ends in a new 'orientation', a new proportion between the 'I' and 'reality'. Thus, the relation between both is not set down as unique and unambiguous from the beginning. It first comes to be because of the manifold ideal processes of 'mutual differentiation and determination', as in myth and religion, language and art, science and the different basic forms of 'theoretical' conduct in general. For human beings, a fixed relation of subject and object according to which they conduct themselves does not exist from the beginning. Rather, in the entirety of a human being's activity, in the entirety of his bodily and his psycho-spiritual activities, there first arises knowledge of both subject and object; the horizon of the 'I' first separates itself from that of reality.[18] There is no solid, static relation between them from the outset. There is, as it were, a fluctuating movement of back and forth. From this movement a form gradually crystallizes in which the human being first grasps his own being as well as the being of objects.

If we apply this general insight to the problem that is present here, we see that the human being, in his magical and technological activity, does not already have a determined form of the world. He must instead search for this form and find it in various ways. The way he finds it depends on the dynamic principle that the general movement of mind follows. If we assume that the principle of 'causality' and the question concerning the 'ground' of being and the 'causes' of events already prevail in the magical view of nature, the partition between magic and science falls away. In his work *The Magic Art*, James George Frazer, one of the best specialists on magical phenomena, expressly draws this conclusion in his attempt to lay out completely the factual sphere of the magical arts. At the same time, he links a certain theory about the meaning and origin of magic to his description of this factual sphere.

On Frazer's account, magic amounts to nothing other and nothing less than the beginnings of 'experimental physics'. In magic, the human first perceives objective being and happening, which are ordered according to fixed rules. The course of things now appears to him as a closed nexus, a chain of 'causes' and 'effects' in which no supernatural power can arbitrarily intervene. According to Frazer, it is here that the world of magic is clearly separated from the religious world. In the religious outlook, the human is subjected to a foreign power to which he entrusts the whole of his being. Here there is still no fixed natural course, for the world still does not have its own gestalt and its own power; it is a plaything in the hands of superior transcendent powers. It is, however, just this basic view against which the magic worldview protests. It grasps nature as a strictly determined sequence of events and seeks to penetrate into the essence of this determination. It knows no coincidence. It rises to the conception of a strict uniformity of events. And, in this way, it achieves, in contrast to religion, the first stage of scientific knowledge of the world. Magic admittedly differs from science in its result but not in its principle and its problem. This is the case because the principle 'like causes, like effects' governs it as well, giving it its generally apparent character. That it is not able to employ this principle in the same sense as the theoretical science of nature is not, according to Frazer, due to a logical reason but only to a factual one. It is 'primitive' not in its form of thought but in the measure and the security of its knowledge content. The circle of observation is too narrow, the nature of observation too fluctuating and uncertain, for it to be able to erect truly durable empirical laws. The consciousness, however, of lawfulness as such has been awakened in it and is tightly and steadfastly held onto by it. Thus in the end, Frazer sees in both basic forms of magic nothing other than the applications and variation of the 'scientific' principle of causality, which he understands and expounds here in accordance with the views of English empiricism: 'sympathetic' magic and 'homoeopathic' or 'imitative' magic are both founded on the fundamental laws of ideal association that rule over all causal thinking. In the case of the former it results in the law of 'association by similarity' and in the case of the latter it results in the law of 'association by contact' and becomes the guiding principle of theoretical and practical activity.[19]

The flaw in Frazer's theory, which is endorsed by a great number of ethological researchers, can be stated as follows: it awards magical activity a significance and ascribes to it an achievement that is reserved for technological activity. Magic may differ from religion insofar as the human being is able to escape the merely passive relationship

to nature – that is, he no longer receives the world as the mere gift of a superior divine power but wants to take possession of it and stamp it with a determined form. But the manner of this appropriation is entirely different from the appropriation carried out by technological efficacy and in scientific thinking. The magical human being, the *homo divinans*, believes in a certain sense in the omnipotence of the 'I'. However, this omnipotence expresses itself only in the force of a wish. Reality is not able to withdraw from wishing in its highest intensification and potency; it is connected and subjected to it. The success of a particular act is linked to reality in the following way: the goal of the action is precisely anticipated in the imagination, and the resulting image of this goal is worked on and held to with great intensity. All 'real' actions, if they are to be successful, need such a magical preparation and anticipation. Warring or raiding, fishing or hunting, can succeed only if every phase is magically anticipated in the right way and at the same time 'rehearsed'.[20] Already in the magical worldview, the human being tears himself away from the immediate presence of things and builds his own kingdom with which he reaches out into the future. However, if in a certain sense he is freed from the power of immediate sensation, then he has only exchanged it for the immediacy of desire. In this immediacy, he believes he is able to seize reality directly and to conquer it. The totality of magical practices is, so to speak, simply the laying out, the progressive unfolding of the desired image that the mind carries within itself of the goal to be reached. The simple, ever more intense repetition of this goal is already regarded as the way that must inevitably lead to it. Herein originate the two archetypes of magic: word-magic and image-magic. Word and image, then, are the two ways in which the human being handles a non-present thing as present – by which he, as it were, sets something wished and longed for before himself, in order, in this very act of 'imagination', to enjoy and to make it his own. That which is spatially remote and temporally distant is 'called forth' in speech or is 'imagined' and 'prefigured'. Already here, the *regnum hominis*[21] is sought-after, though it slips away at once and dissolves into a mere idol. Undoubtedly, magic is not merely a way of world-apprehension, but contains within it real seeds of world-formation. But the medium in which it moves does not let these seeds develop, for the reality of experience is still not seen in its order and rules. It is enveloped more densely into a simple, wishful dream that conceals its own form. Moreover, this accomplishment of 'subjectivity' is not to be assessed in an exclusively negative fashion, for it is already a first and, in a certain sense, a crucial step. The human being does not

simply abandon and submit himself to an impression of things, to their mere 'givenness', but changes them, letting a world be generated out of himself. When he is no longer satisfied by mere existence, he demands to be a something and to be different. However, this first active direction in which the world of being faces the world of doing still lacks the means of actuation. Because the will jumps directly towards its goal in the magical identification of 'I' and 'world', no true mutual determination between them occurs. For every such confrontation calls for proximity as well as distance, empowerment as well as relinquishment, the force of grasping but also the force of keeping something remote.

It is precisely this double process revealed in technological activity that differentiates it from magical activity. Here, the power of the will replaces the power of mere desire. This will reveals itself not only in the force of the forward-driving impulse but also in the way in which this impulse is led and mastered. It reveals itself not only in the ability to seize its goal but also in the particular ability to distance the goal from it and to leave it at this distance, letting it stand there. It is only this letting-stand of the goal that makes an 'objective' sense perception possible, a sense perception of the world as a world of 'objects'. For the will, the object is just as much the guiding principle and thread that first gives it its determination and its solidity, as it is the limit of the will, its counterpart and its resistance. The strength of the will first grows and becomes stronger on the strength of its limit. The will can never succeed in its application simply by making itself stronger. Success demands that the will intervene in an originally foreign order and that it know and recognize this order as such. This knowing is at the same time a mode of recognition. Nature is not, as in magic, merely repressed by desiring and imagining. Rather, its own independent being is acknowledged. And the true victory of thought is only achieved in this self-modesty. '*Natura … non nisi parendo vincitur*':[22] victory over nature is only achieved through obedience to it. By means of this obedience, which lets nature prevail and no longer seeks to captivate and subjugate it magically, a new gestalt – in a purely 'theoretical' sense – of the world emerges. Human beings no longer attempt to make reality amenable to their desires with various methods of magic and enchantment. They take it as an independent and characteristic 'structure'. In this way, nature has ceased to be an amorphous material that yields to every metamorphosis and, in the end, allows itself to be forced into any gestalt through the power of magical words and images. In place of magical compulsion, the 'discovery' of nature emerges, which is contained in all technological activity, no matter how simple and primitive the application of the tool may be.

This discovery is a disclosure; it is the grasping and the making one's own of an essential connection that previously lay hidden. Thus only here are the fullness and limitless changes of the gestalts of the magical-mythical world traced back to a determined, standard measure. Yet, on the other hand, reality does not become rigid through a reduction to its inner relation of measure; its inner mobility has been preserved and has lost nothing of its 'plasticity'. However, this plasticity, this 'formability', is now set as if in a fixed intellectual framework limited by certain rules of the 'possible'. This objective possibility now appears as the border where the omnipotence of desire and affective fantasy are placed. In place of merely libidinous desire, there first emerges a genuine, conscious wilful relationship – a relationship in which ruling and serving, demanding and obeying, victory and submission are united. In such a mutual determination, a new meaning of the 'I' and a new meaning of the world are grasped. The arbitrariness, self-will and obstinacy of the I withdraw, and insofar as this happens the proper meaning of Dasein and happening, reality as cosmos – as order and form – stand out.

To make this clear, we need not look at the complete unfolding and present structure of technology. A basic circumstance presents itself in the most ordinary and inconspicuous phenomena, in the first and simplest beginnings of tool-use, more clearly than in almost all the marvels of modern technology. Already here we penetrate, from a purely philosophical perspective, into the core of the problem. Although the distance between the most cumbersome and imperfect tools we use and the results and achievements of technological execution appears vast, at least with respect to their content, if we focus on the principle of action, we find that the gap is much smaller than the gulf that separates the first invention and application of the crudest tool from mere animal behaviour. It would not be an exaggeration to say that the transition to the first tool not only contains the seeds of a new mastery of the world, but also a turning point in knowledge. The mode of action established here grounds and steadies, for the first time, a type of mediacy that belongs to the essence of thought. In its pure logical form, all thought is mediated. It is directed to the discovery and extraction of a mediating structure, which joins the opening sentence and the ending sentence of a communicative chain. The tool fulfils the same function, represented here in the logical sphere, in the objective sphere of physical objects. It is grasped, as it were, in objective sense perception; it is not merely the '*terminus medius*'[23] of thinking. It sets itself between the first positions taken by the will and its goal. Only in this in-between position is it permitted to separate them and

set them at a proper distance. As long as the human being makes use only of his limbs, his bodily 'organs', in order to achieve his goals, such distancing is not yet reached. Admittedly, he effectively acts on his environment. But there is a great distance between this work and the knowledge of this very efficacy. Whereas all human doing is absorbed in apprehending the world, human beings cannot yet comprehend it as such, because they cannot yet conceive of it as an objective gestalt, as a world of objects. The elementary taking-possession-of, immediate physical seizing, is not a constructive grasping. It does not lead to a building up in the region of sense perception or in the region of thought. In the tool and its application, however, the goal sought-after is for the first time moved off into the distance. Instead of looking spellbound at this goal, the human being learns to 'fore-see' it. This 'fore-seeing' becomes both means and condition for attaining the goal. This form of seeing is all that distinguishes human intentional doing from animal instinct. This 'fore-seeing' establishes 'fore-thought'. It establishes the possibility of directing attention to a goal, towards something spatially absent and temporally remote, rather than acting on an immediately given sensuous stimulus. It is not so much because animals are inferior to the human in bodily skill. But because this line of sight is denied to animals, there is no genuine tool use in the area of animal existence.[24] And it is also from this line of sight that there first arises the thought of causal connection in the strict sense of the word. If one takes the concept of causality so loosely that it can be present wherever spatial and temporal co-extension connects through mere 'association', then the origin of this concept must be considered to be much earlier. There is no doubt that association is present in the magical act and that the magical world is pervaded by it. Frazer follows this view of causality when he subordinates the world of magic to the principle of causality, when he sees in magic the true beginning of 'experimental physics'.[25] But another picture – and judgement – of the logical connections and differences between the basic forms of world understanding emerges if we take the concept of causality in the sharper and stricter sense Kant gave to it in his criticism of Hume's theory of causality. The main focus of this critique lies in the proof that it is in no way the mere 'habitual' connection but the thought of a 'necessary' connection that determines the nucleus of the concept of causality as a category of the 'pure understanding'. And the correctness of this notion is to be sought-after and proven by showing that, without it, the relation of our ideas to an object would not be possible. The concept of causality belongs to the original forms of synthesis, which alone

make it possible to give ideas an object. It is, as the condition of the possibility of experience, the condition of possibility of the objects of experience. The mythical-magical world still knows nothing about a sense of causality that both constructs and renders possible the sphere of objects, making them accessible to thought. For the mythical-magical world, the whole of nature is similarly broken into a play of forces, into actions and reactions. These forces, however, are of the sort that the human being lives with and experiences in his immediate drives. They are personal, demonic-divine powers that direct and determine events, and whose participation human beings must secure in order to influence these events. With the creation of the tool and by means of its regular use, the limits of this type of representation were first breached. Here we encounter the 'twilight of the gods' of the magical-mythical world. Only here does the notion of causality emerge from the limitations of 'inner experience', from being bound to the subjective feelings of the will. It becomes a bond that joins pure objective determinations together and sets down a fixed rule for their mutual dependence. The tool no longer belongs immediately, like the body and its limbs, to the human being. The tool signifies something detached from its immediate being and becomes something that exists in itself, a continued existence that can far outlast the life of the individual human being. This kind of 'thing-hood', this 'reality', does not, however, now stand alone; it is truly real only in and through the effects it wields on other beings. These beings are not simply joined externally to the tool. They belong to its particular essence. The perception of a particular tool, for instance the perception of an axe or a hammer, never exhausts itself in the perception of a thing with particular characteristics, of materials with certain qualities. Here, its use – its function – becomes apparent in its very stuff. The form of its activity comes to be in 'matter'. They are not separated from one another but are apprehended and comprehended as an insoluble unity. The object is determined as something only insofar as it is for something. This is because in the world of tools there are no mere things with properties. There are only ensembles of 'vector-magnitudes', to use a mathematical expression. Although every being is determined here in-itself, it is, at the same time, the expression of a particular activity to be performed. And in the perception of this activity, a fundamentally new direction of seeing opens up for the human being: the perception of 'objective causality'.

Of course, when we consider this achievement, we should bear in mind that the gap between the two different aspects of the world confronting one another cannot be jumped over all at once. The

distance between the two poles continues to exist and can be traversed only step by step. Long after the human mind has produced, in both language and tools, the most important means of its liberation, these methods still appear enveloped in the magical-mythical atmosphere which it is supposed to overcome in its final and highest development.[26] The world of language, like that of tools, is in no way immediately comprehended as the creation of the human mind, but rather as the efficacy of foreign and superior forces. The demonic character that belongs to the mythical conception as such also includes these two worlds and at first threatens to draw them completely under its spell. The totality of language and tools appear as a kind of pandemonium. Originally, language is not the means of a matter-of-fact presentation, a medium for the exchange of information that serves to bring about reciprocal, logical understanding. The more we attempt to return to the 'origins' of language, the more its purely 'objective' character is lost. Herder says that the oldest dictionary and grammar of humanity were nothing more than a 'pantheon of tones', a realm consisting less of things and their names than of animate, acting beings. The same held for the first and most primitive tools. They too are regarded as 'given from above' as gifts from a god or saviour. They are worshipped as divine. The Eweer tribe in South Togo still regards the blacksmith's hammer as a mighty deity, to which they pray and offer sacrifice. The traces of this feeling can be seen in the great cultural religions.[27] But this awe subsides. The mythical darkness that still surrounds the tool gradually begins to clear to the degree that they are not only used but also, through this very use, continually transformed. So the human becomes increasingly conscious of being a free sovereign in the realm of tools. Through the power of the tool the tool-users come, at the same time, to view themselves differently, now as the administrator and producer of the tool. 'The human being experiences and enjoys nothing', says Goethe, 'without at the same time being productive. This is the innermost quality of human nature. We can even say without exaggeration that it is human nature itself.'[28] This basic force of the human being reveals itself perhaps nowhere as clearly as in the sphere of the tool. The human works with it only insofar as he, in some way, even if initially with only modest results, works on it. It is not merely his means for transforming the objective world – in the process of the objective world's metamorphosis the tool itself undergoes a transformation and moves from place to place. And in this change the human now experiences a progressive increase, a peculiar strengthening of his self-consciousness. A new world-attitude and a new world-mood now announce themselves over and against

the mythical-religious worldview. The human being now stands at that great turning point in his destiny and self-knowledge that Greek myth embodied in Prometheus. Titanic pride and consciousness of freedom confront fear and reverence for demons and gods. The divine fire is wrested away from the seat of the immortals and placed in the sphere of the human being, in his home and hearth. The world of desire and dreams in which magic had enveloped the human being is destroyed. Man sees himself led into a new reality that receives him with a seriousness, and severity, and necessity that obliterates all his desires. However, if he cannot escape this necessity, and he is no longer able to control the world according to his desires, he now learns to master it increasingly with his will. He no longer attempts to control its course; he falls into line with the iron law of nature. But this law does not enclose him like the walls of a prison. By means of this law, he tests and wins a new freedom. For reality shows itself, regardless of its strict and irrevocable order, not as an essentially rigid existence but rather as a modifiable, malleable material. Its gestalt is not complete. Rather, it offers human will and initiative enormous latitude for action. And it is by moving about in this space, in the whole of that which is achieved through his work – and through which his work first becomes possible – that the human progressively builds up his world, his horizon of 'objects', and the concept of his own essence. He now sees himself expelled from that magical realm of immediate wish-fulfilment that magic has enticingly placed before him. He is expelled onto a limitless path of creative work that promises him no essential goal, no more final stop or resting point. However, in lieu of all this, a new determination of value and meaning is now established for his consciousness: the genuine 'purpose' of action is no longer measured by what it brings about and finally achieves; rather, it is the pure form of doing, the type and direction of the productive force as such, that determines this purpose.

III

The indispensable participation of technological creation with the conquest, securing and consolidation of the world of 'objective' sense perception has become clearer through the preceding observations. It has become increasingly clear that a certain misgiving not only threatens to problematize the value of technological achievements but also to turn them directly into their opposite. Is not what was regarded here as the authentic achievement of technology nothing other than the basic evil from which it suffers? Does not this increased accessibility to the

world of objects at the same time necessarily result in the alienation of human beings from their own essence, from what they originally are and what they originally feel? With the first step into the world of facts that technological work secures and constructs for him, the human being also appears to be subjected to the law, to the brute force of factual matters. And is this brutality not the strongest enemy of the inner life enclosed in his I, in the being of his soul? All technology is a creation of mind; mind can only ground its own mastery in this way, because it conquers all powers that find themselves enclosed upon it, despotically holding them down. To become master, it must not only restrict the free realm of the soul, it must also deny and destroy it. No compromise is possible in this conflict. Mind, whose goal and power emerges in technology, is the irreconcilable opponent of the soul. And, as it progressively alienates the human being from his own centre of life, the same thing occurs concerning the human relationship to the whole of nature – insofar as this is not taken in one of the senses already distorted by technology, insofar as it is not thought of as a mere mechanism obeying general laws, but rather felt in its organic peculiarity and in its organic fullness of life. The more the power of technology grew within the circles of modern culture, the more passionately and more inexorably relentless did philosophy levy this complaint and accusation against it. As Ludwig Klages, the most eloquent and radical proponent of this fundamental idea, writes: 'Whereas all living creatures except for human beings beat with the rhythm of cosmic life, the human being has severed the law of spirit from this. What appears to him, the bearer of I-consciousness, in light of the superiority of anticipatory thinking over the world, appears to metaphysicians, when they penetrate sufficiently deeply, in light of the enslavement of life under the servitude of concepts. [The human being] has himself fallen out with the planet that bore and nurtured him, even with the cycle of change of all heavenly bodies, because he is possessed by this vampiric and soul-destroying power.'[29]

We miss the actual meaning of these accusations if we believe ourselves able to moderate or overcome them by simply remaining here with the observation of the appearances, with the bare effects. Here it does not suffice to compare the pernicious effects of the rational-technological stance, which are perfectly clear, with other pleasant and beneficial consequences, drawing an acceptable or favourable balance out of this comparison by a 'hedonistic calculus'. For the question is not directed to the consequences but to the ground, not to the events but to the functions. It is from such observation and analysis of function that

the critique of a determined cultural content and cultural domain must begin. In the centre of this critique there must always stand the question about the human being himself, about his meaning and 'determination'. In this sense, Schiller, standing at the apex of a particular epoch of aesthetic-humanist culture, poses the question about the significance and value of the 'aesthetic'. And he answers this question by saying that art is not a mere possession and it is no less a mere performance or act of the human being; rather, it must be understood as a necessary path towards becoming human and as a particular phase along this path. It is not the human being who, as mere natural being, as a physical-organic being, becomes the creator of art; rather it is art that proves to be the creator of humanity, that first constitutes and makes possible the specific 'mode' of being human. The ludic drive upon which Schiller grounds the region of beauty does not simply add to the mere natural drives such that it would be a broadening of their range, but rather this drive transforms their specific content, first opening up and conquering the proper sphere of 'humanity'. 'The human only plays where he exists in the genuine meaning of the word "human", and *he is completely human only when he plays*.'[30] This totality of humanity appears to have been realized in no other function in the same sense and to the same measure as in art. We could easily trace how, in German intellectual history, this purely aesthetically composed and grounded 'humanism' gradually grew, and how another cultural power locates itself, independently and equally, next to art. For Herder and Humboldt it is language that shares with art the role of creator and seems to be the basic motive for the real 'anthropogeny'. The domain of technological efficacy seems, however, to be denied any such acknowledgement. For, this efficacy appears to be completely subjected by the mastery of those drives, which Schiller characterizes as the sentient impulse or as the material drive. The urge towards the outside – that typically 'centrifugal' impulse – manifests itself in it. It brings one piece of the world after another under the dominion of the human will; this spread, this expansion of the periphery of being, thereby leads further and further away from the centre of the 'person' and personal existence. Thus it seems that every advance in width must be bought at the cost of a loss of depth. Can it in any way be said of such a function, even if we turn to the most indirect sense of the word that Schiller has stamped on art, that it is not only a creation of the human being, but that it is also his 'second creator'?

Certainly, a general consideration arises against the constitutive interpretation that wants to see technology as an endeavour directed

only towards an outside. Here, Goethe's claim that nature has neither core nor shell rightly applies to the totality of mental activities and energies. Here there is no separation, no absolute barrier between the 'outer' and 'inner'. Each new gestalt of the world opened up by these energies is likewise always a new opening out of inner existence; it does not obscure this existence, but makes it visible from a new perspective. We always have before us a manifestation from the inner to the outer and from the outer to the inner – and in this double movement, in this particular oscillation, the contours of the inner and the outer world and their two-sided borders are determined. This is also true for technological efficacy because it is in no way directed towards the seizing of a mere 'outside', but rather it encloses in itself a particular turn inward and backward. Here too it is not about breaking one pole free from another, but rather about both being determined through each other in a new sense. If we move from this determination, then it would appear at first that knowledge of the I is tied in a very particular sense to the form of technological doing. The border that separates purely organic efficacy from this technological doing is likewise a sharp and clear demarcating line within the development of I-consciousness and singular 'self-knowledge'. From the purely physical side, this shows itself in the fact that a determined and clear consciousness of his own body, both a consciousness of his bodily gestalt and his physical functions, first grows in the human being after he turns both of these towards the outside and, so to speak, regains both from the reflection of the outer world. In his *Philosophie der Technik*, Ernst Kapp sought to think through the idea that the human being is granted knowledge of his organs only by a detour through organ-projection. By organ-projection he understands the fact that an individual limb of the human body does not simply work outward, but it creates an outer existence, so to speak, an image of itself. Every primitive work-tool is just such an image of the body; it is a contrary playing-out and reflection of the form and activity of the living body in a determined material structure of the outer world. Likewise, every tool that can be used by the hand appears in this sense as a further laying out and formation, as an exteriorization, of the hand itself. In all its conceivable positions and movements, the hand has provided the organic prototypes after which the human being has unconsciously formed his first necessary pieces of equipment. Hammers and axes, chisels and drills, scissors and tongs are projections of the hand. 'The parts of the hand, its palm, thumb and fingers, the open, hollow, finger-spreading, turning, grasping and clenched hand are, either alone or simultaneously with the stretched

or bent forearm, the common mother of the tool named after it.' From this Kapp draws the conclusion that the human being was only able to gain an insight into the composition of his body, into his physiological structure, through the artificial counter-image, through the world of artefacts he himself created. Only insofar as he learned to produce certain physical-technological apparatuses did he truly come to know the structure of his organs in and through them. The eye, for example, was the model for all optical apparatuses. The properties and function of the eye, however, have only been understood through these apparatuses: 'Only as the sight organ had projected itself into a number of mechanical tasks, thus preparing their relation back to its anatomical structure, could this physiological puzzle be solved. From the instrument unconsciously formed according to the organic tool of seeing, the human being has, in a conscious manner, transferred the name to the actual focus of the reflection of light in the eye – the *crystal lens*.'[31]

We cannot closely follow the metaphysical content of this thesis or the metaphysical justification that Kapp has given for it. Insofar as this justification is based upon essentially speculative assumptions, including Schopenhauer's theory of the will and upon Eduard von Hartmann's *Philosophie des Unbewußten*, it is justly disputed and sharply criticized.[32] But this criticism does not destroy the basic perspective and insight Kapp expresses when he says that technological efficacy, when outwardly directed, likewise always exhibits a self-revelation and, through this, a means of self-knowledge.[33] Admittedly, if we assume this interpretation, a radical consequence cannot be avoided – namely, with this first enjoyment of the fruit from the tree of knowledge the human being has cast himself out forever from the paradise of pure organic existence and life. We may with Kapp still attempt to understand and interpret the first human tools as mere continuations of this existence; we may rediscover in the shape of the hammer, axe, chisel, drill and tongs nothing other than the being and structure of the hand itself. If we go one step further, however, and enter into the sphere of advanced technology, this analogy immediately breaks down. This sphere is governed by a law that Karl Marx called the law of the 'emancipation of the organic barrier'. What separates the instruments of fully developed technology from primitive tools is that they have, so to speak, detached and dissociated themselves from the model that nature is able to immediately offer them. What these instruments have to say and what they have to accomplish completely comes to light only because of this 'dissociating'. As to the basic principle that rules over the entire development of mechanical engineering, it has been pointed out that the general

situation of machines is such that they no longer seek to imitate the work of the hand or nature, but instead seek to carry out tasks with their own authentic means, which are often completely different from natural means.[34] Technology first attained its own ability to speak for itself by means of this principle and its ever-sharper implementation. It now erects a new order that is not grounded on the contact with nature, but rather, not infrequently, in conscious opposition to it. The discovery of new tools represents a transformation, a revolution of the previous types of efficacy and the mode of work itself. Thus, as other thinkers have emphasized, with the advent of the sewing machine comes a new way of sewing, with the steel mill a new way of smithing – witness the problem of flight, which could only finally be solved once technological thinking freed itself from the model of bird flight and abandoned the principle of the moving wing.[35] Once again, a penetrating and surprising analogy appears here between the technological and linguistic function, between the 'mental aspect of the tool' and the 'the tool of the mind'. For language in its beginning still seeks to hold fast to the 'proximity with nature'. It devotes itself to the direct sense impression of the thing, and then strives to hold on to its sound and, as much as possible, to its sound image, and, in a sense, to exhaust itself in it. But the further it progresses on its way, the more it dissociates itself from this immediate constraint. It abandons the path of onomatopoetic expression; it wrestles itself free from the mere metaphor of sound in order to turn into the pure symbol. And with this it has found and established its own mental gestalt; the power dormant in it has arrived at a true break-through.[36]

Thus, here too the march of technology is mastered by a universal norm that rules the whole of cultural development. The transition to this norm, however, cannot, of course, take place here, as in the other spheres, without struggle and the sharpest opposition. The human being faces the risk of absolving himself from the guardianship of nature, standing purely on his own and on his own wanting and thinking. He has herewith renounced all the benefit that is contained in his immediate proximity to nature. And once the bond that binds him to nature is cut, it can never be tied again in the old way. The moment the human being devotes himself to the hard law of technological work, the abundance of immediate and unbiased happiness that organic existence and activity had given him fades away forever. From the first and most primitive levels it appears as if a close connection still existed between the two forms of efficacy, as if there occurred between them a constant, almost unremarkable transition. Karl Bücher, in his writing on *Arbeit und Rhythmus*, explains how the simplest works accomplished by humanity

are still closely connected and related to certain prototypes of the rhythmic movement of one's own body.[37] They appear as the simple continuation of these movements; they are not so much directed by a determined idea of an external goal as they are inwardly motivated and determined. What is represented in these works and what directs and regulates them is not a goal-conscious will, but a pure impulse to expression and naive joy of expression. Even today this connection can be directly detected in the widespread customs of native peoples. It is reported that in many indigenous tribes dance and work are denoted by the same word. Both are for them phenomena so immediately related and so insolubly bound together that they cannot linguistically and intellectually be distinguished from one another. The success of agricultural labour depends not only upon certain external technological performances but also upon the correct execution of their cultural chants and dances; it is one and the same rhythmic movement that both forms of activity enclose, bringing them together into the unity of a singular, unbroken feeling of life.[38] This unity appears immediately endangered and threatened as soon as activity takes the form of indirectness, as soon as the tool comes between the human being and his work. For the tool obeys its own law, a law which belongs to the world of things, and which, accordingly, breaks into the free rhythm of natural movements with a foreign dimension and foreign norm. The organic bodily activity asserts itself over and against this disturbance and inhibition insofar as it manages to include the tool itself in the cycle of natural existence. This inclusion still appears to succeed without difficulty at the relatively early stages of technological work activity. Organic unity and organic connection reinstate and reproduce themselves insofar as the human being continues to 'grow together' with the tool he employs, so long as he does not look upon the tool as merely stuff, a mere thing composed of matter, but instead relocates the tool into the centre of its function and, by virtue of this shifting of focus, feels a kind of solidarity with it. It is this feeling of solidarity that animates the genuine craftsman. In the particular individual work that is created by his hands he has no mere thing before him; in it he sees both himself and his own personal activity. The further the technology progresses and the more the law of 'emancipation from the organic barrier' affects it, the more this original unity slackens until it finally breaks up completely. The connection of work and working ceases in any way to be a connection one can experience, because the end of working, its proper telos, is now entrusted to the machine, while the human being essentially becomes, in the whole of the process of work, something dependent – a section or part that is increasingly converted into a mere

fragment. Simmel sees the essential reason for what he calls the 'tragedy of modern culture'[39] in the fact that all creative cultures increasingly set out certain orders of things for themselves that confront the world of the I in their objective existence and in their being-such-and-such. The 'I', the free subjectivity, has created these orders of things, but it no longer knows how to grasp these things and how to penetrate into them. The movement of the 'I' breaks upon its own creations; the greater the scope and the stronger the power of this creation becomes, the more its original tide of life subsides. This tragic element of all cultural development is perhaps no more evident than in the development of modern technology. But those who turn away from it on the basis of these findings forget that in their damning judgement of technology they must logically include the totality of culture. Technology has not created this state of affairs. It merely places an especially remarkable example urgently before us. It is – if one speaks here of suffering and sickness – not the ground of suffering, but merely a manifestation, a symptom of it. What is crucial here is not an individual sphere of culture but its function, not a special way that it follows, but the general direction it takes. Thus, technology may at least demand that the charges raised against it not be brought before the wrong court. The standard by which it alone can be measured can, in the end, be none other than the standard of mind, not that of mere organic life. The law that one applies to it must be taken from the whole of the mental world of forms, not merely from the vital sphere. Thus grasped, however, the question as to the value and demerit of technology immediately receives another sense. It cannot be resolved simply because one considers and sets off against each other the 'utility' and 'disadvantages' of technology. We cannot judge it by comparing the good that it gives to humankind with the idyll of some pre-technological 'state of nature'. Here, it is about neither pleasure nor displeasure, neither happiness nor sorrow. It is about freedom and bondage. If the growth of technological ability and wares necessarily and essentially secures in itself a stronger measure of servitude such that it increasingly enslaves and constrains humanity rather than being a vehicle for its self-liberation, then technology is condemned. If the reverse shows itself – that is, if it is the idea of freedom itself that shows the way for technology and finally breaks through in it – then the significance of this goal cannot be curtailed by looking at the suffering and troubles technology causes along the way. For the path of mind stands here as everywhere under the law of renunciation, under the command of a heroic will that knows it can only reach its goal through such renunciation, establishing itself through it and renouncing all naive and impulsive longings for happiness.

IV

The conflict generated between the human longing for happiness and the demands imposed on it by the technological mind and technological will is, however, in no way the sole and strongest opposition that emerges here. The conflict becomes deeper and more menacing when it emerges in the sphere of cultural forms. The true battlefront first appears where the mediating mind no longer merely struggles with the immediacy of life, but when the mental tasks become increasingly differentiated and simultaneously alienate themselves further from one another. For now, it is not only the organic unity of existence, but also the unity of the 'idea', the unity of direction and purpose, which are threatened by this alienation. Moreover, as technology unfolds, neither does it simply place itself next to other fundamental mental orientations nor does it order itself harmoniously and peacefully with them. Insofar as it differentiates itself from them, it both separates itself from them and positions itself against them. It insists not only on its own norm, but also threatens to posit this norm as an absolute and to force it upon the other spheres. Here, a new conflict erupts within the sphere of mental activity, indeed, on its very lap. What is now demanded is no simple confrontation with 'nature', but the erection of a barrier within mental life itself – a universal norm that both satisfies and restrains individual norms.

The determination of this barrier is most easily fixed in technology's relation to the theoretical knowledge of nature. Here, harmony seems to be given and guaranteed from the beginning. There is no struggle for superiority and subordination, but a reciprocal giving and taking. Each of the two basic orientations stands on its own. However, even this independence unfolds freely and spontaneously in an unforeseen manner towards a pure subservience to and with the other. The truth of Goethe's words – that doing and thinking, thinking and doing, constitute the sum of all wisdom – appears nowhere more clearly than here. For it is in no way the 'abstract', pure theoretical knowledge of the laws of nature that leads the way, proving first the technological aspect of the problem and its concrete technological activity. From the very beginning, both processes grasp one another and, as it were, keep the balance. Historically, this connection can be made clear when we look back at the 'discovery of nature' that has taken place in European consciousness since the days of the Renaissance. This discovery is in no way the work of only the great researchers of nature – it returns essentially to an impulse originating out of the questions of the great

inventors. In a mind like that of Leonardo da Vinci the intertwining of these two basic orientations appears with a classic simplicity and depth. What separates Leonardo from mere bookish learning, from the spirit of '*letterati*', as he himself called it, is the fact that 'theory' and 'praxis', 'praxis' and 'poiesis', penetrate one another in his person in a completely different measure as never before. First an artist, he became a technician and then a scientific researcher. Likewise, for Leonardo all research transforms directly into technological problems and artistic tasks.[40] This is hardly a question of a mere one-time connection but rather of a factual and basic connection that, from here onwards, points the way for the entire science of the Renaissance. The actual founder of theoretical dynamics, Galileo, also began from technological problems. In his book on Galileo, Olschki rightly places the strongest emphasis on this element. He notes that 'very few of the biographies have directed attention to this side of Galileo's work and scientific development. To be more precise, however, this more original and persistent of his varied dispositions constituted the main focus of his seemingly disparate life works ... One must keep in mind the fact that each of Galileo's discoveries in physics and astronomy are closely linked to some instrument of his own invention or to some special set-up. His technological genius is the authentic prerequisite for the scientific efforts through which his theoretical originality first received its direction and expression.'[41] The genuine explanation of these facts is that theoretical activity and technological activity do not only touch one another externally, insofar as they both operate on the same 'material' of nature, but, more importantly, they relate to one another in the principle and core of their productivity. The image of nature that thought produces is not captured by a mere idle beholding of the image; it requires the use of an active force. The more one steeps oneself in critical epistemological reflection about the origins and conditions of this image, the more it becomes clear that this image is no simple copy – that its outline is not simply drawn from nature – but that it must be formed from an independent energy of thought. Here we have arrived at the point where reason, according to Kant, appears as the 'author of nature'. This authorship, however, assumes another direction and attests to a new path as soon as we consider the workings of technological creation. Technological work and theoretical truth share a basic determination in that both are ruled by the demand for a 'correspondence' between thought and reality, an 'adaequatio rei et intellectus'.[42] That this 'correspondence' is not immediately given, but rather is to be searched for and continuously produced, appears even more clearly in technological creation than in

theoretical knowledge. Technology submits to nature in that it obeys its laws and considers them as the inviolable requirements of its own workings. Notwithstanding this obedience towards the laws of nature, however, nature is never for technology something finished, wherein laws are merely posited. Nature is something that is to be perpetually posited anew, something that is to be formed repeatedly. Mind always measures anew objects in relation to itself, and itself in relation to objects, in order to find and guarantee in this twofold act the genuine *adaequatio*, the actual 'appropriateness', of both. The more this movement takes hold, the more its force grows, the more the mind feels and knows its reality to have 'grown'. This inner growth does not simply take place under a continuous leadership, under the rule and guardianship of the actual; rather, it demands that we constantly return from the 'actual' to a realm of the 'possible', and see the actual itself according to this image of the possible. Acquiring this point of view and orientation signifies, from a purely theoretical perspective, perhaps the greatest and most memorable achievement of technology. Standing in the middle of the sphere of necessity and remaining within the idea of necessity, it discovers a sphere of free possibilities. There is no uncertainty, no mere subjective insecurity attached to these possibilities; they confront thought as something thoroughly objective. Technology does not initially ask what is but what can be. This 'ability', however, designates no mere assumption or supposition, but an assertive claim and certainty – a certainty whose final authentication, of course, is to be sought not in mere judgement, but in the output and production of certain artefacts. In this sense, every truly original technological achievement has the character of both a discovering and an uncovering. A certain state of affairs is in a sense extracted from the region of the possible and transplanted into the actual. Here, the technician bears a likeness to the activity of the divine 'demiurge' in Leibniz's metaphysics who does not create the essence or possibility of objects, but selects only one, and the most perfect, among those possibilities that exist in themselves and are presently at hand. Thus technology repeatedly teaches us that the sphere of the 'objective', which is determined by fixed and general laws, never coincides with the sphere of that which is presently at hand – that is, with that which becomes actual through the senses.[43] Pure theoretical natural science can, of course, never know the actual without constantly reaching out into the realm of the possible, the purely ideal. In the end, however, the only actuality to which its gaze appears to be directed seems to have exhausted itself in the clear and distinct description of the actual processes of nature. Technological

work, however, never binds itself to this pure facticity, to the given face of objects; rather it obeys the law of a pure anticipation, a prospective view that foresees the future, leading up to a new future.

With the insight into this state of affairs, however, the authentic centre of the world of technological 'form' now seems to shift increasingly, and to cross over from the pure theoretical sphere into the sphere of art and artistic creation. Here, we need not prove how tightly both areas are interwoven with one another. A glance at general intellectual history suffices to teach us how fluid the transitions are in the concrete becoming, in the genesis, of the technological world of form and in artistic form. Again, the Renaissance, with its construction of the '*uomo universale*'[44] in such spirits as Leon Battista Alberti and Leonardo da Vinci, provides us with great examples of the constant interweaving of technological and artistic motives. Nothing appears more natural and more enticing than concluding that such a coincidence in fact can come from such a coincidence in person. Indeed, there are those among the modern apologists of technology who believe that they can serve their cause in no better way than by equating it with the cause of art. They are, as it were, the romantics of technology. They attempt to ground and justify technology by dressing it up with all the magic of poetry.[45] All poetic hymns about the achievements of technology cannot, of course, raise us above the task of determining the difference between technological and artistic creation. This difference immediately emerges if we consider the kind of 'objectification' that is actual in the artist and in the technician.

In the present-day literature on the 'philosophy of technology', we repeatedly encounter the questions of whether and to what extent a technological work is capable of producing pure aesthetic effects and to what extent it is subject to pure aesthetic norms. The answers given to these questions are diametrically opposed to one another. The 'beautiful' is quickly claimed and praised as an inalienable good of technological products, and just as quickly rejected as a 'false tendency'. This struggle, often fought with great bitterness, wanes when one considers that in the thesis and antithesis the concept of beauty is, for the most part, taken in an entirely different sense. We grasp the norm of 'beauty' so widely that we speak of it everywhere there emerges a victory of 'form' over 'stuff', 'idea' over 'matter', such that there can be no doubt as to the great extent of technology's direct role. This beauty of form encompasses par excellence the whole expanse of mental activity and formation in general. Understood in this sense, there is, as Plato said in the *Symposium,* not only a beauty of physical formation but also of

logic and ethics, a 'beauty of knowledge' and a 'beauty of custom and endeavors'.[46] To reach the special region of artistic work from this all-embracing concept of form an essential limitation and a specific regulation are required. This results from that original relation in which all artistic beauty stands in relation to the grounding and original phenomenon of expression. In an absolutely unique way that is reserved for it alone, the work of art permits 'gestalt' and 'expression' to merge into one another. It is a creation that reaches out into the realm of the objective and that places before us a rigorous objective lawfulness. However, this 'objective' is in no way a mere 'appearance'. It is the expression of something interior and gives a certain transparence to it. The poetic, painted, or plastic form is in its highest perfection, in its pure 'detachment' from the 'I', still flooded by the pure movement of the 'I'. The rhythm of this movement lives on mysteriously in the form and speaks to us immediately in it. The outline of the gestalt turns back here repeatedly to a certain trait of the soul that manifests itself in it; and, in the end, it is to be rendered understandable only from the whole of this soul, from its totality that is enclosed in each true, artistic, individual thing. Such wholeness and such individual particularity continue to be denied to technological work. Admittedly, if one restricts oneself only to the mere experiential content of technological and artistic creations, then there appears to be no strict border between the two. Indeed, when it comes to intensity, fullness and passionate emotion, the one is not inferior to the other. And when the work of a discoverer or inventor first breaks through into reality after years and years of being carried inwardly, it involves no less a psychical or mental tremour than when the poetic or plastic gestalt detaches itself from its originator, confronting him as a figure in its own right. But after this separation has taken place even once, a quite different connection between the creator and his work prevails in the purely technological sphere as compared to the artist and his work. The completed object, in becoming actual, belongs to reality. It is situated in a pure world of things whose laws it obeys and by whose measure it wants to be measured. It must henceforth speak for itself, and it speaks only of itself and not of the creator to whom it originally belonged. This type of detachment is not demanded of the artist and it is not possible for him. Even when he becomes completely absorbed in his work, he does not become lost in it. The work always remains – insofar as it stands purely on its own – simultaneously the testimony of an individual form of life, an individual Dasein and a particular kind of being. Technological creation can neither reach nor aspire to reach this sort of 'harmony' between the beauty of the work

and the beauty of expression. When, with the erection of the Eiffel tower, the artists of Paris united and rallied in the name of artistic taste to object to this 'useless and monstrous' construction, Eiffel answered them that he was firmly convinced that his work had its own beauty: 'Are the right conditions of stability not always in agreement with those of harmony? The foundation of the art of building is that the main lines of the building must completely correspond to certain rules. What is, however, the basic condition of my tower? Its resistance against the wind! And here I claim that the curve[s] of the four pillars of the tower that climb higher and higher into the air in accordance with the fixed measurements of the weight of the base make for a powerful impression of force and beauty.'[47] This beauty, which originates from the perfect solution to a given problem, is, however, not of the same type and origin as the beauty that confronts us in the work of poets, sculptors and musicians. This latter beauty is not based on 'being bound' by the forces of nature, but also represents a new and unique synthesis of the 'I' with the world. If we can denote the world of expression and the world of pure signification as the two extremes between which all cultural development moves, then the ideal balance between them is, as it were, achieved in art. Technology combined with theoretical knowledge, to which it is closely related, renounces increasingly all that is measured by expression in order to lift itself up into the strictly 'objective' sphere of pure meaning.[48] At the same time, it is indisputable that the gain achieved here contains a sacrifice. But even this sacrifice and this renunciation, this possibility to cross over and rise up into a pure world of things, shows itself to be a specific human power – an independent and indispensable descriptor of 'humanity'.

However, a deeper and more serious conflict erupts before us if, rather than measuring technological works and activity by aesthetic norms, we ask after its ethical right to exist and its ethical meaning. The moment this question is vigorously put forth and understood in its entire severity, the decision seems already to be made. The sceptical and negative critique of culture, which Rousseau introduced in the eighteenth century, seems to be able to give no weighty evidence, no stronger example than the development of modern technology. Does this development not, under the promise and alluring image of freedom of the travelling juggler, involve human beings even more inexorably in bondage and enslaved? In that it removes him from the bond to nature, has it not increased his social bonds to the point of being unbearable? The thinkers who have struggled most profoundly with the basic problem of technology are precisely those who have repeatedly enjoyed

this ethically damning judgement over it. Whoever does not from the beginning subscribe to the demands of simple utility, and instead treasures the meaning of ethical and spiritual standards, cannot carelessly pass over the grave inner damages of a lauded 'technological culture'. Few modern thinkers have as keenly observed and forcefully uncovered this damage as Walther Rathenau.[49] He has done so with growing zeal and passion in his writing. On one hand, there is completely soulless and mechanized work, the hardest chore. On the other hand, there is unrestricted will to power and will to rule, unrestrained ambition and meaningless consumerism. Such is for Rathenau the picture of the times captured in the mirror of technology: 'If one considers ... world production, the insanity of the economy appears to us terribly frightening. Superfluous, trivial, harmful, contemptuous things are heaped in our stores, useless fashion statements that should, in a few days, emit a false radiance, ways of getting intoxicated, stimulus, a numbing ... Every new financial quarter, all these worthless things fill stores and warehouses. Their manufacture, transportation and consumption require the work of millions of hands; they demand raw materials, machines, plants, occupying approximately one-third of the world's industry and workers.'[50] Modern technology, and the modern economy, which has apparently created and sustained itself by its own means, is the true jug of the Danaides. This image, already used by Plato in *Gorgias* to describe the vanity and absurdity of an ethics measured according to purely hedonistic criteria, spontaneously forces itself upon us when we read Rathenau's description. Every satisfied need serves only to bring forth new needs in increasing measure – and, once you have entered it, there is no escape from this cycle. Seizing the human being even more relentlessly than the workings of his own drives is the working of the drives of his situation that is the result and product of technological culture; he is thrown by technological culture into a never-ending vertigo that moves from desire to consumption, from consumption to desire.

As long as we remain in the sphere of its external appearance, its consequences and effects, the hard verdict cast here upon technology is without appeal. Only one question can still be asked: whether these effects can necessarily be attributed to its essence, that is, whether they are enclosed in the principle of formation of technology, and whether they are demanded by it. When the problem is taken in this sense, a thoroughly different aspect of the observation and judgement emerges. Rathenau leaves no doubt that all the gaps and damage of modern technological culture he inexorably uncovers not only come from itself, but rather have to be understood in terms of their connection with a

certain form and order of commerce. Every attempt at improvement must begin here. This connection does not originate in the culture of technology. It is more the case that it is made necessary and thrust upon one by a particular situation, by a concrete historical position.[51] Once this interconnection is established, however, it cannot be undone by means of technology alone. It is not enough here to appeal to the forces of nature or mere understanding to technological and scientific intellects. Here it suffices to indicate the point at which only the deployment of a new willpower can create change. In this construction of the realms of will and the basic convictions upon which all moral community rests, technology can only ever be a servant, never a leader. It cannot by itself determine the goal, although it can and should collaborate in carrying it out. It best understands its own meaning and its own narrative when it is content in the fact that it can never be an end itself. Rather, it has to fit itself into another 'realm of purpose', into a genuine and final teleology that Kant described as ethico-teleological. In this sense, the 'dematerialization', the 'ethicization' of technology forms one of the central problems of our present culture.[52] Just as technology could not immediately create ethical values out of itself and its own circle, there cannot exist alienation and opposition between technology's values and its specific direction and basic convictions. This is the case because technology is governed by 'practical thinking', by the idea of a solidarity of work in which all ultimately work for one and one works for all. It creates – even before the truly free community of wills – a sort of community of fate between all those who are active in its work. Thus, we can correctly define the implicit meaning of the technological world and technological culture as the idea of 'freedom through bondage'.[53] If this idea is truly to have an effect, it is, of course, necessary that it transform more and more its implicit meaning into an explicit one. That which appeared in technological creation is recognized and understood in its basic direction, that it is raised into mental and moral consciousness. Only if this happens does technology prove not only to be the vanquisher of the forces of nature but also the vanquisher of the chaotic forces of the human being. All the defects and failings one is in the habit of advancing today are, in the end, based upon the fact that until now it has not fulfilled its highest mission. In fact, it has hardly yet recognized it. All 'organization' of nature, however, remains questionable and sterile, provided that it does not lead to the goal of the formation of the will to work and the real and fundamental work attitude. Still, our culture and our present society are far from this goal. Only when this is understood as such and methodically and

energetically grasped, will the real relationship between 'technology' and 'form', its deepest form-forming strength, be able to prove itself.

Translated by Wilson McClelland Dunlavey and John Michael Krois

Notes

1. First published in *Kunst und Technik*, ed. Leo Kestenberg (Berlin: Wegweiser, 1930), 15–61. Our translation is based both on the essay's first publication in *Kunst und Technik* and the later publication in Ernst Cassirer's *Gesammelte Werke*, ed. Birgit Recki (Hamburg: Meiner, 1998–2009) (hereafter cited as ECW), vol. 17 *Aufsätze und kleine Schriften (1927–1931)*, ed. Tobias Berben (2004), 139–83. We have translated the footnotes as they appear in the first edition, as well as some helpful footnotes from the second edition (shown in square brackets). We have followed the typography of the latter edition. Further comments added by us are marked as translators' note.
2. The German word is 'Geist', which is sometimes rendered as 'Spirit' in English, particularly in reference to Georg Wilhelm Friedrich Hegel. 'Mind' is our preferred term, though the 'mind' of René Descartes should not be presupposed (translators' note).
3. [Georg Wilhelm Friedrich Hegel, *Grundlinien der Philosophie des Rechts*, in *Werke*, ed. Eduard Gans, vol. VIII (Berlin, 1833), 19f.]
4. Friedrich Dessauer, *Philosophie der Technik: Das Problem der Realisierung* (Bonn, 1927), 146.
5. Eberhard Zschimmer, *Philosophie der Technik: Vom Sinn der Technik und Kritik des Unsinns über die Technik* (Jena, 1914), 28.
6. Art, skill (translators' note).
7. Plato, *Cratylus* 389 A (for detail, see my presentation of the history of Greek philosophy: 'Die Philosophie der Griechen von den Anfängen bis Platon', in Max Dessoirs (ed.), *Lehrbuch der Philosophie*, vol. I, 7–138, 92f [ECW 16, 313–467]).
8. Dessauer, *Philosophie der Technik*, 150; Max Eyth, 'Poesie und Technik', in *Lebendige Kräfte: Sieben Vorträge aus dem Gebiete der Technik*, 4th edn (Berlin, 1924), 1f.
9. In the scope of this work I can only state this thesis: for the development and the systematic justification of this claim I refer the reader to my *Philosophie der symbolischen Formen* (vol. 1: *Die Sprache*, Berlin 1923 [ECW 11], vol. 2: *Das mythische Denken*, Berlin 1925 [ECW 12] and vol. 3: *Phänomenologie der Erkenntnis*, Berlin 1929 [ECW 13]).
10. [Jean-Jacques Rousseau, *Discours qui a remporté le prix a l'Academie de Dijon, en l'année 1750. Sur cette question proposée par la même Academie: Si le rétablissement des sciences et des arts a contribué à épurer les mœurs*, in: *Collection complette des œuvres*, vol. XIII (Zweibrücken, 1782), 27–62.]
11. ['Do not laugh, do not lament, do not even hate; rather, understand.' Baruch de Spinoza, *Tractatus politicus*, in *Opera postuma* (Hamburg, 1677), 265–354, 268. See, for example, the disparate judgements over the meaning and worth of technology, which Zschimmer has summarized in his *Philosophie der Technik*, 45ff and 136ff.]

12. Eyth, 'Poesie und Technik', 12ff; see also the lecture 'Zur Philosophie des Erfindens', in *Lebendige Kräfte*, 229–64.
13. For details about this 'analogical character of logos' in the theory of language of the sophists, see the explanation of Ernst Hoffmann, *Die Sprache und die archaische Logik* (Tübingen, 1925), 28ff.
14. [Verified by James Boswell (conversation on 7 April 1778), in *Life of Samuel Johnson*, vol. II (London, 1900), 422–30, 425.]
15. Wilhelm von Humboldt, 'Ueber die Verschiedenheit des menschlichen Sprachbaues und ihren Einfluss auf die geistige Entwicklung des Menschengeschlechts', in *Werke*, ed. Albert Leitzmann, vol. VII, part I, (Berlin, 1907), 119; for details, see my *Philosophie der symbolischen Formen*, vol. I: *Die Sprache* (Berlin, 1923). [ECW 11]
16. [Wilhelm von Humboldt, *Werke*, vol. IV, 1–34, 27.]
17. Theodor-Wilhelm Danzel, *Kultur und Religion des primitiven Menschen: Einführung in Hauptprobleme der allgemeinen Völkerkunde und Völkerpsychologie* (Stuttgart, 1924), 2ff, 45ff and 54ff.
18. For a more detailed argument, see the introduction to my *Philosophie der symbolischen Formen*, vol. I, 6ff [ECW 11, 4ff].
19. See James George Frazer, *The Golden Bough: A Study in Magic and Religion*, part I in vol. II: *The Magic Art and the Evolution of Kings* (London, 1911), chapters 3 and 4.
20. Rich ethnological material for this fundamental view can be found in Lucien Lévy-Bruhl, *Das Denken der Naturvölker* (German translation: Wien, 1921).
21. The dominion of man on earth (translators' note).
22. [Francis Bacon, *Novum Organum*, in Robert Leslie Ellis, James Spedding and Douglas Denon Heath (eds), *Works*, vol. I (London, 1858), 70–223, 157.]
23. The middle stage in a process (translators' note).
24. For details, see *Philosophie der symbolischen Formen*, vol. III, 317ff [ECW 13, 315ff].
25. 'Wherever sympathetic magic occurs in its pure unadulterated form, it assumes that in nature one event follows another necessarily and invariably without the intervention of any spiritual or personal agency. Thus its fundamental conception is identical with that of modern science. The magician does not doubt that the same causes will always produce the same effects. Thus the analogy between the magical and the scientific conceptions of the world is close. In both of them the succession of events is perfectly regular and certain, being determined by immutable laws, the operation of which can be foreseen and calculated precisely; the elements of caprice, of chance and of accident are banished from the course of nature.' (Frazer, *The Magic Art*, vol. I, 220f.)
26. Ludwig Noiré, in his book *Das Werkzeug und seine Bedeutung für die Entwickelungsgeschichte der Menschheit* (Mainz, 1880), has emphasized that the particular signification of the work-tool, in its purely intellectual sense, lies in the fact that it represents a basic means in the process of 'objectivation' out of which the worlds of 'language' and 'reason' emerge. 'The great importance of the work-tool', he emphasizes, 'lies mainly in two things: in the solution or singling out of causal relations whereby the latter receives in human consciousness an ever growing clarity and, secondly, in the objectivation or the projection of his organs that had up to now taken place only

in the darkness of the consciousness of an instinctual function.' (34). This thesis remains valid even if one does not agree with the justification given by Noiré – a justification that is founded mainly on linguistic-historical facts and on a certain theory about the origin of the language.

27. For details, see my work *Sprache und Mythos: Ein Beitrag zum Problem der Götternamen* (Studien der Bibliothek Warburg, vol. 6) (Leipzig, 1925), 48ff, 68f [ECW 16, 227-311, 278ff, 298f].
28. [Johann Wolfgang von Goethe, 'Paralipomena', in *Werke* (Weimar, 1887–1919), part. I, vol. XLVII, 275–389, 323.]
29. Ludwig Klages, *Vom kosmogonischen Eros* (München, 1922), 45 (first quote); see also *Mensch und Erde: Fünf Abhandlungen* (München, 1920), 40ff (second quote: 40f).
30. [Friedrich Schiller, *Über die ästhetische Erziehung des Menschen in einer Reihe von Briefen* (1793–4), in *Philosophische Schriften*, vol. II (Stuttgart and Berlin, 1905), 3–120, 59.]
31. Ernst Kapp, *Grundlinien einer Philosophie der Technik: Zur Entstehungsgeschichte der Cultur aus neuen Gesichtspunkten* (Braunschweig, 1877), 41ff, 76ff and 122ff (quotes: 41 and 79).
32. See, for example, Max Eyth, 'Zur Philosophie des Erfindens', 234ff; Zschimmer, *Philosophie der Technik*, 106ff.
33. Kapp, *Grundlinien*, 26.
34. See Franz Reuleaux, *Theoretische Kinematik: Grundzüge einer Theorie des Maschinenwesens* (*Lehrbuch der Kinematik*, vol. I) (Braunschweig, 1875).
35. For details, see Dessauer, *Philosophie der Technik*, 40 ff; Zschimmer, *Philosophie der Technik*, 102ff.
36. For details, see my *Philosophie der symbolischen Formen*, vol. I, 132ff [ECW 10, 133ff].
37. Karl Bücher, *Arbeit und Rhythmus*, 2nd edn (Leipzig, 1899), esp. 24ff.
38. For details, see Preuß, *Religion und Mythologie der Uitoto: Textaufnahmen und Beobachtungen bei einem Indianerstamm in Kolumbien, Südamerika* (Göttingen and Leipzig, 1923), vol. I: *Einführung und Texte*, 123ff, as well as Preuß's essay 'Der Ursprung der Religon und Kunst', *Globus* 86 (1904), 321–7, 355–63, 375–9, 388–392; and *Globus* 87 (1905), 333–7, 347–50, 380–4, 394–400 and 413–19.
39. [See Georg Simmel, 'Der Begriff und die Tragödie der Kultur', in *Philosophische Kultur: Gesammelte Essais* (Potsdam, 1923), 236–67.]
40. For details, see my *Individuum und Kosmos in der Philosophie der Renaissance* (Studien der Bibliothek Warburg, vol. 10) (Leipzig, 1927) [ECW 14, 1–220].
41. Leonardo Olschki, *Geschichte der neusprachlichen wissenschaftlichen Literatur*, vol. III: *Galilei und seine Zeit* (Halle, 1927), 139f.
42. Adequateness of thing and intellect (translators' note).
43. In his *Philosophie der Technik* (47f) Dessauer keenly and poignantly remarks: 'The reunion of an inventor with the object that he has "brought forth" for the first time, is an encounter of unprecedented power, a strong revelation. The inventor looks at that which was achieved by his work, though not by it alone, not with a "I have made you", but with a "I have found you". You were already somewhere; I had to search long for you ... That you did not exist before owes to the fact that it was only now that I found that this is how you are. You could not appear or fulfil your purpose *until you were so in*

my look, as you are in yourself, because this is the only way you can be! Certainly, now you exist in the visible world. But I have found you in another world, and for a long time you refused to cross over into the visible realm, just until I rightly saw your true Gestalt in that other realm.'

44. Universal man (translators' note).
45. One thinks here in particular of the essay by Eyth, 'Poesie und Technik', 9ff.
46. [Plato, *Symposium*, 210 C ('*ἐπιστημών κάλλος*') and 211 C ('*τά κάλά ἐπιτηδένματα*').]
47. Quoted after Julius Goldstein, *Die Technik* (*Die Gesellschaft: Sammlung sozial-psychologischer Monographien*, ed. Martin Buber, vol. 40) (Frankfurt am Main, 1912), 51.
48. Concerning theoretical knowledge, this process is explained and developed further in my *Philosophie der symbolischen Formen*, vol. III, part III, 472–559 [ECW 13, 468–556].
49. See esp. Walther Rathenau, *Zur Kritik der Zeit* (Berlin, 1912), and, by the same author, *Zur Mechanik des Geistes oder vom Reich der Seele* (Berlin 1913) and *Von kommenden Dingen* (Berlin, 1917).
50. [Rathenau, *Von kommenden Dingen*, 91f.]
51. Concerning the necessary disjunction between technology and economy, see, in addition to the writings of Rathenau, the remarks by Zschimmer, *Philosophie der Technik*, 154ff, and Dessauer, *Philosophie der Technik*, 113ff.
52. The problem of this 'ethicization' is rightly emphasized by Viktor Engelhardt, *Weltanschauung und Technik* (Leipzig, 1922), 63ff, and by Richard Nikolaus Coudenhove-Kalergi, *Apologie der Technik* (Leipzig, 1922), 10 ff.
53. Dessauer, *Philosophie der Technik*, 86; see esp. 131ff.

Ernst Cassirer on Form and Technology

Contemporary Readings

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