Communication and Control in Time

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ABSTRACT

This essay offers a general view of communication *and control*. It reviews some basic concepts and processes in *social control*. Then it surveys the most important *techniques* of social control. Special attention is given to the fact, that all *communication and control occur in time*, and that it also takes time for their consequences to occur. Therefore some of the most important *factors in the timing (diachronization)* of the emission of messages and commands are described. The *being in time* of the subjects of control and of their Selves is briefly mentioned. Finally, it is suggested that the Self is essentially a communication and control system, and that it functions as a *modal converter*.

COMMUNICATION AND CONTROL

A view of communication

While conceptions of communication, such as "transfer of information from sender to receiver" or "sending messages through channels" are extremely useful in the areas of their proper application, in the context of this paper it may be of advantage to adopt a much broader view of communication. Such a view should not only be compatible with, but also subsume the more specialized common definitions.

In the broadest sense we can regard as communication any MODIFICATION OF THE ENVIRONMENT (outer or inner) of an object by which it can be, and sometime is, influenced. Those aspects of the environment, the states of which can influence an object and are thus of potential interest to it, are generally called (at least in the case of a subject) the object's situation. We may therefore restrict our notion of communication to any *modification of the situation of an object*. A modification in the situation of an object can only result in change of state of the object, if it affects the object through forces to which it is susceptible. Since, in theory[4], to each distinguishable force there corresponds a specific *medium* (or 📖 *276* field) through which it is propagated, we shall say, that COMMUNICATION IS A MODIFICATION OF A MEDIUM, which can affect the object.

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[4]   Such as **gauge theory**. The discussion of communication and control from a theoretical point of view turns out, unfortunately, to be beyond the scope of this essay.

We may wish to imagine, that in order to respond in a non-negligible way to a modification of a medium (a communication), the object — or if you insist, subject — must attach SIGNIFICANCE to it. As is well known, whether or not the object will attach significance, depends both on the informational and on the motivational component of the modification. The informational significance of the modification depends on its exceeding certain threshold of the object's irritability. We generally assume that among these characteristics of the modification are the improbability or randomness of its occurrence, the variation in its magnitude, the variation in its context, and the degree of its similarity to previous modifications deemed significant. The motivational significance of the modification depends on whether it is related to the object's interests. We may well distinguish between the object's general and specific interests (as they are embodied in its organization). Any modification will be of greater motivational interest, if the object is in a state a general arousal[5] (excitation). Particular modifications will be of greater interest, if the object is in a state of a corresponding specific arousal (drive).

Only when a modification is assigned both informational and motivational significance can we say that the object has assigned a MEANING[6] to it. When a source is attributed to the modification (source of disturbance), and significance is attached to the source as well, the modification can be treated as a SIGNAL[7.] A signal is a behavior of any object that provides information about its present or future state. To interpret a signal as a MESSAGE, an assumption has to be made that the signal is intended to control the state of an other object, or at least that it is related to its past, present or future states. Clearly not only people, but also animals behave as if they regarded signals as messages, received or intercepted, but it is difficult to theorize about messages without anthropomorphizing and introspecting. We shall leave the topic with this remark for now. In the present context, the topic of signals and messages is interesting, because the false attribution of sources to modifications of media leads not only to erroneous behavior, but also to well-known pathologies, which range from projection to illusions, hallucinations and the creation of paranoid pseudo-communities[8].

Communication *equals* control

It is a fundamental theorem of cybernetics, that COMMUNICATION AND CONTROL ARE THE SAME process. At most one could say, that they are the same 📖 *277* process conceptualized differently, for the theoretical or practical purpose at hand. To say that an object has been influenced by a communication is to say that it has been controlled. Some aspect of its state has to be modified — in higher organisms at least their nervous, hormonal, or immune system. Terms communication and control are hopelessly imbued with anthropomorphism and teleology, and it is difficult to use them without recourse to intentional discourse and reference to introspection. It seems nevertheless, that one can use these terms interchangeably, and in this essay one or the other term shall be used, depending on the immediate context.

Another concept that is closely associated with the concepts of communication and control is the concept of action. It assumes different guises in the history of physical and social theories, yet it seems to have some common essential features. It is a term that is cast in a

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[5] Cf. e.g., BERLYNE (1960) or (1965, pp. 251-255).

[6] That does not yet mean that the object has assigned a **sense** to it. Subjectively this is the same as decoding the communication. But that is a topic that exceeds the scope of this essay.

[7] In a broad sense, not in the technical sense.

[8] Cf. CAMERON (1943) and (1949).

functional form, which is a form that allows its formalization by the calculus of variations. It describes the behavior of objects with one or more of their variables maximized, minimized, or optimized. In the physical sciences this form is used, when one contemplates the effect of the behavior of one object on another, or their interaction. In physics it was, and in the life sciences it still is, imbued with teleology and intentionality.[9] It is nevertheless a useful concept for describing the communication and/or control relationships between definite objects.

We may distinguish between physical, social, and psychological action. An action is physical, when an object is controlled as if it was merely an object, *i.e.,* as if it had no propensities to exercise control itself. An action is social, if an object is controlled as if it had a propensity to exercise control over its own or over the controller's behavior, *i.e.,* as if it were a subject. Finally, an action will be called psychological, if the controller controls its own Self as a subject, *i.e.,* as if its actions were capable of controlling its future actions.

This calls for a reminder of another set of useful distinctions, those between indirect control, direct control, and programming. Indirect control alters the situation of an object, so that the conditions of its behavior change. Such control may thus disguise both the relevance and the source of the disturbance to the object. Direct control acts on the object as it is presently organized. Programming attempts to alter the organization of the object; if successful, the initial source of control may become disguised from the object in the future.[10]

This leads us to the final, preliminary distinction among the sources of control. The source of control of an object may be internal, if it is emanating from its 📖 *278* organization (program). It may be external, if the control stems from an object or process outside of it. The source of control may be an interaction between two or more objects. This often leads to a complementary arousal, *i.e.,* increased sensitivity of the interacting objects to each other's behavior. Such behavior is responded to as if it were regarded as signals, given meaning, and interpreted as messages.[11] Over time the behavior of the two objects may be characterized by a complementarity of readiness to respond in a particular way — in subjects a complementarity of expectations. There emerges a double contingency of behavior, when the actions of each depend on the actions of the other(s).[12] Such control may become internalized, *i.e.,* the arousal and behavior may become programmed by learning or inheritance. On the other hand, it may become institutionalized, *i.e.,* the mutual expectations may become binding. They may become internalized and controlled internally, and/or they become controlled externally, either by the other interacting object or by other objects external to the interaction. Here each object[13], to the extent that it controls binding (legitimate) expectations in an interaction, becomes an authority. Control by authority is indispensable to the stability and stable change of institutions. As institutionalization of interaction is

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[9]   In antiquity, Hero's explanation of the behavior of light rays attributes them with purposivity, intelligence, and parsimony. Many biologists still talk as if organisms did strive for survival and species sought to adapt themselves to their environments. In sociology, Parsons expressed the state of the field in the 1950's, when he defined action as "an actor seeking goals in situations". However, even he recognized the inadequacy of this formulation, and sought to define action as "the relation between an actor and a situation". Later he attempted to bring his definition in accord with the physical conception, by defining action as "distribution of energy ... subject to definite constrains". For a concise review of Parsons' conception of action, cf. JUNG (1984).

[10] To reveal such disguised sources of programming was one of the goals of psychoanalysis.

[11] Cf. WASSENAAR ET AL. (1995) in this volume.

[12] This phenomenon occurs in the most elementary physical objects. In higher animals, the best examples are display behaviors and ritual behaviors, such as mating dances. It is of course the stuff of which the fabric of social life is made.

[13] Literally each object: e.g., a person, a symbol, a dog, a dice, a law, weather or an omen.

stabilized, the control by authority is expanded (halo effect)[14]. The authority can then set new binding expectations.

Social control

Social control is the control over the interaction of an aggregate of individuals with each other and with their environment. To the extent that social control is effective, we may speak of a social system (e.g., a family, a group, an organization, a community, a society).

In social systems, each individual object exercises to some extent control over the behavior of some other objects and is in turn to some extent controlled by some other objects. An object that is both socially controlled and controlling can be properly called a subject in both senses of the word. It is 'subject' to control, and it seems proactively to attempt to control. Subjects exercise control over each other by communication.[15] Both direct and indirect communication / control as well as programming come into play, and internal, interactive, internalized, and institutionalized control as well as control by authority is effective. In a well functioning and stable system all these sources and modes of control become transparent, and the social system (in the same way as one of its sectors, the economy) seems directed only by an invisible hand. In fact, the controls are simply the authority that each individual exercised in the past or exercises currently over others, or is assumed by them to be able to exercise ⌨ *279* over them in the future. Subjects with authority can therefore by seen as agents of social control. They are agents both in the sense of seeming proactive, as well as appearing of communicating (controlling) on behalf of some other agency[16].

Authority is defined as legitimate power (in our context, control) over others. Agents of social control strive to be seen as appearing to control legitimately, *i.e.,* when their right to control others is or might be questioned, they display or invoke evidence of having authority bestowed (delegated) upon them by agencies whose authority is not questioned by the one(s) being controlled. When Max Weber concerned himself with this issue, he distinguished between two ways of acquiring authority. The first is authority by appointment (or, we might add, by election)[17] to an office, which in itself is seen as a source of defined authority. The second is authority by calling, when the subject himself and/or others see signs that he has a mission to exercise control over others in a certain situation. Calling rather then appointment has been the way of acquiring authority in the free professions, by preachers, healers, and teachers. Their authority is usually confirmed by peers, and accepted by the controlled.

A special, perhaps the original, type of calling is charisma, where the controlled detect in the controller special gifts[18], and therefore submit freely to his control. Later his peers

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[14] **Halo:** the aura of glory, veneration, prestige, or sentiments surrounding an idealized person or thing. Webster's. **Halo effect** *n*: a tendency for a general opinion or attitude derived from rating an individual as high or low on one item of a test to exert an influence upon the rating of other and separate items, traits, or responses; *esp*: generalization from the perception of one outstanding personality trait to an overvaluation of the whole personality. Webster's. The term was introduced into psychology by Thorndike in 1920 in the context of psychological testing.

[15] Cf. e.g., Karl-Otto Apel's (and Jürgen Habermas') occasional consideration of a social system as a Kommunikationsgemeinschaft (in a free translation: 'a community of communication').

[16] E.g., their office, a higher official, society, culture, science, a profession, the natural order, the supernatural, *in loco parentis.*

[17] The agent(s) appointing someone to an office must hold authority presumably unquestioned by those to be controlled. They need not be persons; an appointment might occur, for example, by inheritance, relative age, or a throw of dice.

[18] Such as access to powers or information (knowledge) not accessible to the controlled, *i.e.,* a special pipeline to heavens.

may also acknowledge his charisma. If the institutions established by the charismatic authority are to persist, a process, which Max Weber has called the routinization of charisma, must start. It generally results in the replacement of charisma by calling, and eventually by election or by appointment. Charismatic authority is replaced by an office, which is represented as possessing similar gifts[19] as the founder. It should be noted that most holders of authority strive for, or are granted by the controlled, additional authority, beyond that originally specified in the control relation (e.g., office)[20]. It is as if authority, acquired in any way, was itself a sign of charisma — here again we have the 'halo effect'.

Freud devoted much thought and writing to the issue of acquisition and exercise of authority in general and specifically by parents over their child and by the analyst over the analyzand. His technique of psychoanalysis, taught for years as a craft in the analytic institutes to those aspiring to be called to the profession, contains many procedures and rules relevant to our topic. Many of these have been systematized and generalized by Talcott Parsons in his theory of social control, which we shall review soon. Here we should only note that Freud's theory of transference is to a considerable extent a theory of the origin of the 'halo effect'.

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The technique of social control

To be able to communicate with and to control another subject, the agent of social control must go through a series of processes. While the effort and time invested may decrease, for successful communication / control it is necessary to go through the series, whether this is the first attempt to control, or whether there is a history of previous communication. Even if the control relation has been institutionalized, the processes have to be repeated. This is primarily because the medium of communication, the controlled, and the institutional structure of control are complex systems, that undergo spontaneous changes through time, and because in the meantime competing controllers may have established themselves.

The first step, in any effective attempt to communicate / control, is to find or choose such a modification of such a medium to which the intended subject will attach significance. In other words, the modification must capture his attention. Then the modification must be both repeated (and varied, so that attention remains), till the subject interprets it as a message.[21] The third necessity is to modify the message until it is interpreted by the subject as relevant to his interest, *i.e.,* is regarded by him as a crucial message and is endowed by him with meaning.[22]

Next, the subject's attention must be drawn from the message to the source of the message. This is obvious when direct control is attempted, and the controller is attempting to establish himself as an authority. It is also essential when the controller wishes to establish indirect control through structuring the subject's situation, and the subject must be led to believe that certain situational givens are crucial for him and that he is to divine their meaning. In the case of control by programming, when the controller attempts to modify the subject's inner states and structure, the subject must be taught to 'listen' to certain inner states, which become the sources of his compulsions. In these last two modes of control,

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[19] Potency (access to unusual powers) and credibility (access to unusual information).

[20] E.g., as when a subordinate of an official or a patient of a physician seek personal advice from, or bestows sexual favors on, them.

[21] Cf. WASSENAAR & SCHUT (1995) in this volume.

[22] In psychological terms, the subject develops *attention cathexis*, as Rapaport has called it.

the controller may wish to disguise himself in order not to be seen as the real source of control.

Once the source of control is attended to, the controller must seek to institutionalize the control relationship, *i.e.,* seek to persuade the subject to endow the source of control with authority.[23] For the description of this and subsequent phases of control, we shall rely on Talcott Parsons' analysis of the psychotherapeutic relationship, which he first applied to the doctor-patient relationship, and then generalized to a model of social control.[24] Although in the ⊞ *281* rest of this section I shall follow Parsons in talking about the therapeutic relationship, the reader may readily apply the reasoning to other control relations, such as the relationship of a citizen to a bureaucrat, or the relationship between a subordinate and a superordinate in any employment, business, or family situation.

The therapeutic contract will serve as example of the institutionalization of the communication / control relation. The therapist agrees to contribute his time, effort and skills and the client agrees to cooperate, by giving the therapist truthful information and by following his directions in behaviors which the therapist deems relevant to the patient's health. The contract first of all institutionalizes the commitment of both parties to pay attention to and to attempt to assign meaning to all changes of media that pertain to the patient's health, and attempt to define some of these. Secondly it institutionalizes an asymmetric relation, in our example the doctor - patient relationship. The patient is expected to pay attention to changes in media relevant to his health, and to communicate them, uninterpreted, to the doctor. The doctor is expected to interpret these as to their relevance, *i.e.,* to assign them meaning, and to attempt to control the patient's behavior and situation — with direct, indirect, and/or programming control.[25] The patient is expected to obey or to suffer this control. In other words, the doctor is granted authority in a defined area, and the patient agrees to a voluntary subordination to a higher and responsible will, *i.e.,* to discipline.

Further aspects of the asymmetry are either specified in the contract, or they are assumed to be understood, because they are already institutionalized.[26] The nature of salient communication is different. The doctor issues frame commands, asks questions, gives interpretations and instructions, physically manipulates or restricts the patient, and answers the patient's questions at will. The patient reveals intimate details about himself.[27] The doctor 'attends' to the patient by giving him time, attention and care (*i.e.,* control and communication) according to his judgment and (professional) responsibility. The patient pays the fees, attends[28] at limited, specified times and places, complies, and waits and suffers patiently. In most of their encounters, the doctor and patient display the stigmata[29] of their respective statuses. The doctor employs the props[30] of his profession: the trappings of his

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[23] The *internalization* of the control relationship by the subject is also called *identification* with the controller.

[24] For a general discussion of the doctor - patient relationship cf. PARSONS *Social System*, Ch. X. "Social Structure and Dynamic Process: The Case of Modern Medical Practice".

[25] E.g., instructions, medication, surgery, hospitalization, behavior modification, or cognitive and emotional modification.

[26] By law, a more general contract (e.g., with a hospital or health insurance,) or custom (tradition).

[27] E.g., dreams, feelings, body states, display behavior (self-expression), reactions of others to himself.

[28] *I.e.,* presents himself and pays attention.

[29] Visible (perceptible) signs of status organized into an image. I am using the term **stigma** in its original neutral meaning, not in its current colloquial and restricted meaning, which emphasizes signs of inferior status, as does e.g. GOFFMAN in his two excellent studies, *Asylums* and *The Presentation of Self in Everyday Life.*

[30] The term **prop** is used in the theater and by applying the dramaturgic metaphor to socio-psychological phenomena. Cf. GOFFMAN, *The Presentation of Self in Everyday Life* and his *Frame Analysis.* The latter book is in

office (diplomas, furnishing, apparatus, library), attire, and superior spatial placement and posture. The patient is denied the status he assumes in other relationships, assumes an inferior placement and posture, is stripped of his normal clothing and insignia (which are often replaced by a patient uniform)[31], and is denied any authority in interpreting and controlling his health.

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    Parsons[32] has identified further techniques of social control, such as support, permissiveness, and refusal to reciprocate, and deliberately imposed sanctions or relational rewards. Of these, in my view, the first two are mainly effective in strengthening the institutionalization of the control relation, whereas the second two are fully effective only when the authority of the agent of social control is firmly established. While relying on Parsons' analysis, I shall emphasize or add those features of the following techniques of social control, which are directly relevant to the orientation of this paper.

    The prospective agent of social control provides support of behaviors and feelings of the person (to be) controlled, including items that no other situation permits, in order to seduce him/her into the control relation. The support is usually localized to behaviors and feelings engaged in the privacy of the relation. This support is the initial reward for attending and fulfilling the contract.

    The initial permissiveness of the controller encourages the one controlled to display the full repertory of his behaviors and feelings, or to report it. Occasionally, the controller may act as an agent provocateur, trying to stimulate behaviors and feelings, which may not be spontaneously revealed. Thus the controller gains information about items to be controlled later, and is prepared for unintended consequences of the strain induced by future attempts to control.

    The actual control employs first the technique of denial of reciprocity. This consists of invoking the asymmetry of the relation mentioned above, and the props and stigmata mentioned earlier are employed. The controller may support 'deviant' behavior and excessive expression of 'inappropriate' emotion, but 'keeps his cool' and 'stays outside and above it'. He maintains a detached and affectively neutral stance, since his power, knowledge, and inner states are in a realm presently inaccessible to the controlled. This behavior is essential to avoid being drawn into intimacy and to deal with transference, to refuse to be treated and regarded as an equal, but to maintain oneself as an authority.

    In order to modify the behaviors and feelings of the person controlled the controller must actively intervene. In general, this takes the form of advice and persuasion to follow new rules of behavior and emotion. The aim of control may be not only overt compliance by, but actual reprogramming of the controlled. The intervention may occasionally take the form of coercive control, by modifying the bodily states or the inner organization of the controlled. For all these procedures, the technique of administration of sanctions (rewards and punishments, including the 'relational rewards' available due to the 'halo effect') □ 283 is essential. The controlled is rewarded for his cooperation or sufferance, and punished for the lack of it. The modification of the situation of the controlled, when indirect control is employed, has not only coercive aspects, but may be an ancillary source of sanctions — here

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turn frequently used as a text in schools of acting.

prop *n -s* [by shortening] **1 :** property **2 :** an article, object, or device used to provide or aid in creating a realistic effect (as of a performance, exhibit, or narrative) … . WEBSTER'S.

[31] Cf. GOFFMAN, esp. *Asylums,* Ch. 1. "On the Characteristics of Total Institutions".

[32] For PARSONS' analysis of social control, cf. his *Social System,* Ch. VII. "Deviant Behavior and the Mechanisms of Social Control". The four techniques, as I call them, are discussed in the section titled "The mechanisms of social control", pp. 297-321. Most relevant are pp. 299-301, where the four 'mechanisms' are directly described.

the actual source of the sanctions may be disguised, so that the authority of the controller is not attenuated by the negative reactions of the controlled.

All these techniques are consciously or unconsciously employed by all agents of social control: from extreme brainwashing, through political and commercial practices, artistic performances, status seeking in a community, parenting, to love and friendship. The sequence is always the same: to capture the attention of the object to be controlled, to learn its behavior and feeling repertory, to modify its situation, to establish oneself as authority, to shape its behavior and inner states and structure.

COMMUNICATION AND CONTROL IN TIME

All communication and all control occur in time and over time. There exist a number of logical schemes and mathematical techniques, which are intended to aid in executing communication and control over time.[33] We shall, in this essay, consider in general terms some implication of the space-time separation of the controller and of the controlled. This is necessary, since in social control we may only to a very minor extent rely on mathematical and physical-technological solutions of the problems that arise. Instead, we must invent psychological and sociological techniques, often adapted to unique situations.

Signals degrade and nobody may be listening anyway

An event is a perturbation (modification) of some medium (or some media) at a space-time location. This perturbation spreads over space in time. At other space-time locations, objects are in time perturbed by it. Some may simply be somewhat perturbed by it, and thus in turn relay the perturbation (as new sources) through the medium. Others may regard it as a signal, or even assign a meaning to it, *i.e.,* treat it as a message, and perhaps even try to infer its source.

Let us first consider the situation of the object to be controlled, *i.e.,* the potential receiver of a message. As the perturbations spread through space-time, it is attenuated. It is also interfered with, not only by the spontane- 📖 *284* ous, random fluctuations of any medium, *i.e.,* by noise, but also by the systematic perturbations due to events at other space-time locations. The object that regards perturbations of some medium (perhaps emanating from a particular source, i.e. A space-time region) as significant, may try to improve its chances to detect the signal and its ability to interpret it as a message. It may try to orient itself to the perturbation (pay more attention), and to increase the relevant segment of its boundary in size and sensitivity to the perturbation. This means however, that it specializes and decreases (perhaps only temporarily, but often in general) its ability to detect perturbations from other sources and in other media. It may try to filter out the interference, but it will thereby further reduce the intensity of the perturbation. It may try to boost the intensity of the perturbation by adding to it from its own energy, but amplification inevitably adds noise and systematic interference.

Unfortunately, the situation is further complicated. A perturbation never affects an object only through one medium. One can see this effect quite clearly, when one observes the interaction of an elementary relay system called "Newton's Balls", a toy consisting of several suspended bouncing balls. The momentum (perturbation of the gravitational field) imparted

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[33] From calendars and Tinbergen's arrow scheme to computer programs for inventory control and optimal time programming. The value added process of sequencing operations in manufacturing — from extracting raw material to the finished product and its storage, distribution, marketing, sale, delivery, billing, collecting payment, and accounting for it — is a prime example.

to the first ball is partly absorbed by it, and is attenuated during the relay, till the system comes to rest. In the case of billiards, there is not only attenuation, but the slightest imperfection in the balls adds interference and changes the direction of the momentum. Since the direction of the last ball is to be controlled, a calculation of the interaction of the intervening balls is necessary. In the parlor game of 'pass it on in a whisper', the effects on the message of being relayed through complex intervening media are demonstrated beyond doubt.

Now we shall consider the propagation of a perturbation from original source to receiver in more detail (even if still quite superficially). The modification of the boundary of the source object causes the perturbation of a field. At each relay object, the perturbation of the field causes modification of the boundary, the interior of the object, then the boundary, and then the original field. Eventually the perturbation may reach the destination object, modify its boundary, modify its interior, and result in a response, *i.e.,* a modification of its boundary. It is this last modification that is (to be) controlled by the source.

The boundary of each macro-physical object as well as its interior are complicated systems of interaction, *i.e.,* fields in which objects are embedded, functioning as sub-relays. For each relay's (and sub-relay's) boundary and interior, we should consider at least its elastic modulus, which is never equal to 1.   📖 *285* We should also consider its internal structure, which even in the simplest case is heterogeneous and anisotropic.[34] Only then can we estimate the initial deformation of its boundary (perception) and the final deformation of its boundary (response).

At each relay and in the receiver, the initial perturbation must be not only relayed, but also suffer a translation into another field (medium). Relay and reception thus not only experience attenuation and interference, but also refraction, usually much more complex than when light enters from interstellar space into air and then water. When we deal with some non-living, and all living objects, we must note that they are in certain directions hyper-elastic, *i.e.,* the energy (and information) of the response is not only other, but also greater than the energy of the stimulus.[35] They themselves produce interference by boosting signals to which they are oriented with energy (and information) from their own sources. It is then evident, that repeated translations of "messages", not only in relays, but also necessarily in the final receiver, cannot produce a command identical to the original message. A radical translation is impossible.[36]

What is then the situation of the object trying to control, *i.e.,* of the sender of a message? By the mere fact of his being, he causes — voluntarily or not — intended and unintended perturbations of many fields. He may say it with flowers and blush, send a telegram, set a house on fire or build a wall around it, display stigmata, walk bent, or appear on television. If he wants to exercise social control over a public (perhaps a single individual), he must assess the situation of the intended receiver, his own resources, and accordingly compose and then execute a message, *i.e.,* modify his boundary. This will cause a perturbation of a field and may eventually affect the intended receiver in the desired way — or not.

The social control agent may be able to choose a medium and affect the energy of the initial perturbation. He may improve its coherence as to maximize its directionality and in-

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[34] *I.e.,* forces (perturbations) do not *propagate* the same way in all directions.

[35] Anybody who has been slapped, or felt hated and *persecuted* for life in response to a minor remark perceived as insult, has experienced an example of *hyper-elasticity.*

[36] Quine's doctrine of the "impossibility of radical translation" applies generally in communication and control, not only in linguistic communication for which Quine has formulated it.

fluence the selection of relays, so that the perturbation arrives at the expected space-time location of the receiver. On the other hand, he may disperse it, so that it arrives at the probable or possible space-time locations of the receiver. He may try to insulate it from noise or from systematic interference.[37] He may address[38] the disturbance, to attract the attention of, and only of, the intended receiver(s). He may cause a very unusual (improbable) disturbance, to attract attention to it. He may increase the redundancy[39] of the perturbation, and thereby increase the chance of its being received as intended. He may offer variations[40] of the message, so that its meaning can be inferred 286 from the degraded perturbations that arrive. He may attach his signature to identify the source, and to authenticate it, in order to give it a seal of his and/or a super-ordinate authority. In spite of all these efforts, the perturbation may not reach the expected space-time location of the receiver. If it does, the receiver may not be there then. If he is, he may not be listening. Even if he is listening, he may not be able and/or willing to divine the meaning of the perturbation, or to obey the command that it is supposed to entail.

Decomposition and diachronization of control signals

Ultimately, the success of communication and control depends on the timing of the original perturbation. Since all signals travel by various routes at various speeds, they all arrive from the receiver's past. If different components of a message (command), arrive at different times, he must be able to attend to all of them, recognize that they belong together, compose them, interpret and execute them. All that takes time. In general, no perturbation reaching the receiver is a complete message: to constitute a message (command), it must be completed by recourse to (genetically or didactically) pre-programmed components to constitute a meaning and a response. All that takes time. If pre-programming is not in place, it must precede the command by the necessary interval. From the point of view of the receiver, there exists a problem of synchronization.

For the sender (controller), however, there exists the twin problem of decomposition and diachronization. He must identify which components of the desired response are already programmed, how they can be activated, and which additional components have to be sent as the total message. He must emit the various components of the message in such a sequence, at such intervals, by such media, etc., that they arrive at the various expected space-time locations of the receiver not at the same moment, but at the proper moments. The proper moments are those, which take account of the receiver's readiness to receive, to compose and interpret, and to organize and execute a response. The target of the command is the space-time location of the receiver's response.

It is obvious, that these problems can and have been solved. For simple systems, such as a telephone net, e-mail net, or satellite and space probe control, we may avail ourselves of sophisticated technological solutions. But when attempting to control very complex systems, such as higher animals, or extremely complex systems, such as people or social systems, we need to consider them time and again, and rely on craft[41] for providing 287 solutions to typical, or on art to solve unique situations.

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[37] E.g., put it in a sealed envelope, or communicate only in the privacy of his bed or office.

[38] "To whoever hears this", as in a SOS, "to whom it may concern", or "for your eyes-only".

[39] E.g., "I repeat 'NOT' ... " .

[40] E.g., "In other words, ... " .

[41] A collection of tested procedures for solving typical problems or for handling recurrent situations.

Let us review some of the elements of the craft. A simple message of the form "Do this at such a place and at such a time!" can be sent, with any hope of being properly executed, only in the very rare circumstances, when many of the factors of control that we have already discussed are already satisfied and pre-programmed. Even when they are, we usually have to go through a number of preliminary and subsequent steps. An omission of any of these steps may only have trivial, sometime comic, but occasionally costly or disastrous consequences.

When, for example, issuing such commands by telephone, there has to be a pre-established telephone line between the receiver and us; we have to remember, look up or otherwise find his correct telephone number, and have an idea when he may be able to hear his phone ringing. We have to lift the receiver, verify that the line is active, dial the number, verify that it is ringing, verify that the phone is picked up at the other end, identify ourselves, verify the identity of the receiver, and alert him that a command is coming. Before issuing the command, some time is usually taken up by courtesy chatter, in order to allow the receiver to wake up, orient himself, and warm up to us. This gives us an opportunity to remind the receiver of relevant conventions and of previous agreements; if successful, this helps to reestablish and to fine-tune the relationship. On the basis of his responses, we have to pick the right time to issue the command. If he is not there, we may have to ask someone to summon him — or leave a message for him to call us or to expect our call at some place and time. Then we have to repeat the introductory procedure again, perhaps several times. For this there must be already a pre-established control relation. If there is not, we have to establish it on the phone, or perhaps invoke an authority that he acknowledges and assert that we act on its behalf. One or several authentication calls may follow. After issuing the command, we have to query whether it has been understood, repeat and/or vary any portions that have not been understood, verify that the receiver is able to, and agrees to, execute the command. The receiver may give reasons for not being able and/or willing to execute the command as given at the requested time and place. We must then insist on the execution exactly as commanded, or modify the command and repeat the whole procedure again. Often there occurs a protracted negotiation. Finally we confirm the agreement, and sign off (hang up).

All this time all of the previously discussed communication factors have relevance. There may be static or interference on the line, the connection may 📖 *287* be broken, the listener may be distracted by extraneous events, etc. This requires additional repetitions and verifications. If we wish to know whether the command has actually been executed, we may ask for a report by the object given the command, and/or by an independent source. Now the problem is reversed: we must be at the agreed place and time to receive the report.

Most of this applies not only to people, but also to the control of any somewhat complex system, such as a washing machine, television set, a satellite, or a dog. In general, before composing, decomposing and diachronizing a command, we must issue an alert, allow time for the system to warm up and orient itself so that it is able to pay attention, to identify us, and to invoke previous programming. If response and acknowledgment can be obtained from the receiver, we must verify that we are communicating with the correct receiver; which components are already in place; that its interpretative and response ability is intact, that it accepts our authority and command, and that it is on the correct course to the space-time location at which it is to execute the command. If acknowledgment cannot be received in time to issue corrective commands, we must rely entirely on our estimate of the pre-programming, decomposition, and diachronization of the receiving system's internal processes. Finally, after the command has been issued and confirmed, we must terminate communication, so as not to become ourselves a source of interference.

Some relevant timing factors

To be able to correctly estimate the receiving system's ability and willingness to receive, compose, interpret, and execute our command, we must not only consider the general factors of communication and control that have been already discussed, but also the static and dynamic organization of the system and of the control relation in which we partake. In this section we shall consider only some dynamic aspects of the control relation and of the organization of a receiving system, which may be relevant to the sender's decomposition and diachronization of the total control signal.[42]

The basic fact of communication and control is that there always exists a non-trivial space-time separation of the source from the execution of a command. Even when the separation is very small when sending the message[43], and therefore the reaction of the receiver can be observed, or its acknowledgment can be received in time, the internal processes of the receiver will take time. The receiver will thus carry the execution to elsewhen and perhaps also to elsewhere. When the separation is non-trivial and one must resort to remote control, the likelihood of the receipt of acknowledgments decreases inversely with the 📖 *289* magnitude of the separation. In addition, there is a corresponding increase in the uncertainty of the actual space-time location of the receiver to which the signal is to be aimed. Further, the likelihood decreases, that the command will be executed in the target space-time region.

There are two direct consequence of the space-time separation of the controller, the object controlled, and its response, that have to be taken into account in the decomposition and diachronization of commands:

- As the signal travels through space, it experiences *degradation,* e.g., due to spread and attenuation, noise and interference from other sources, refraction and barriers of varying permeability, and other factors we have already discussed.

- Since it travels in time, there will always be *delays* between the emission, reception, and execution of commands. We shall now review the nature and causes of some delays.

All signals travel at limited *speed*. The speed with which the signal is carried by a given medium will cause delays in reaching the boundary of the receiving system and beyond through the system to its execution. Signals travel through space by definite *routes*. The length of the route will affect the duration of the delay.[44] Some routes, or certain sections of a route, are open only during certain time intervals[45], and if the signal does not traverse the whole route while it is open, it must wait for relays. Routes may terminate short of target, or relays may be missing or be mainly barriers. In principle the past is closed to us due to the directionality of time, and most space due to the limited speed of electro-magnetic and gravitational radiation, the swiftest of all messengers — in practice we may not be able to

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[42] Given the inherent space limitation of this essay, only the most important timing factors are mentioned. They are only identified; hopefully enough for the reader to consider their full implications.

[43] Such as when the boundaries of the two objects seem to be touching.

[44] Some routes may also be more noisy and subject to interference, unexpected detours and spread (crossroads and message robbers) then others.

[45] For example the postal service; road traffic signals, rail and drawbridge crossings, police blocks and checks, slow drivers and traffic jams; or clear sight (ballistic) communication to a target (a hunted animal or an orbiting satellite). All such barriers cause noise and interference.

find even in the upper light cone, where communication is in principle permissible, routes that lead from here to there and from now to then.[46]

Since messages are often decomposed not only before, but also during their travel, COMPONENTS OF A MESSAGE ARRIVE BY DIFFERENT ROUTES AT DIFFERENT TIMES at the boundary of the receiver (relay or object to be controlled), and have to be reassembled, amplified, and enhanced. This requires internal control and amplification sub-systems, which supply commands, information and energy from the receiver's own sources[47]. Objects that have such ability are HYPER-ELASTIC, in that the magnitude of their response (amount of energy and/or information) may exceed the magnitude of the stimulus. What was just said about the travel of the message from sender to receiver, applies as well to the travel of the message within the receiver's (often very complex) system.

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Amplification (including enhancement of information) often leads to massive responses to minimal stimuli. Physical aggression in response to perceived verbal insult has already been mentioned; we should now note that it is also caused by an informational enhancement of the original stimulus. This is prevalent in paranoid reactions, when the receiver not only supplies its own address to a stray perturbation (ideas of reference), but it also enhances it through confabulation. Also in hysterical reactions we observe inappropriate amplification and enhancement. A similar physiological phenomenon is an allergic reaction. Here we may also observe a sensitization of the receiver to the message: the speed and/or amount of amplification increases with repetition.[48] An immune reaction serves also as an example of the rejection of the command by the receiver: the experience of a previous message served as an inoculation against its repetition. In other cases fatigue sets in: the speed and/or the magnitude of amplification decreases with repetition. Sensitization, rejection, inoculation and fatigue may be induced by our commands. On the other hand, they may be due to exogenous (situational) factors beyond our control or predictive ability, or be brought about by endogenous factors, some of which will be discussed later.[49]

The delay between the arrival of a signal at the receiver's boundary and his response is called the reaction time of the receiver.[50] For our purposes, we shall distinguish between cognition[51] time and response time. Cognition time consists of the successive delays in orientation to the perturbation, attention to the perturbation, its classification as signal, its interpretation as having a particular meaning, the inference of its source, and the acceptance of the source's authority. Response time consists of the successive delays required by the receiver to go through operations preliminary to action. It will assess its external and internal situation (its action possibility space) as it relates to the command. This will generally involve a survey of its resources (including preprogramming and memory) and of conflicting commands from the same or other sources. It will prioritize required compliances

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[46] In practice, then, here is one way (of several) to avoid control: "Seek autonomy where and when the controller(s) will not be able to reach you!"

[47] Including prosthetic devices.

[48] An allergic response is of course undesirable from the point of the controller. Desirable is the sensitization that occurs during the institutionalization of a control relation, when the receiver internalizes a special readiness (attention cathexis) to respond to the controller's commands.

[49] Good examples of all the phenomena mentioned in this paragraph we may find in the development of a sexual relationship.

[50] The phenomenon was noted in 1796 by Astronomer Royal Maskelyne and analyzed nearly 20 years later by Bessel. Since it varies among persons, he named it an observer's *personal equation*.

[51] Cognition time, rather than perception time, since in addition to perception higher cognitive and evaluative processes are involved.

and put them in a time queue, compose and organize alternative courses of action, and evaluate their efficacy in order to be able to decide on a course of action.[52] It will activate relevant portions of its memory and install the necessary programs. It will allocate and mobilize its other resources, and if necessary, negotiate alliances and chains of command. It will organize its response components, and then trigger the response. All this, not surprisingly, takes time. There may be further delays for negative feedback and error control. Cognition and response time may be shortened or lengthened due to sensitization or fatigue, or by distractions cased by other commands or the receiver's own schedule.

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Another important set of time factors, that are relevant to the timing of control signals, are those that arise from the apparent HYPER-PLASTICITY of very or extremely complex systems. Plastic systems flow (*i.e.,* change their shape and/or structure) while a load (signal) is applied, and freeze (retain the modified shape and/or structure) as soon as the load is removed. Hyper-plastic systems, however, continue to flow even after the load has been removed. This effect is due to their amplification of the energy of the load or its substitution by their internal energy, and/or to their enhancement of the content and duration of the load (command) by their own information and control system.

It is well known that *learning, and* especially *over-learning* of skills takes time; and that learning takes place mainly after the initial command is no longer applying a load to the system. Here the repetition of the command by the controller, or its repetition by the receiver (its internalization) is essential.[53] It is only through *drill* that, in some systems, the undesired effects of hyper-plasticity can be corrected[54] and the desired ones can be stabilized. Another reason for repetition is that often with time the effects of learning are extinguished or become inaccessible. *Extinction* or *amnesia* may be due to a variety of reasons, for example: the system may have recovered or developed elasticity (generally due to increased complexity); previous learning may have been swamped by newer learning and newer commands may conflict with previous[55]; or — like all things — it may have simply degraded with time. Thus *rehearsals* are required. We must, however, not forget the *repetition effects* already mentioned: sensitization, fatigue, inoculation, and rejection.

If the receiver is not entirely static and exclusively related to the controller — and in social control we are not dealing with such receivers — it will *develop* with time different meaning and authority structures. We cannot expect, therefore, that a response to a command will always be the same. Complex systems also *evolve* in time, some in a typical (and known) fashion. The ONTOGENESIS of systems in time usually occurs in a characteristic *sequence of stages of typical approximate duration.* Between the stages usually there occurs some *disorganization* of the system, when previous programming may become inaccessible or mal-operative. At the beginning of each stage new internal programs and skills start emerging, and the system seeks opportunities to practice them. First during the apex phase of the stage, we encounter in the system full blown *maturational readiness* with new programs and skills. Some old programs and skills may be then lost. One implication of the

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[52] During a portion of the response time, the behavior of the system may noticeably change. It may suspend its previous activity and, in the psychologist's shorthand, **VTE**, *i.e.,* engage in vicarious trial and error. In people we may call this behavior thinking, but it can be readily observed in higher animals, such as rats that encounter problems, or in dogs when they are considering whether or how to obey a command. It occurs also in complex inanimate systems.

[53] Of interest in this regard are the speculations of Julian Janes.

[54] An example is superstitious behavior in dogs.

[55] The system may come to suffer from cognitive, conative or affective dissonance. It may cope with it by employing constructive mechanisms (such as prioritization, scheduling, or differentiation), or the known defense mechanisms (such as ambivalence or repression).

development and evolution of systems is that, unless we know the internal and external situations of the receiver at which he will receive and execute the command, we should issue ⌨ *292* generalized instructions, which the receiver is able to enhance to fit the circumstances. *Rehearsals under varying circumstances* may strengthen this ability. An *instruction to consult* the commander (or another authority) if the receiver encounters unexpected circumstances, or a *contingency routine* for such a case, should also be issued if practicable.

Another phenomenon, relevant to the timing of commands, is cyclicity in the receptivity of objects. We are all familiar with the cyclicity of *physical* objects: the mechanical cycles of days alternating with nights and of the seasons (accompanied by changes of the duration of days, temperature, humidity, and other states of communication fields); lunar and solar cycles; and of the cyclic changes in the constellation and relative orientation of natural and artificial bodies. In complex physical objects there are, in addition, maintenance, recharging, and repair cycles. All these have their effects on the timing and choice of fields and routes of communication. In the subjects of social control there are also *physiological* cycles, such as cerebral and hormonal rhythm. On these are superimposed other cycles, such as breathing, ingestion, elimination, ovulation and sexual heat. These again are complicated by diurnal and seasonal cycles of arousal (activation). Among the instances of *psychological* cycles (which often are correlated with, or can be reduced to, physiological or social cycles) let us note just those having to do with the cyclic allocation of attention — such as in various scanning rates — or the cyclic scheduling of attention to the nodes in the heterarchy of control of various (internally or externally demanded) tasks, recreation, rest and sleep. The controller may know the scheduling and adapt to it, or he may try to influence it. The main way, in which agents of social control may influence psychological and to some extent physiological functions, is through the scheduling of social occasions.[56] During these occasions, especially if they are firmly institutionalized, those 'attending' will be oriented to relevant control sources and tend to accept their authority. Many occasions are organized into a public and/or private *social* calendar or cycle.[57]

The first decision in the diachronization of commands is when and where they should be executed. From that, and the knowledge of such timing factors as have been discussed, we should be able to infer when they should arrive at the receiver's boundary. Finally we can calculate when we should emit them. However, additional complications arise: The receiver's situation only sometime presents sufficient (and, more rarely, ideal) *opportunities for execution.* We must therefore attempt to predict the receiver's future situations. The receiver is also not always *ready to receive and to comply.* The space-time regions, where and when reception and compliance by the receiver are at all possible, are called GATES and ⌨ *293* WINDOWS. From the various *launching platforms* available to the controller, only some fields and routes can carry signals that can knock at the receiver's gates and windows there and then. But doors are unlocked and windows thrown open only to some types of signals[58] and only at specific times. We shall now consider when signals are welcome.

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[56] A good, old, and early example is *toilet training.*

[57] Among such institutions are typically work and service cycles, periodic holidays, office and postal activity cycles, elections, public communication events (mail collection and delivery, news broadcasts, prime time), school, dances, parties and recreational events. Interesting examples of many of the above factors are **ejective channels** (as I have called them). Among their instances are systems of biological reproduction, manufacturing processes, and educational institutions. We can see in them, how commands are decomposed and diachronized, considering individual development and evolution as well as the various cycles of physical, physiological, or social systems. *Cf.* JUNG (1962).

[58] Sometime one can use a deceptive (Trojan horse) signal to get in, as is customary for door to door salesmen, advertisers, politicians, and would be lovers.

One set of gates is controlled be the *reaction times,* fatigue, and *schedules* of its subsystems, as we discussed earlier. Another set is controlled by the *refractory periods* of its receptors and effectors (nerves and muscles or their equivalents), and of more complex subsystems. The receiver's *attention span* holds one or more of its windows open; when they begin to close, some light entertainment or shocking stories may persuade it not to close all the shutters and not to doze off. The system not only opens, but through its ontogenetic development also builds doors and windows. This is another way to conceive of the *maturational readiness* for reception and execution of commands, which has already been mentioned. Maturational readiness of the system implies also, that it not only has new requisite programs and skills, but also that it is suddenly receptive for further programming by the controller. This is essential for the *value added* process of control. Everybody knows, that maturation occurs in *physical* systems: concrete needs time to ripen and wood to dry, before they are ready to serve. In *physiological* systems, there occur metamorphoses, and as a miracle there appears the ability to crawl, walk, fly, or procreate.[59] We have extensive knowledge of the windows opened by stages in *psychological* ontogenesis, and even have a craft of "building blocks" in education; the classics on this topic are Shakespeare, Freud[60], Erikson[61], and Piaget[62]. Then there are *social* windows provided by the social occasions mentioned earlier. These depend on the development and maturation of institutions with binding expectations for the participants.

Some windows are not only closed in time, but are walled in permanently[63]. In the development of systems, there occur CRITICAL PERIODS during which the system is exclusively open to certain commands and particular programming. We can see these in the development of some animals, for example bees; in humans they are discussed in the literature on ontogenetic development just cited.

The doors of the receiver are sometime suddenly flung open, or cracks appear in the walls, because of erupting EXCITATION STATES of the receiver. Excitation that occurs cyclically has already been mentioned. Now we are concerned with states, that seem to occur spontaneously and unexpectedly, provoked by subtle changes in the internal or the external situation of the re- 294 ceiver. *Physical* excitation states occur in all matter, even in elementary particles. Matter in an excited state (phase) often becomes volatile, and a single command can bring it to unusual, extreme behavior (such as an explosion). *Physiological* excitation is often called general or specific arousal, activation, or drive state; in these states the receiver may be willing to comply with commands that he otherwise refuses. The *psychological* excitation states appear *inter alia* as moods; changes in the intensity and duration of attention, affection or irritability; changes in the rate and intensity of response; and/or changes in the level of intimacy, that the receiver permits. They may hinder or facilitate the establishment of a communication or control relation, and are extremely important when issuing commands that may conflict with those already operative, for example when the receiver's anxiety, shame, or guilt is to be overcome, or in bargaining situations. In addition to the institutionalized social occasions, there exist *social* excitation states, often dependent on the presence or absence of specific others. Such social phases are mainly precipitated by

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[59] A classic on stages in physical and physiological development is Gesell & Ilg. For a more recent reviews of literature on physical development *cf.* Tanner, and on physiological development *cf.* Eichorn.

[60] I assume a familiarity with Freud's stages of psycho-social maturation.

[61] For an extension of Freud's theory, *cf.* Erikson.

[62] The best introduction to Piaget's theory of mental development is, in my view, Flavell.

[63] Windows are also seemingly 'walled in' in some pathology, e.g., in injury or hysterical blindness. Occasionally they may be restored by time or therapy, e.g., growth of nerves, drugs, psychotherapy, and hypnosis.

individual actors through their emergent and contagious expectations of market, social, or physical events. During the excitation phase, any or all of those present may function un-expectedly and temporarily as agents of social control. Many of such excitation states, e.g., a mob situation or a pre-revolutionary situation, are described and analyzed in the litera-ture on the psychology of crowds or on the social psychology of social movements.[64] Espe-cially in complex systems, it requires great skill to anticipate excitation states, and even greater skill to induce them.[65]

BEING IN TIME

Even 'now' is extended in time

Not only is our *here* extended in space, but also our *now* is extended in time. All the at-tempts at measurement as well as theoretical analysis from micro-physics to psychology suggest, that when we speak of now, we must think of it not as a dimensionless point, but as a segment of a line in time.[66] 'NOW' IS NOT A MOMENT, BUT A *DURATION*. What we consider, and in this essay call OBJECTS, are not only extended in space, but also in time. We might best imagine each object as a whirlpool of smaller objects (also extended in space-time), held together for a somewhat greater space-time interval by some attractor (cyclical or higher). In our context, however, we shall say that new objects are *created* by syncopes in space-time, which are the results of interactions of older, previously independent objects.[67] Most of these ancestor objects regain their independence, although modified by each interaction. Others are trapped *295* into a new whole. The new object is maintained, for a non-trivial space-time interval, by a web of diachronized communication and control signals among its components. Some signals come from outside sources, and constitute the boundary condi-tions (the ecological niche) for the object's extended existence.[68] But the main ground for the object's DWELLING IN SPACE AND BEING IN TIME, is the continued functioning of its internal communication and control system.

The itinerant Self

The continuity of the internal communication and control system constitutes the essence of any object's *identity*, and in subjects, of the their Selves. Subjects mostly conceive of their "Self" as "I". This "I" they experience as the site of their awareness, consciousness (*i.e.,* some internal communication) and autonomy (*i.e.,* internal regulation of some of their states and overt actions). They believe that their "I" is unitary and continuous during their exis-

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[64] For an excellent theoretical analysis of crowd behavior and social movements, emphasizing the value added process in the development of social movements as well as the 'maturational readiness' for communication and control that arise at different stages, *cf.* Smelser. For a critical review of Smelser, with suggestions for further development of his approach, *cf.* JUNG (1966).

[65] Excitation states can sometime be induced by supernormal stimuli, drugs or alarming messages.

[66] If time itself is quantized, there exists a minimal physical interval of duration (sometime called *chronon* and provisionally set at 10^{-24} sec). The just perceptible duration or *mental moment* (in people, depending on modal-ity) lasts around 50 milliseconds. The *species present,* a term coined in 1882 by an anonymous author, who is now identified as E. R. Clay, and popularized by William James, connotes an interval of objective time or a se-quence of events that is perceived or cognized as one immediate experience. It is variously estimated to last from five or six seconds to maximally one minute. Bergson uses the term *durée reelle* to refer to experiential time, that to him is real, as contrasted with the time of physics, which he regards as a construction or conven-tion.

[67] Strictly speaking, objects are created by syncopes and destroyed by diascopes. An object pulsates in space-time: appearing and vanishing, swelling and shrinking, becoming and ceasing.

[68] From the Latin *exsistere,* to step forth, to come into being, to stand out.

tence as subjects; some believe that it even survives the death and decomposition of their bodies. This is the illusion of THE INDEXICAL "I". The actual existence of such an indexical "I", or a "Self"' with the above mentioned attributes, is problematic even as a useful abstraction.[69] In almost any object (and certainly in all human subjects), the communication system is highly decentralized and the control system is heterarchical. The nodes of this system, that may be a site of awareness, consciousness, and/or autonomy, are dispersed through the bounded space-time region, which constitutes the object. We all have had the experiences of this decentralization and of only a limited and temporary awareness, consciousness and control — even of our own bodies.[70]

We may think of the Self as a traveler through space-time. I shall therefore add to the concept of the indexical "I" a concept of the ITINERANT SELF. As the itinerant Self jumps from one node of the subject's communication - control system to another, it receives messages subject to all the constraints and factors we have identified on the previous pages. It is subject to delays, noise and interference from other sources, translation, amplification, enhancement, to opening and closing of windows, excitation states — that is, to all the vicissitudes of communication and control. Among the messages and commands it receives it may pay particular attention to a specific source: its former Self, that was then elsewhere (both in the world and inside its body). Since these messages and commands are both signed by, and addressed to, the same indexical "I", if accepted, they are appropriated. Hence comes the sense of the continuous and unitary permanence of the indexical "I"; hence also comes the meaning of the Self as a traveler. Since the old Self is possibly elsewhere and definitely in the past (and therefore 🕮 *296* dead) by the time the newborn Self has received, inherited, and appropriated its message legacy, the Self is discontinuous: necessarily in time and generally in space. That is the meaning I wish to invest in its characterization as "itinerant".

Since some of the communication from the old Self is necessarily lost and since some of it is appropriated by the new Self through amplification, enhancement, or erroneous attribution of source SELF-REFERENCE IS NECESSARILY PARTIAL.[71] The facts of the discontinuity of the Self and of partial Self-reference have many implications. Only very few can be mentioned here. First of all, implications for programming: during each rebirth, the Self must reinstall and initialize previous programs, some errors and losses may occur then; there is at the same time an opportunity to install new programs that may be appropriated by the self (computer viruses are sneaked in this way). Secondly, some extinction, forgetting, amnesia,[72] and screen memories are possibly explainable this way. Thirdly, the frequent rebirth of the Self offers an opportunity for suggestion, when information and commands may bear the falsified signature of the old Self. Finally for now, the persistence of neuroses may be

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[69] Even the most intense and thorough introspection does not reveal a definite Self, only (as A. L. Kroeber characterized culture) 'rags and patches' of memory, emotion and will — rather than a coherent system. Although this insight is already the basis of Gautama Buddha's doctrine of *Anatta* (the non-existence of a discernible, unitary or permanent self), most subjects, and most psychologists, act if such a definite "Self" was a reality. JUNG (1995c).

[70] Such experiences are particularly clear when we become aware of the functioning of our basic bodily functions or of our memory, intense in 'moments of passion', and distressful when we are subject to internal compulsion or duress. Even ancient Roman law recognized the limitations of the "I" in the *"Imposibilis"* doctrine of exemptions from legal responsibility, because of incapacity due to inadequate resources or external coercion: e.g., *Ultra posse nemo tenetur,* nobody can be bound beyond his capacity. Such exemptions have been carried into most modern legal and moral systems.

[71] Thus the logical doctrine of the impossibility of complete **s**elf-reference, that used to plague the 'New Cybernetics' school, does not apply in the case of **S**elf reference.

[72] Especially *childhood amnesia*: there is a transition from the non-verbal to verbal organization of consciousness and memory.

explainable by messages from an encapsulated part of an archaic Self that retain high coherence and great emotional intensity.

The Self as a modal converter

The view of the Self as itinerant in space-time is still very superficial. Each new Self, awakened by the first message that bears its address, finds itself drowning in a boundless and timeless sea of indefiniteness. It has to construct itself and its world from the fluctuations of the field — random or induced by the syncopes accompanying the life histories of other objects and of the flotsam of its old Self — which it interprets as messages and commands. In this state space-time of modalities, it progresses from indefiniteness through other modal layers[73], till it constructs itself and its world (including its Others) as real. While it is preoccupied with the construction, its reality is already disintegrating and sinking through the modal layers, until it all drowns in indefiniteness again. For a while there remains the life history of this Self: a fuzzy swath of decaying modalities.

CONCLUSION

This essay reviewed the correspondence between communication and control; described the nature and some techniques of social control, *i.e.,* control 📖 *297* of individual subjects and of social systems; devoted special attention to communication in time; and introduced the notions of being in time and the Self as a time traveler. The communication window opened to me was not wide enough to permit a discussion of other relevant topics, about which there is considerable knowledge — what is being communicated in social control[74]; how it is communicated (esp. The contagion of commands and the epidemiology of communication); relation to decision theory; and resistance to and emancipation from control. There is no discussion here of the state and prospects of the theory of communication and social control.[75]

As may be seen even from this very partial and sketchy review, our problem is not that we do not know enough: we know a lot. Our problem is that WE ARE NOT CAPABLE OF USING ALL OUR KNOWLEDGE. A real theory of social control is still lacking. But even if we had a theory to guide us, we would have to recognize, that for control of very complex and extremely complex systems technological solutions are not (for the present, perhaps) possible. A basic obstacle to a technology of social control is, that EXTREMELY COMPLEX SYSTEMS — including the controllers as well those to be controlled — ARE EXTREMELY DIRTY. Which means that they generate a lot of noise, are moody, are extremely sensitive to external interference, and generate their own interference.[76] We have to rely on craft, and in this craft as in all others, there are better and there are worse craftsmen. Occasionally a real artist appears, who solves complex control situations in a novel and elegant way.

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[73] The modal layers, common to all construction, are (1) indefiniteness and (2) potentiality. The Self's world (incl. Others) is constructed in modal layers as: (3) possible (or meaningful), (4) necessary, (5) actual, (6) ideal, (7) permissible, and finally but also temporarily (8) real. The Self is constructed, by itself and/or others, through the modal operations of: (3) commitment, (4) individuation, (5) separation, (6) calling (appointment), (7) posture, and finally but also temporarily (8) engagement. More on the topic may be found in JUNG (1995c).

[74] For a systematic classification of the components of orientation, that would constitute the content of commands, *cf.* JUNG (1965) and its major revision some 30 years later in JUNG (1995b).

[75] Elements of a possible theory of control can be inferred from JUNG (1983) on the definition of boundary, and the discussion of loads (read *commands*) in JUNG (1989).

[76] To overcome this, Burrhus Frederic Skinner created the *Skinner Box;* because of this, his *Walden II* concludes with a failure.

In all attempts at control we confront a fundamental law: ANY (even successful) ATTEMPT AT CONTROL GENERATES MORE UNCERTAINTY AND/OR MORE SYSTEMATIC DEVIANCE[77] THAN IT RE-MOVES.

The uncertainty generated by the control attempt is deposited in the receiver as the primary sink, and in its situation as the secondary sink. Thus, successive or more comprehensive control becomes more difficult. Here lies the ultimate barrier of control and the ironclad guaranty of freedom[78].

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[77] From the controller's point of view, this appears as noise, chaos, contrariness or arbitrariness.

[78] Freedom occasionally comes too late, or at the cost of considerable disorganization of the object that has been controlled.

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[79] Notes that appeared in the original publication as endnotes on pp. 297-305 have been reprinted here as footnotes.

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