



## CONCEPT

A word or phrase used in propositions purporting to describe real world relationships. Concepts are neither true nor false, only more or less useful. [S.U.]

## PREDICATION

Predication<sub>1</sub>: analytic predication. --A concept is said to have an intension and an extension. The extension of a concept is the set of all objects to which the concept is applicable. So for example the extension of the concept "triangle" is the set of all triangles. The intension of a concept is the set of all properties that every element of the extension has. So for example the intension of the concept "triangle" is the set of all properties like "closed figure", "having three sides", etc. (For a more thorough discussion of these definitions of intension and extension see their glossary entry.) I call each such property (each element of the intension) a predicate.

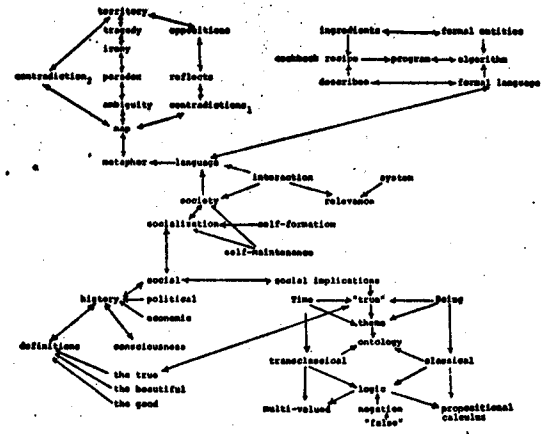
A concept is defined by its intension and extension. The intension of a concept may be considered as a set of procedures that compute a model of the concept's extension, since a set of procedures that compute a model of the extension necessarily compute properties or predicates of the model that every object for which the model is a model has. So for example if a set of procedures computes a model of a triangle, so the, that model will embody all the properties or predicates of all triangles.

Of the set of procedures that is the intension of the concept, each procedure that computes an aspect of the model (of the extension of the concept) that is a property or predicate of the model may be said to predicate that property or predicate of the model. The set of all such procedures (a subset of the intension) that do not predicate may thus be called the predication of the concept.

continued

Predication<sub>2</sub>: synthetic predication. --A predication is synthetic if a property or predicate that it is to compute is not analytic to the concept. So for example consider the synthetic concept "green triangle". The relations of extension, intension, computation, modeling, and predication are for the synthetic case the same as for the analytic one, except that in the synthetic case the property or predicate "green" is added to the intensional computation.

This distinction between "analytic" and "synthetic" is made in order to distinguish between relationships that hold for axiomatic systems, and relationships that are being investigated by the second-order cybernetics of cognitive processes. [R.H.H.]



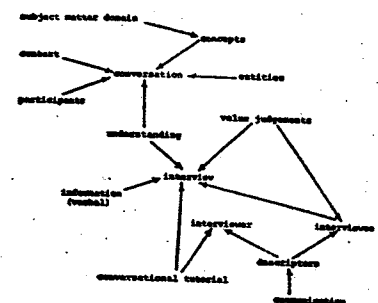
## CONVERSATION

From Latin Con + Verser, literally meaning "to turn to or with".

Colloquial meaning - to talk to someone, with connotations of familiarity and/or friendship. Less formal than "dialogue", more structured than "chat", and less emotionally loaded than "gossip".

Cybernetic meaning - a series of verbal or non verbal exchanges between two distinguishable entities, during the course of which understanding is reached about the definition of any of the series of concepts which make up the subject matter domain of the conversation. In order to qualify for this definition, the conversation must refer to a possibly evolving context and the participants must agree to honour this constraint.

One purpose of this type of "conversation" is tutorial, but the subject matter need not be confined to purely academic or skill related fields. A perfectly valid use of "conversation", in this technical sense, is during interview situations when the interviewer wishes to ascertain the interviewee's basic concepts about some topic and to establish common descriptors which are unique to this event; concurrently the interviewee is learning the interviewer's basic concepts about the same topics. [E.P.]

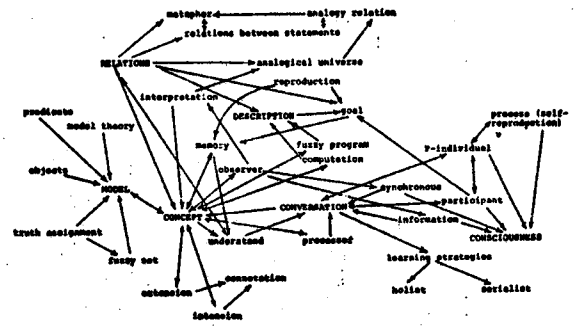




## CONVERSATION

A strict conversation is a specially construed interaction involving regulated synchronicity and/or information transfer in which A and B concepts are realised as "external" semantic models (in the sense, usually, of b) (see concept [G.P.])) and memories are "externally" realised in the same manner. As a result, ordinarily concealed cognitive events may be externally observed and ordered. The strict conversation is, of course, restrictive (the price paid for observation) insofar as processes (the working models of a) (see concept [G.P.])) are exe-

cuted under a begin and end condition; so are the memorial processes. Such ordered segments are known as occasions, each of which concludes with the understanding of an indexed topic relation, ("Understanding" is used technically; to mean "the learning of a concept for the topic relation and its stabilization by a memory. [G.P.]



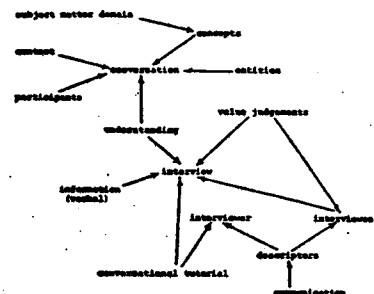
## INTERVIEW

From Latin Inter + Vedere, literally meaning "to see between".

Colloquial meaning - a series of pre-selected questions administered in a standard manner, and expected to elicit one of a finite set of answers. This technique is commonly used in market research.

Cybernetic meaning - a formalised exchange of verbal information, in the course of which the interviewer establishes a set of descriptors common to both interviewer and interviewee, which are unique to the topics under consideration during the course of the interview. Value judgements and emotive qualities implicit in any interview situation are separated from the descriptor set; this descriptor set will be identical in all interviews, the value judgements and emotive qualities will be unique to each interviewee.

The language of descriptors common to both interviewer and interviewee is generated as a mutual communication between them, the responsibility for ensuring the uniqueness of the descriptor set lies with the interviewer, who elicits the interviewee's descriptors of each topic and using the "conversational tutorial" technique, teaches the interviewee the descriptors already assigned uniquely to each topic. When mutual understanding has taken place, the interview proceeds using the descriptor language to establish the interviewee's value judgments and emotive qualification of these topics. [E.P.]



Jürgen Habermas: "Preparatory Remarks to a Theory of Communicative Competence."  
 From: Habermas-Luhmann: Theorie der Gesellschaft oder Sozialtechnologie.  
 Frankfurt am Mein: Suhrkamp, 1971. pp. 101 -141.

Outline prepared by Richard Herbert Howe

Note on Jürgen Habermas: Jürgen Habermas is one of the most respected, outspoken, and controversial contemporary exponents of the Critical Theory of society developed by Max Horkheimer and Theodor Adorno of the Institute for Social Research and the University of Frankfurt. Habermas' work ranges over linguistics, sociology, psychology, and philosophy. Two collections of his essays, Toward a Rational Society and Theory and Practice, and his book: Knowledge and Human Interests are presently available in English (Boston: Beacon Press); another, on his theory of communicative competence, is forthcoming. His studies of the antinomies of systems analysis in social research, based on analysis of the epistemological differentiation of the object domains of the two sciences, are invaluable provocations to anyone interested in "the application of cybernetics to social systems". Habermas is currently at the Max Planck Institute in Munich.

"Dialogue in ordinary language moves halfway between monologue and the impossibility of linguistic communication." --Jürgen Habermas.

I Toward delimiting communicative and linguistic competence. Elementary utterances, elementary sentences, elementary propositions.

Chomsky's distinction between competence and performance does not take into account the fact that the general structures of possible-conversation are themselves generated by speech-acts. These structures are neither part of the extra-linguistic conditions that influence and restrict performance vis-a-vis competence in any conversation, nor are they equivalent to the linguistic expressions generated by linguistic competence. The linguistic structures of conversations are distinct from the linguistic structures in conversations.

Distinction between utterance and sentence: Sentences are linguistic units formed from linguistic expressions; Utterances are "situated" sentences, pragmatic units of conversation. Extra-linguistic determinates of competence and performance are the object of empirical pragmatics, a behavioural-scientific communications theory.

The general structures of possible-conversation are the object of a universal pragmatics, a theory of communicative competence.

The theory of linguistic competence studies the grammar of sentences; the theory of communicative competence studies the grammar of possible-conversation.

Speech-acts: speech-acts are the elementary units of possible-conversation. The speaker in a speech-act accomplishes the very action that the utterance performed portrays. Performative-utterances have a twofold sense: linguistic and institutional. This latter sense is the object of universal pragmatics. This institutional sense lies in the fact that an utterance performed institutes a "situation" or "context" for forthcoming (and previous) linguistic expressions. Linguistic expressions as performative-utterances are pragmatic-universals.



Speaker-listeners employ sentences in their utterances in order to reach agreement on "matters of fact".

The elementary conversational unit (speech-act, performative-utterance) has a double structure: as performative-sentence, and as logical-proposition.

There are two kinds of sentence: the dominating sentence and the dependent sentence. The dominating sentence is characterized by a 1st person pronoun as its subject, a 2nd person pronoun as its object, and a predicate in the present tense; its use is to establish a mode of communication between speaker and listener. The dependent sentence is characterized by a noun as its subject and a predicate of the referent of the noun; its use is to communicate a fact about an object.

Agreement requires that two Subjects meet simultaneously on two levels: 1) The level of intersubjectivity, which corresponds to the performative-sentence: Subjects speak with one another. [This level is Subject-generative.] 2) The level of Objects, which corresponds to the logical-proposition: Subjects seek agreement concerning "matters of fact". [This level is Object-generative.]

Dependent sentences are not always immediately propositions, yet they can always be changed into such via the appropriate change in the mode of communication and a corresponding change in the structure of the dependent sentence.

There are two kinds of linguistic usage: Reflexive usage and Analytic usage. In Analytic usage the metacommunicational (intersubjective) level serves only as a means for reaching agreement on the propositional (Object) level. In Reflexive usage the propositional level serves only as a means for reaching understanding on the metacommunicative level.

Three stages of abstraction serve to delimit communicative competence from linguistic competence. The zero-level of abstraction is the concrete utterance.

- 0) Concrete utterance: made in a specific situation and affected by extra-linguistic factors.
- 1) Elementary utterance: [(0) - (all extra-linguistic factors)]. Determined only by the general structures of possible-conversation.
- 2) Elementary sentence: [(1) - (all actualization of communication)]. Consists of linguistic expressions only.
- 3) Elementary proposition: [(2) - (all senses of pragmatic application)]. Consists only of that which is necessary for the description or specification of a fact.

#### THEORY

#### OBJECT DOMAIN

concrete utterances.....empirical pragmatics (psycho- & socio-linguistics)  
 elementary utterances.....universal pragmatics  
 elementary sentences.....linguistics  
 elementary propositions.....propositional calculi

Note on calculi: they are both more and less than linguistics. Less because they do not take into account any relation to conversational situations; more because as calculi of truth-values they relate to the pragmatics of application.

#### II Pragmatic-universals. A Proposal for Systematizing Speech-acts.

Five classes of words and their grammaticalizations determine the general structures of possible-conversation.

WORD CLASS	GRAMMATICALIZATION	GENERAL STRUCTURE
1) personal pronouns	vocative, honorative	participants
2) greetings & addresses	"	"
3) deictics	tense forms & modes	time & place of utterances and objects of the conversation
4) performative verbs	interrogatives, imperatives indirect discourse	relation of the speaker to his utterances and of speakers to one another
5) non-performative intensional verbs, some modal adjectives	not specified	intention, position, expression of the speaker

Although pragmatic-universals are metacommunicative, they are not components of a distinct metalanguage. Ordinary language is its own metalanguage.

Pragmatic-universals supply the conditions of possible-communication, they elicit the level of intersubjectivity. Hence they could be called dialogue-constitutive-universals.

Pragmatically, the most important aspect of the speech-act is the performative-sentence. There is still no adequate systematization of speech-acts.

Searle's classification of speech-acts by rules:

- 1) preparatory rule: establishes the application-conditions for a speech-act.
- 2) propositional content rule: establishes which dependent sentences are to be considered as propositional.
- 3) sincerity rule: establishes the "earnestness" of the speech-act.
- 4) essential rule: establishes the pragmatic sense of the speech-act.

Under Searle's #4 four further classes may be distinguished:

- 1) Communicativa: determine the general sense of the conversation.
- 2) Constative: determine the sense of the cognitive application of sentences. [Note: here "cognitive" refers to rational in the sense of logical, propositional.]
- 3) Representativa: determine the sense of the speaker's self-portrayal.
- 4) Regulativa: determine the sense of the practical application of sentences.

- Examples of the four word-classes:
- 1) Communicativa: I say, I express, I speak, I talk, I ask, I answer, I reply, I counter, I contradict, I agree, I object, I repeat, I quote, etc.
  - 2) Constativa: I assert, I describe, I report, I communicate, I tell, I clarify, I remark, I show, I explain, I predict, I indicate, etc.
  - 3) Representativa: I know, I think, I mean, I hope, I fear, I love, I hate, I wish, I want, I decide, I bring out into the open, etc.
  - 4) Regulativa: I command, I demand, I request, I remind, I forbid, I permit, I decline, I unite, I am responsible, I affirm, I empower, I announce, I excuse, I reject, I propose, I advise, I warn, etc.

Speech-acts prepare three distinctions fundamental to any communication:





DISTINCTION	WORD CLASS	FUNCTION
1) What-Is and What-Seems-To-Be	Constativa	to distinguish intersubjectivity from intrasubjectivity
2) What-Is-Essential and What-Is-Appearance-Only	Representativa	to distinguish the Subject from his utterances
3) What-Is and What-Ought-To-Be	Regulativa	to distinguish empirically observed regularities from the results of normative rules

Together these three distinctions lead to a fourth, decisive distinction: the distinction between a "true" consensus and a "false" consensus.

(What now follows is a search for a principle that would justify these classifications.)

III Communicative action, and Discourse. The Two Forms of Ordinary Language Communication.

COMMUNICATIVE ACTION	DISCOURSE
Utterances occur in a context open to extra-linguistic factors.	Utterances are treated thematically only.
Validity of sentences is presupposed	Validity of sentences is examined.
Information is exchanged	Information is not exchanged.
Understanding and agreement are presupposed	Understanding and agreement are sought.
Rests on opinions and norms	Opinions and norms are to be justified.
Subjects intentionally express and communicate:	
An understanding of the pragmatic sense of intersubjective relations (clarifications)	Clarifications → Interpretations
The propositional content of their utterances (clarifications)	" " " "
No questions of the validity of opinions exchanged (assertions, explanations)	Assertions → Propositions
Acceptance of the norms of action that they could follow (justifications)	Explanations → Theoretical explanations Justifications → Theoretical justifications

Sense of the validity-claim of norms: Our notion of Subject rests on our normative assumption and expectation that a Subject can at anytime account for his actions, statements, opinions, etc. Thus we contrafactually presuppose in our recognition of a Subject intentionality and possible-legitimation.

These expectations lead to the assumption that a Subject's being a Subject means that the conversational mode can be shifted from that of communicative action to that of discourse at anytime that consensus becomes problematic.

The contrafactuality of expectations leads to an idealization of all conversation. This in turn leads in every, even distorted conversation to the possibility, as idealization, of reaching "true" consensus in the discursive mode.

[This contrafactuality is Subject-generative in the dialectic of reciprocal recognition in that it presupposes that the self-objectivation of the Other is incomplete, and, hence, that the self-subjectivation of the Other is incomplete.]

It is the paradoxical accomplishment of ideology that the obstacles to "pure communicative action" make the above norms truly contrafactual, and at the same time lend them legitimacy.

(The search for a principle justifying the classification of pragmatic-universals is now seen as the search for a principle that distinguishes between ideologically constrained subjectivity and subjectivity capable of actual discourse.)

Five cases of real or apparent discourse:

- 1) Discourse as means of communicative action (debates, etc.)
- 2) Communicative action pretending to be discourse (ideological justifications)
- 3) Therapeutic discourse (generation of discourse by analyst mediated self-reflection)
- 4) Normal discourse (paradigm, though questionable: scientific discourse)
- 5) Innovative discourse (learning [art])

(The search for a principle is now seen as a search for a principle that distinguishes between "true" and "false" consensus in #s 2 - 5 above.)

ASSERTION: In every discourse it is necessary for us to presuppose an "ideal speech situation".

IV On the Consensus Theory of Truth. Truth of Propositions, Genuineness of Utterances, Correctness of Actions.

Agreement is a normative concept. Hence consensus is a normative concept, hence intentionality and legitimation are normative concepts. --In short, all contrafactuality is normative.

In the case where ontology is denied criterion-status, the motion of a search for consensus moves as follows:

The truth of propositions [distinction: What-Is / What-Seems-To-Be; determining word class: Constative] is dependent on:  
 The genuineness of Utterances [distinction: What-Is-Essential / What-Is-Appearance-Only; word class: Representativa] which is dependent in turn on:  
 The correctness of actions [distinction: What-Is / What-Ought-To-Be; word class: Regulativa] which is in turn dependent on:  
 Consensus vis-à-vis norms, which is dependent on ... [and the cycle begins again].

Breaking out of this cycle without recourse to ontology requires a presupposed conception of an "ideal speech situation" in which any consensus reached is necessarily a "true" consensus.

V Determinations of the Ideal Speech Situation

IF:

- 1) conversation means that two or more Subjects interact in agreement with one another or else search for agreement;
- 2) agreement means the generation of a "true" consensus;
- 3) "true" and "false" consensus can be distinguished only with reference to an ideal speech situation;



THEN:

there must be a "pre-understanding" of what this ideal speech situation is that is inherent in every concrete conversation owing to the communicative competence of the participants [and, hence, this pre-understanding defines that communicative competence].

It then follows that such a pre-understanding of an ideal speech situation is the necessary condition for any and all possible-conversation (whether communicative or discursive) and that the structure of this pre-understanding is the general structure of possible-conversation, i.e., the components of this pre-understanding will be the pragmatic-universals.

An ideal speech situation is defined: as a situation in which communication is not hindered by any external influence (Force) or by any compulsions resulting from the communications structure itself (neuroses, ideologies).

Unhindered communications structures means that all participants have equal opportunities in the selection and execution of each class of speech acts.

In detail: equal opportunity vis-à-vis

- 1) Communicativa --allows equal opportunity for continuing the conversation;
- 2) Constativa --allows that all "pre-understandings" get "on the table" [undisclosed pre-understandings prejudice or constrain the communications structure itself];
- 3) Representativa --allows that intentionality and possible deception may be discovered through the behaviour of the participants as actors, which implies equal opportunity vis-à-vis
- 4) Regu'ativa.

Together #s 1 & 4 are necessary conditions for effecting a shift in mode from communicative action to discourse.

It is not that the model of "pure communication", the "ideal speech situation" requires this possibility of shifting into the discursive mode, rather the possibility of discourse requires this model of "pure communication".

TRUTH, FREEDOM, and JUSTICE are the traditional terms for the symmetrical distribution of opportunities for the selection and execution of speech-acts that relate to propositions as propositions, to the relation of the speaker to his utterances, and to the observance of rules.

This "ideal speech situation" model of truth, freedom, and justice is not based on any personal qualities of the participants but on the structures general to possible-conversation [and, hence, on communicative competence, which can now be equated with autonomy and responsibility].

This construction is to serve as proof that we must assume the pre-understanding of an ideal speech situation, which can only be done via the four classes of speech-acts, whenever we wish to participate in any discourse.

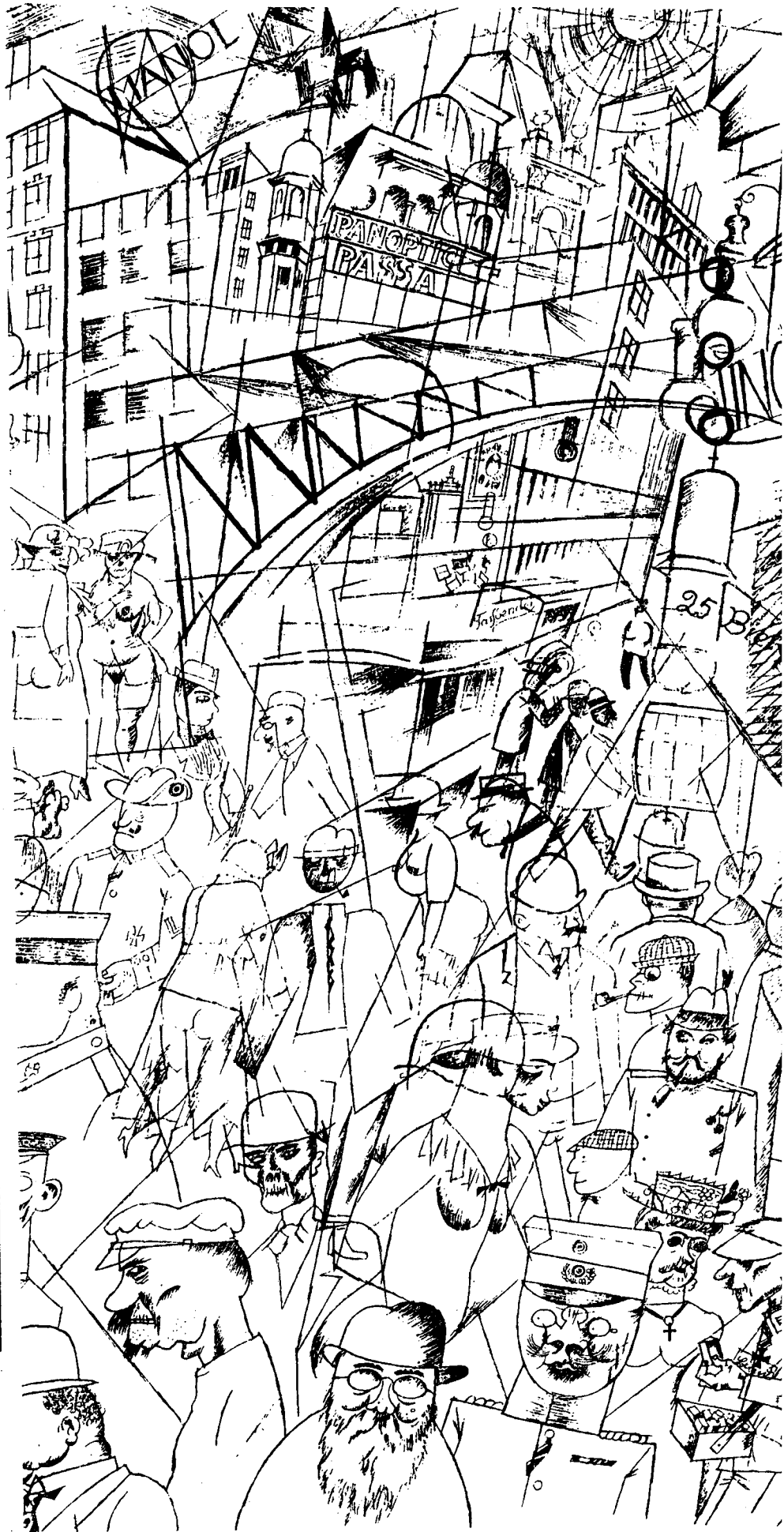
Corollary: pragmatic-universals function as such only if they at at the same time sketch out the ideal speech situation.

The conditions of possible-conversation are not necessarily apparent in and certainly not identical to the conditions of empirical conversation --so far.

The last, and most important structural condition of possible-conversation is that the speakers act contrafactually, i.e., as if the conditions outlined above were actually realized. Hence the concept of an ideal speech situation is not merely regulative (as in Kant) nor existential (as in Hegel) because no society as yet allows these conditions to be met.

Hence the ideal speech situation may be compared with a transcendental illusion, but not so in the sense of being a metaphorical extension of a category of Reason, rather as a constitutive condition of possible-conversation. Hence it is a constitutive appearance, and a pre-appearance, a utopian moment.

It cannot be determined a priori whether this pre-appearance is merely an illusion or is an empirical condition for the (even if only asymptotic) realization of its utopian moment. Hence it contains a practical hypothesis. From that hypothesis the Critical Theory of society takes its departure.



## ACCESS

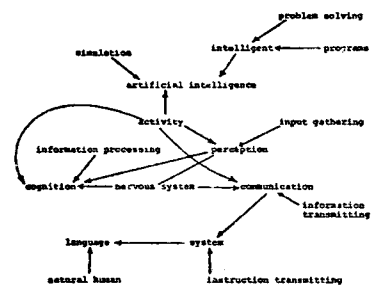
The process of articulating relations between an observed state in a system and an observing state in another system.

To 'gain access' in the colloquial sense, we stipulate the operating rule on a set of elements (cybernetic sense). [R.C.]



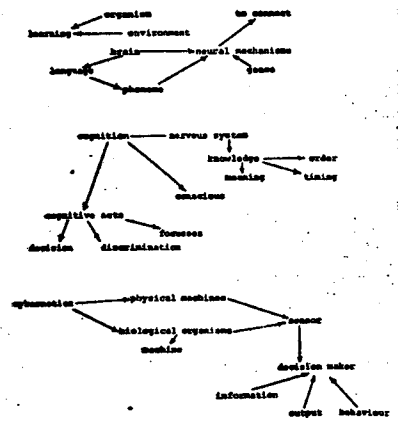
## LANGUAGE

In the broad sense, any structured communication system, including the instruction-transmitting systems used with computers (computer languages) and the communication systems of animals (such as the language of the bees or that of porpoises). In a narrow sense, a natural human language such as English, French or, for that matter, Swahili. [P.G.]



# LANGUAGE

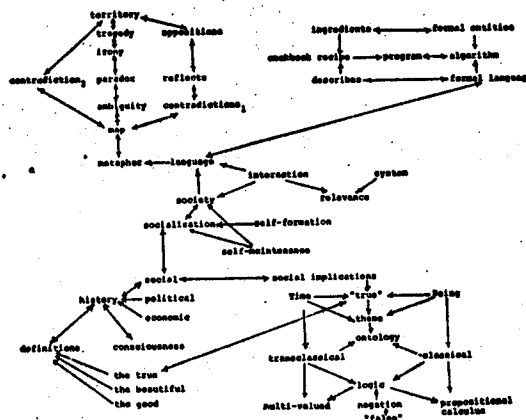
A big dictionary has perhaps 15 different definitions for this word. What goes on in the brain as children learn to walk is what fascinates me most about language. In the first place, their brains are built by the genes so that they emit during the first months of life every sound (phoneme) used in all the world's several thousand known languages. No other animal brain can accomplish this. Then at around 8 months the probability that children will utter the phonemes of their native language begins to rise, and at a year or so they say things like papa and mama in appropriate situations. This means their brains are also built so that they are obliged to connect what they hear and see (father or mother) with what they say. By age 5 every normal child has an impressive vocabulary, shows you he knows virtually all the rules of his native language by arranging his words in correct order, and can both convey and receive ideas, information, instructions, etc. through human vocal sounds. In a normal youngster the inevitability of this sequence of events is absolute, and to a first approximation every child passes through his acquisition sequence in exactly the same way. What the responsible neural mechanisms may be is an outstanding problem for those interested in language. [R.G.]



# LANGUAGE

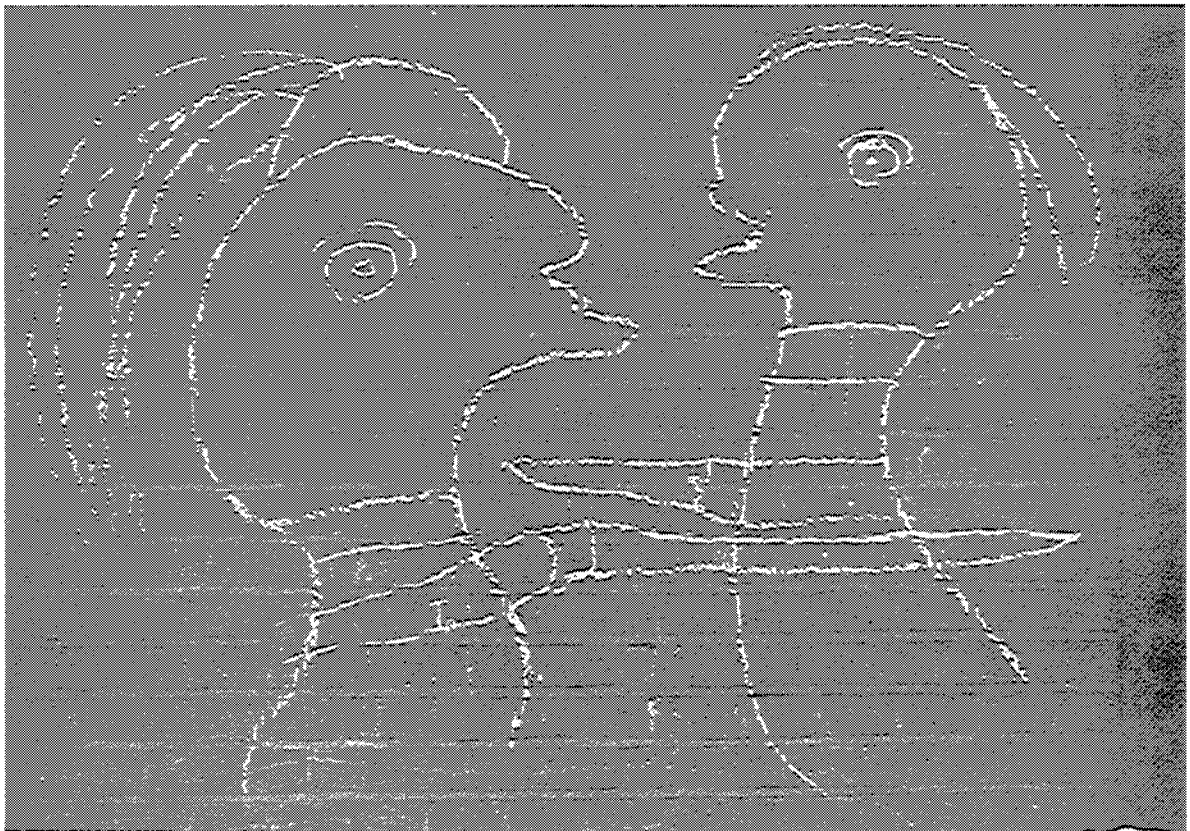
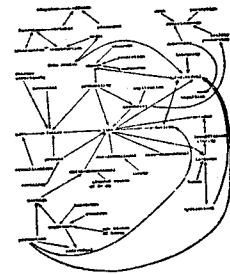
The interaction of totalities within a totality, for example, the interactions of the members of a society within that society.

[R.H.H.]



# LANGUAGE

Language is the syntactical coding of all human experiences by sounds, vocally produced and agreed upon by all users of the language. Writing, or the use of linear sequences of hand-drawn visual symbols for such sounded words, is not in itself necessary for the language concept. Its essence is the time-imposed linear sequence of vocally produced and differentiated code-sounds. Syntactical means that language also implies that there are rules for interrelating (by form and/or positioning) the various codons that are used. Thus language with its linear succession is deeply linked to the number concept via tallying or counting in linear time, the syntactical element of number arising in the positioning rules of place-value systems of numeration. Thus language is more sophisticated than merely tallying or counting, even though to tell is to "recount," a usage going back to primitive sequential mnemonic devices (e.g. rosaries) for remembering a speech sequence or story. Language implies syntax (rules for changing symbol forms and placement), which no non-human system of communication has. [C.M.]







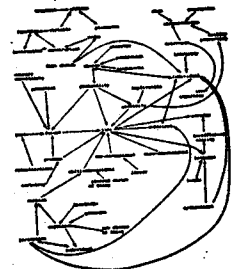




## PARADOX

Paradox is the result of insufficient clarity of thought. Some paradoxes depend on time. Thus, if all Cretans lie and one says "I am lying" though grammatically apparently complete is in fact meaningless. One must say: "I am lying when I said (or say) such-and-such was (or is) so." Then if such-and-such was (or is) in fact true when he said the sentence, the Cretan lived up to his reputation and lied. If, however, it was (or is) false, then this Cretan was the exception that proves the rule. This paradox (as all paradoxes when carefully enough analyzed) is pseudo, depending on the omission of the semantically crucial part of the sentence, in this case the part answering the question, "You lie when you say what?" The empty phrase, "I am lying" says nothing until the statement to which "am lying" refers is given. If the tense were shifted and the Cretan made to say "I was lying," everyone would see the word-juggling and ask "About what?" And then the pseudo nature of the situation would be speedily revealed by this shift of time reference or tense.

Some paradoxes depend on using the same word in two senses that are incompatible within the framework of the proposed situations. Take the well-known but ill-understood chestnut: "Is the class of all classes a member of itself?" Now a class means a selection of items on the basis of certain definable criteria. Hence the first appearance of the word "class" in the quoted question is illegitimate. For "all classes" is a euphemism for "all possible things," and "all possible things" means just what it says and hence cannot denote any class whatsoever because it is not a selection since there can be nothing larger to select from. One can validly speak of "all classes," but this "everything" in itself is not a class; and since there is nothing outside of "all classes," they cannot constitute a member any more than they constitute a class. Thus the entire quoted question is meaningless and misconceived. Again careful thinking unmask the paradox for the linguistic legerdemain it always is. [C.M.]



ELECTRICAL ENGINEERING DEPARTMENT

Interoffice Memorandum

Date 5/9/74

TO CY # 8  
FROM HVF

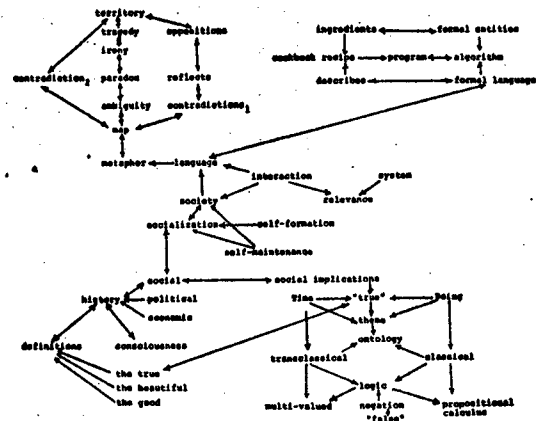
PARADOX :

Thou shalt not  
[redacted] contemplate "para-  
dox".

# PARADOX

The notion of paradox is explicated most easily--although it is by no means easy--within a context of metaphors that cluster around the notions of territory and map. The first of these relationships is just that between territory and map. If in the territory oppositions are found, so then, in the map these oppositions will be reflected as contradictions. This is one level of contradiction. Now another level of contradiction enters into consideration: if the map either is or is considered to be part of the territory and at the same time is considered to be "map" in contradiction to "territory", so then, this second level of contradiction is clear: the map both is and is not the territory. Contradictions of the second level dominate contradictions of the first level. Oppositions in the territory, reflected in the map as first level contradiction, are transcended (aufgehoben) by the second level contradiction. The relationship, if dynamic, between the two levels produces ambiguity. Expressed solely within the map, this ambiguity in turn produces paradox. --Since in every cognitive act we are inescapably both map and territory in a territory that has oppositions--including the oppositions between map and territory and maps and maps and territories and territories, at which latter point the paradoxes of cognition connect to the oppositions of political reality--so then, we are always in a context of ambiguities, and when we give precise expression to these ambiguities, we obtain paradoxes. The more precisely we express these relationships, the more strongly do the paradoxes appear, hence this situation, owing to the inescapability of its ever increasing paradoxicalness, is irony where it is clear and tragedy where it is blind.

[R.H.H.]



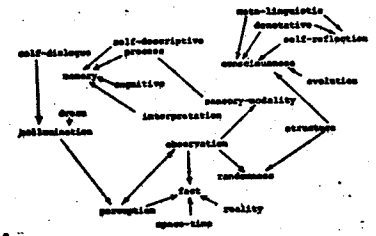


Scott Mutter

# HALLUCINATION

On the perception-hallucination continuum of rising central sympathetic arousal exteroception is transformed into an experience of interoception; at the same time willed motor activity becomes increasingly impaired and ultimately inhibited. Hallucinations (and dreams) therefore, may be described as 'aroused in-sights without action' and characterized by high inner sensory to motor (or S/M) ratios.

Both ends of the perception-hallucination continuum, may be labelled 'normal' or 'pathological' and communication on a truly creative level -- self-dialogues with the unknown -- may originate in hallucinatory or dream experiences.

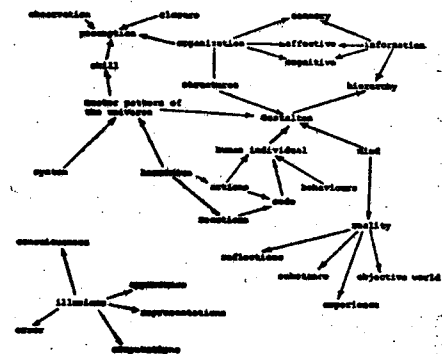


[R.F.]

# ILLUSION

1. Perceptual distortion due to faulty computation: the substitution of an inappropriate ("subjective") representation for the appropriate or correct ("objective") one: error.
2. The attribution of existence to what exists only in appearance: delusion, Maya.

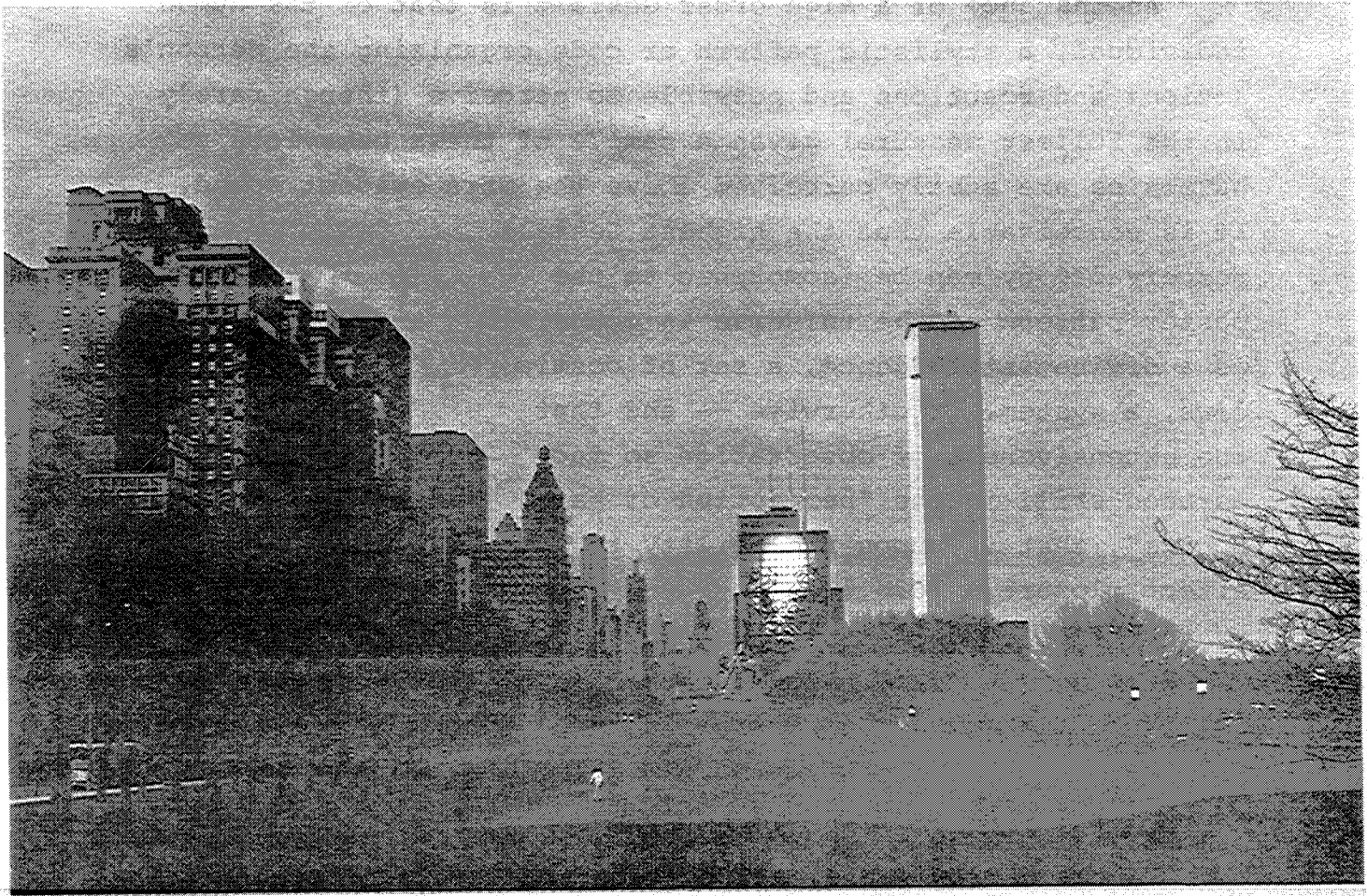
Both perceptual distortion and the attribution of existence to appearance are characteristics of dream consciousness as opposed to wakefulness and may be characteristic of "wakefulness" in contrast to an uncommon and optimal state of awareness understandable as the fully developed manifestation of human consciousness. [C.N.]



# ILLUSION

Any observation or observations in which the observer has no doubt that his/her perceptions perfectly represent reality.

[G.K.]



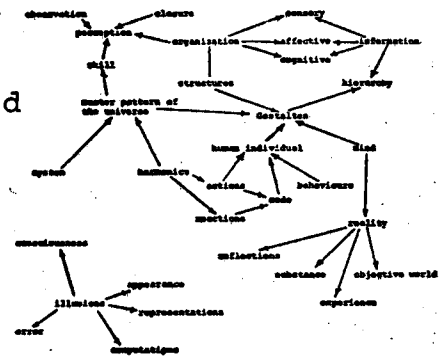
Scott Mutter



## PERCEPTION

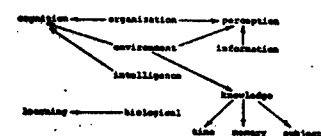
The organization of sensory, affective or cognitive information into a hierarchy of increasingly encompassing Gestalten isomorphic (in the absence of disfunction) to structures in the world.

An instance of a high order Gestalt is that of the human individual, a stylistic pattern or code organizing the person's actions and reactions and possible to perceive (though rarely in the fullest measure) given a sample of these behaviors as harmonics are subtly perceived above the more evident sound. It is conceivable that the highest Gestalt perceivable by man be isomorphic to the master pattern of the universe -- conceived as a divine intelligence, a set of cosmic laws, a system, or otherwise -- and that the extensiveness of observation so much as upon skill in the "perception of harmonics", that is, upon the ability to effect closure. [C.N.]



## PERCEPTION

In the narrow sense, all systems and levels of organization in an organism or other intelligence which are in "direct contact with" or otherwise "not too far removed from" the environment. Since this perspective presupposes both an organism-environment dichotomy and a uniform conceptual background against which, or in terms of which, both the organism and the environment are seen (e.g., energy changes in the environment cause energy changes in the organism, or information or structure in the environment is reflected by information or structure in the organism), the term is not useful in cognition in the wide sense. [K.W.]





## CONSCIOUSNESS

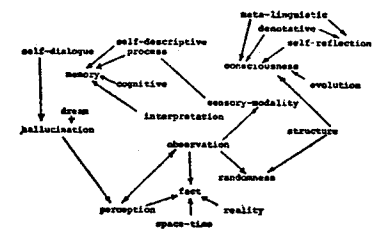
The Universe becomes aware of itself through the evolutionary emergence of energy and matter into magical, mythical and mental structures of consciousness.

Gebser's "magical, mythical and mental" phylogeny is recollected (anamnesis) during each infant's ontogenetic development.

"The universe becomes conscious, therefore, I am." But also: Consciousness is a process by which man creates the universe in his own image.

The conceiving of the above vignette, i. e. the description of the nature of consciousness, also requires consciousness. Hence the latter has at least two aspects: a denotative (describing something else) and a metalinguistic (describing itself) aspect. Note, that both consciousness and punning share these two aspects; observe them e.g. in the following pun: "can you tell the story of Flaubert's 'Madame Bovary' in one word? Yes, Madame B'ovary."

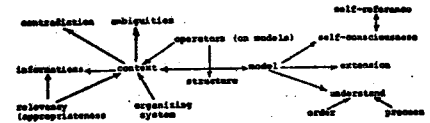
The denotative and metalinguistic aspects clearly re-present the self-reflecting nature of (puns and) consciousness.



[R.F.]

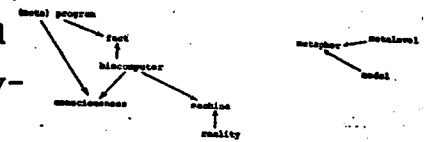
# CONSCIOUSNESS

That aspect of a modelling system to model the various acts (and the concomittant contexts) of its own modelling procedures. Within the above definition of modelling, the 'consciousness' models have the same logical structure or formal properties as that of modelling the environment but the application of the process is to the very processes themselves (self-reference, the taboo of logic). [J.K.]



# CONSCIOUSNESS

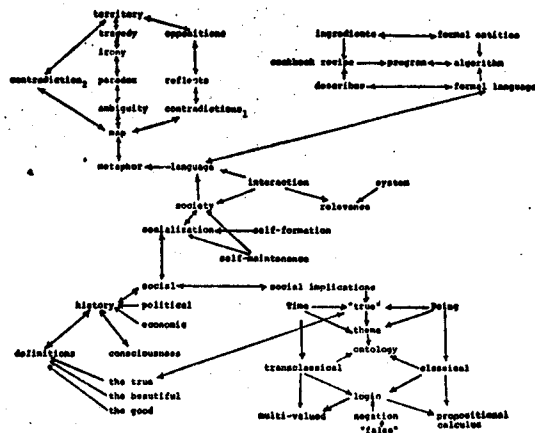
That aspect of the internal operations of a biocomputer which believes it exists, has states of being, etc., It begins with a sperm penetrating an egg and ends with the death of the given central nervous system. It assumes that it programs/is programmed by the biocomputer. [J.L.]



# CONSCIOUSNESS

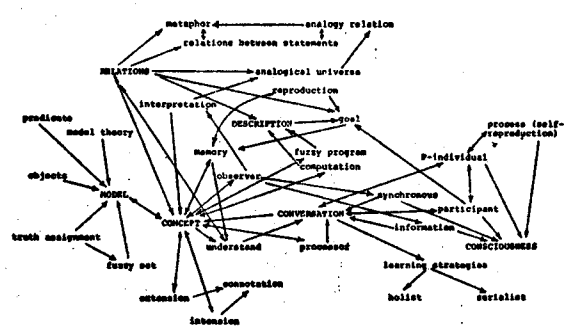
Through thousands of years thousands of attempts have been made to "define" consciousness. Each yields to the other, coalitions form, sides are drawn, definitions struggle, and then, out of the charnel house of unidentified failed definitions, the ghost of consciousness arises once again. This is not to belittle the attempts at definition, and this for two reasons: first, attempts to define consciousness (much like attempts to define "the true", "the beautiful", "the good") result, if not in much information about consciousness, so then, in a great deal of information about the person attempting the definition, the social and political configurations and movement of his time, and so on; second, an adequate understanding, or "definition" of consciousness is absolutely essential to understanding the social, economic, political

movement of history, and thus, our grasp of our own history is correlated precisely with our grasp of what consciousness "is". On the other hand, it is just our place in the social, economic, political movement of history that does define our understanding, and hence "definition" of consciousness. That much about consciousness we do understand. [R.H.H.]



# CONSCIOUSNESS

Consider two L processors  $\alpha, \beta$ , (typically, brains) and two sets of P-Individuals  $\{A_1, A_2, \dots, A_n\}, \{B_1, B_2, \dots, B_m\}$  of which we concentrate upon the pair A, B. Initially  $\alpha$  and  $\beta$  are asynchronous. Hence, especially since A and B contain Fuzzy Programs executed without numerical resolution, no interaction in program sharing is possible. Conversely, at least partial synchronicity is implied by the statement that participants executing A and B do converse. We thus regard any conversation as a partial synchronisation of participants (or equisignificantly) the sharing of A and B programs whereby A and B are distributed under execution (or equisignificantly) an information transfer in the sense of Petri (not simply or primarily in the sense of either selective or statistical information transfer). We may either say (in the capacity of external observers) that partial synchronicity arises between otherwise asynchronous processes or that there is information transfer between the participants. Whichever we say the participants experience the event in terms of a consciousness (of A with B) which is refined and also reified by the attendant cognitive operations. [G.P.]



## A Cartography of the Ecstatic and Meditative States

The experimental and experiential features of a perception-hallucination continuum are considered.

Roland Fischer

In this age so concerned with travel in outer as well as inner space, it is strange that, while we have detailed charts of the moon, we have no cartography of the varieties of human experience. In order to draft a map of inner space, I am ready to be your travel guide and take you on two voyages: one along the perception-hallucination continuum of increasing ergotropic (*1*) arousal, which includes creative, psychotic, and ecstatic experiences; and another along the perception-meditation continuum of increasing trophotropic (*1*) arousal, which encompasses the hypoaroused states of Zazen and Yoga samadhi.

Along the perception-hallucination continuum of increasing arousal of the sympathetic nervous system (ergotropic arousal), man—the self-referential system—perceptually-behaviorally (cortically) interprets the change (drug-induced or “natural”) in his subcortical activity as creative, psychotic, and ecstatic experiences (*2*). These states are

in his own “program.” One can conceptualize the normal, creative, “hyperphrenic,” and ecstatic states along the perception-hallucination continuum as the ledges of a homeostatic step function (*7*). While the creative person may travel freely between “normal” and creative states, the chronic schizophrenic patient is stranded in the “jammed computer” state. And the talented mystic, of course, does not need to go through every intermediate step to attain ecstasy.

The mutually exclusive relationship between the ergotropic and trophotropic systems (*8*) justifies a separate perception-meditation continuum of increasing trophotropic arousal (hypoarousal) that is continuous with, and to the right of, the perception-hallucination continuum (Fig. 1). The course of our second trip, therefore, will take us in the opposite direction, along the tranquil perception-meditation continuum, where man may symbolically interpret his gradually increasing trophotropic arousal as Zazen, and, ultimately, samadhi.

That the two continua in Fig. 1 represent two mutually exclusive states of arousal has been well documented by Hess (*1*) and Gellhorn (*8, 9*). The mutual exclusiveness of the ergotropic and trophotropic systems can also be illustrated by characteristic changes in the frequency of the small, involuntary, microneystagmoid movements of the eye. These rapid scanning movements (with a mean frequency of one per second and an amplitude of 5 to 10 minutes of arc) are regarded as a

prerequisite for the fixation of an object in physical space-time (*10*). The frequency of saccadic movements is increased five- to eightfold in response to the ergotropic arousal induced by moderate doses of mescaline, pflorocin, or LSD (D-lysergic acid diethylamide) (*10*). This increase is also present without drugs in acute schizophrenics (*11*) [that is, patients in a state of ergotropic arousal, the “alarm reaction” (*12*) stage of Selye’s general adaptation syndrome (*13*)].

On the other hand, 0.9 gram of alcohol per kilogram of body weight, and even sleepiness and fatigue, decreases saccadic frequency (*14*); more precisely, 0.01 milligram of Valium (diazepam) per kilogram of body weight reduces the saccadic frequency by 9 degrees per second (*15*). Such a progressive decrease seems to be a characteristic feature of trophotropic arousal along the perception-meditation continuum. That the alpha rhythm appearing on the electroencephalogram (EEG) appears to be phase-locked to the onset of saccades (*16*) may also be of significance, since states of progressively greater trophotropic arousal along the perception-meditation continuum are characterized by EEG waves of progressively lower frequencies (measured in hertz) (*17*) (see Fig. 1, right). Moreover, since a complete arrest of saccadic frequency, [for example, by optical immobilization of the retinal image (*18*)] results in periodic fading, disintegration, and fragmented reconstruction of the image, we may postulate that reduced saccadic

frequency may be linked with the Yogi's comment that, at the peak of a meditative experience, he can still see "objects," but they have no predicative properties (19).

**What Are Hallucinations and How Can They Be Measured?**

The hallucinatory or waking-dream states along the perception-hallucination continuum can best be described as experiences of intense sensations that cannot be verified through voluntary motor activity. Note that such a definition does not differentiate between dreams and hallucinations; for example,

see the "Three Wise Men" (Fig. 2). Two of the three wise men dream with eyes closed, while the third, with eyes open, hallucinates the angel who carries all three away from the "real" world into a mental dimension.

We can describe verifiable perceptions, therefore, by assigning to them low sensory-to-motor (S/M) ratios (20), while nonverifiable hallucinations and dreams can be characterized by in-

creasing S/M ratios as one moves along the perception-hallucination or perception-meditation continuum toward ecstasy or samadhi, the two most hallucinatory states (21) (Fig. 1, left and right, respectively). Moderate doses of the hallucinogenic drugs LSD, psilocybin, and mescaline (22) can get one "moving" along the perception-hallucination continuum, whereas minor tranquilizers and some muscle relaxants may initiate travel along the perception-meditation continuum.

If high S/M ratios do, indeed, reflect hallucinatory experiences, as my definition of hallucinations would imply, it would be important to quantify S/M ratio as a measure of hallucinatory intensity. In fact, a quantitative meaning has been given to the S/M ratio by measuring the components of a psychomotor performance, specifically, handwriting area and handwriting pressure (20), in volunteers during a psilocybin-induced waking-dream state.

The techniques for measuring handwriting area (S) (in square centimeters), as well as for obtaining handwriting pressure (M) (in 10<sup>4</sup> dynes averaged over time), with an indicator that operates on a pressure-voltage-to-frequency basis, have been described elsewhere (20). Using these two parameters prior to (T<sub>1</sub>) and at the peak (T<sub>2</sub>) of a psilocybin-induced experience [160 to 250 micrograms of psilocybin per kilogram of body weight], we found in a sample of 47 college-age volunteers a 31 percent (T<sub>2</sub> - T<sub>1</sub>) increase in mean S/M ratio.

I should note that the standard deviation on handwriting area at T<sub>1</sub> is

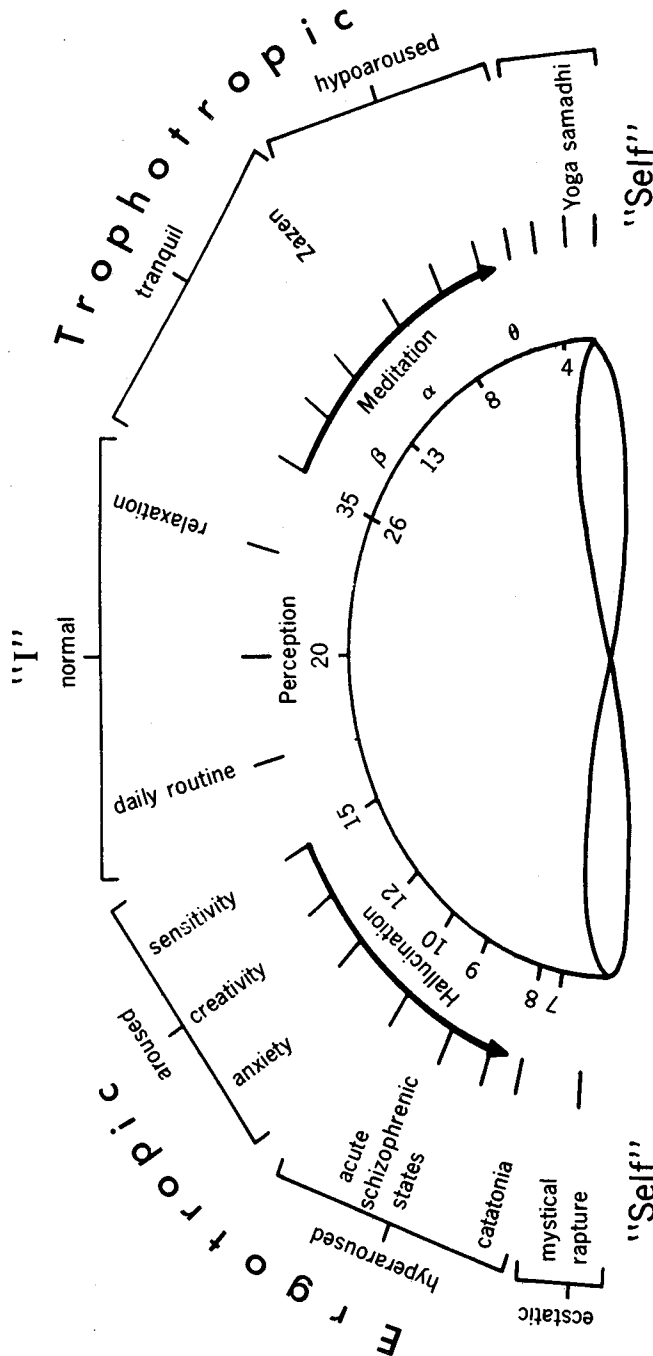


Fig. 1. Varieties of conscious states mapped on a perception-hallucination continuum of increasing ergotropic arousal (left) and a perception-meditation continuum of increasing trophotropic arousal (right). These levels of hyper- and hypoarousal are interpreted by man as normal, creative, psychotic, and ecstatic states (left) and Zazen and samadhi (right). The loop connecting ecstasy and samadhi represents the rebound from ecstasy to samadhi, which is observed in response to intense ergotropic excitation. The numbers 35 to 7 on the perception-hallucination continuum are Goldstein's coefficient of variation (46), specifying the decrease in variability of the EEG amplitude with increasing ergotropic arousal. The numbers 26 to 4 on the perception-meditation continuum, on the other hand, refer to those beta, alpha, and theta EEG waves (measured in hertz) that predominate during, but are not specific to, these states (17).

significantly related to the S/M at  $T_1$  ( $r = 0.4888$ ,  $P < .01$ ,  $N = 47$ ) and that the standard deviation is a simple and useful indicator of the ensuing drug-induced increase in S/M ratio ( $r = 0.372$ ,  $P < .01$ ,  $N = 47$ ). Moreover, subjects with a large standard deviation on handwriting area at  $T_1$  (that is, "variable" subjects), tend to be "perceivers," whereas volunteers with a small standard deviation at  $T_1$  ("stable" subjects) tend to be "judgers," in terms of the Myers-Briggs Type Indicator. This self-reporting, Jungian-type personality indicator yields simple, continuous scores on four dichotomous scales: extroversion-introversion, sensation-intuition, thinking-feeling, and judging-perceiving (23). The perceivers also overestimate or contract time more than judgers do at the peak of a psilocybin-induced experience (4); this implies that perceivers move faster and farther along the perception-hallucination continuum than do judgers, who apparently require a larger dose for a comparable experience.

### Space and Increasing Hyper- and Hypoarousal

We call man's symbolic interpretation of his CNS activity "perception-behavior" and regard creative, "hyperphrenic" and ecstatic states, as well as Zazen and samadhi, as perceptual-behavioral interpretations of ergotropic and trophotropic arousal, respectively. We may now consider some of the per-

ceiving revealed that the preferred level of (the constancy of) brightness increases under the influence of hallucinogenic drugs (26), but only in "variable" subjects (20, 27)—that is, those subjects whose large standard deviations on a variety of perceptual and behavioral tasks indicate a large and varied interpretive repertoire. However, in "stable" subjects, who are characterized by small standard deviations and, thus, by smaller and more predictable interpretive repertoires, the level of preferred brightness decreases when they are under the influence of hallucinogenic drugs. In addition, near-

by visual space was found to gradually close in as subjects moved along the perception-hallucination continuum under the influence of moderate doses of psilocybin. This contraction of nearby visual space was observed with two different techniques: monitoring the apparent fronto-parallel plane (28), and handwriting measurements (29).

The transformation of constancies under ergotropic arousal—specifically, as manifested in the psilocybin-induced contraction of nearby visual space—can also be observed in acute schizophrenics under "natural" ergotropic arousal (that is, without hallucinogenic

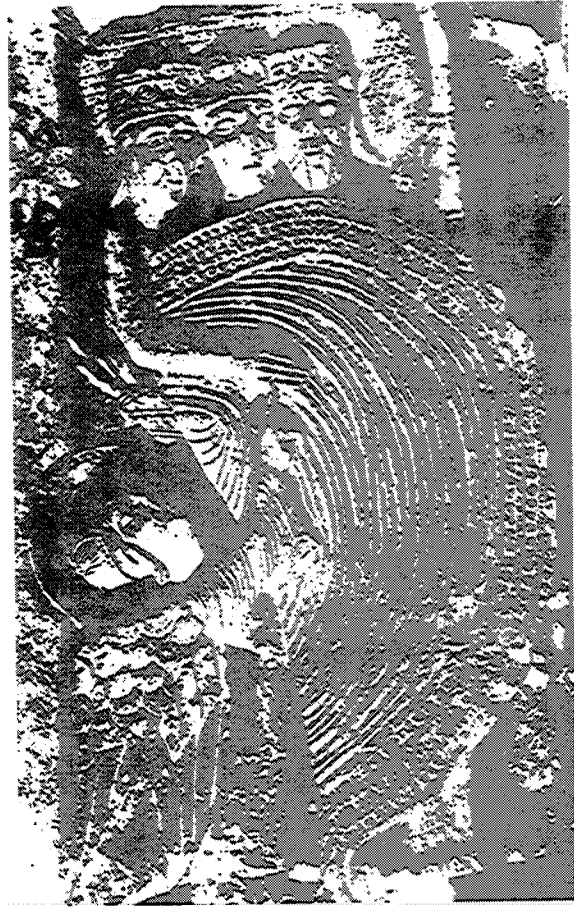


Fig. 2. Gislebertus' "Three Wise Men," in the Cathedral of Autun in the south of France, dramatizes the intense sensations and concomitant loss of voluntary motor activity which are the common features of both hallucinations (see the wise man with eyes open) and dreams (see the two dreaming wise men).

drugs). The transformation of constancies during acute psychotic episodes apparently gives rise to a "vertical displacement of the visual angle," which is implicit in a contraction of visual space and which results in an elevation of the horizon (30). Rennert (30), who for years has studied the angles of the projected type like adults, but only of the introjected type. They hear voices inside their head or other parts of the body, feel that they originate inside themselves and do not feel persecuted by them" (34).

The constancy of corporeal awareness also undergoes transformations as one moves along the perception-hallucination continuum. For instance, phantom sensations [that is, readaptation phenomena compensating for and correcting distortions of corporeal awareness in physical space-time (35)] gradually diminish and disappear as one moves into the mental dimension under the influence of hallucinogenic drugs (36). Depersonalization phenomena, on the other hand, manifest themselves as changes in body image, and usually accompany the dissolution of ego boundaries during creative, psychotic, ecstatic, or meditative states—whether "natural" or drug-induced—as well as while falling asleep. All of this is to say that the constancy of the "I" is interfered with as one moves along the perception-hallucination continuum from the "I" of the physical world to the "Self" of the mental dimension. Analogously, the perception-meditation continuum (Fig. 1, right) also involves

quinine, and so on) to taste a JND in sweetness or bitterness. On the other hand, under the influence of tranquilizers of the phenothiazine type, the Weber fraction becomes larger: more molecules are needed to taste a JND (32). Since the Weber fraction is constant at levels of arousal associated with daily routine (within the customary middle range of taste sensitivity) (33), I interpret the above as examples of arousal-induced transformations of constancies. Because the number of molecules necessary to elicit the sensation of a JND gradually decreases during a voyage from the physical to the mental dimension along the perception-hallucination continuum, it might be extrapolated that no sapid molecules at all are needed for the experience of taste during ecstasy, the most hyperaroused hallucinatory state.

It should be emphasized that the projection of our CNS activity as location in the physical dimension of space and time "out there" was learned at, and is hence bound to, the lower levels of arousal characteristic of our daily survival routines. That this projection is gradually learned can be supported by Bender's observation that schizophrenic children "do not experience hallucinations of the projected type like adults, but only of the introjected type. They hear voices inside their head or other parts of the body, feel that they originate inside themselves and do not feel persecuted by them" (34).

The constancy of corporeal aware-

ness, is gradually reduced along this continuum. Thus, Saint Teresa of Avila tells us in her autobiography that, at the peak of a mystical experience, "... the soul neither hears nor sees nor feels. While it lasts, none of the senses perceives or knows what is taking place" (6). Space, then, which was gradually established in ever-widening circles during childhood, gradually contracts with increasing arousal and ultimately disappears.

**Time and Increasing Hyper- and Hypoarousal**

A gradual contraction and ultimate disappearance is also the fate of chronological time in the physical dimension (of the "I" state) as one progresses along the perception-hallucination or the perception-meditation continuum. In particular, we find that LSD (37) and psilocybin (4) cause an overestimation of time, the magnitude of which is related to a subject's variability on a perceptual or behavioral test before ingesting the given drug. The greater a subject's variability before ingesting a drug—for example, the retest-vari-  
ance on his quinine taste-threshold or the standard deviation on his handwriting area—the greater will be his contraction or overestimation of time at drug peak [that is, 150 minutes after the oral administration of 160 to 200 micrograms of psilocybin per kilogram of body weight, when 63 minutes of chron-

one moves along the perception-hallucination continuum. For instance, phantom sensations [that is, readaptation phenomena compensating for and correcting distortions of corporeal awareness in physical space-time (35)] gradually diminish and disappear as one moves into the mental dimension under the influence of hallucinogenic drugs (36). Depersonalization phenomena, on the other hand, manifest themselves as changes in body image, and usually accompany the dissolution of ego boundaries during creative, psychotic, ecstatic, or meditative states—whether "natural" or drug-induced—as well as while falling asleep. All of this is to say that the constancy of the "I" is interfered with as one moves along the perception-hallucination continuum from the "I" of the physical world to the "Self" of the mental dimension. Analogously, the perception-meditation continuum (Fig. 1, right) also involves a departure from the "I" to the "Self." These two continua can thus be called "I-Self" continua. As will become clear later, the "Self" of ecstasy and the "Self" of samadhi are one and the same "Self."

The further we progress on the perception-hallucination continuum from the normal through the creative, psychotic, and, ultimately, to the ecstatic state (Fig. 1), the more complete is the transformation, or "unlearning," of the constancies of the physical dimension. Input, or outside information in





ological time (in geometrically increasing intervals) are estimated and recorded (4). Moreover, the greater the subject's variability, and thus his contraction of time, the greater will be his "rebound effect" 24 hours after; that is, his underestimation or expansion of time (4).

Dividing people, according to the magnitude of their perceptual variability, into "maximizers" ("stable" subjects) and "minimizers" ("variable" subjects) assists one in resolving the hotly debated question of whether time "flies" or "drags" during a hallucinogenic drug-induced experience. Actually, as we have found, it does both: it is overestimated (it "flies" or contracts) by the minimizers, the subjects with a large standard deviation, who prefer to decrease (visual) sensory data content and its rate of processing at drug peak; and it is underestimated (it "drags" or expands) by the maximizers, the subjects with a small standard deviation, who prefer to increase data content and its rate of processing at drug peak.

Such contraction of time parallels the already described contraction of nearby visual space. By "time-contraction," I mean an increase in data content within a chronological time span, or, in experiential terms, "the flood of inner sensation" (3); and I imply that, during such an experience, the subject, if without a watch, would arrive early for an appointment. Under the impact of an acute, hallucinogenic drug-induced experience, the subject usually compares the time-contraction or increased data

content of the mental dimension with his past and present routine performance in physical space-time and has, therefore, to conclude that "time" passes slowly. Note, for instance, Hofmann's classical description of riding home on his bicycle under the influence of LSD: "The trip is about four miles and I had the feeling of not getting ahead, whereas my escort stated that we were rolling along at a good speed" (38). By comparing the usual rate of revolution of the spokes, as well as the usual rate at which the roadside "passed him by," with his experience of an increased data content or "flood of inner sensation," he had to conclude that he was not getting ahead and that time was dragging. Thus, there is only an apparent contradiction in terms: while experience is shifting from the physical toward the mental dimension, physical or chronological time becomes less and less important. Still, this transitional state can only be described in Aristotelian [dualistic, or two-valued (true-false)] terms of chronological time (39) and by comparing experimental with experiential data. This contradiction resolves itself at the peak of ergotropic or trophotropic arousal, since these purely mental states are timeless and spaceless and in no need of comparative verification.

### Increasing Cortical-Subcortical Integration with Increasing Arousal

If we assume that man, the self-referential system, creates experience through the cortical (that is, perceptual-behavioral) interpretation of his subcortical activity, we may ask about the extent of freedom, or relative independence, of the mind (cortex) from the subcortical substratum. Indeed, man is to a large extent free to interpret his subcortical activity in a variety of ways at levels of arousal associated with daily routine. That this freedom is implicit in the functional independence of the limbic and neocortical systems is dramatically demonstrated by the fact that the electrical discharges resulting from hippocampal seizures are confined to the limbic system (40).

We can find no relation between the extent of psilocybin-induced perceptual and behavioral (or cortical) change and a drug-induced increase in pupillary diameter (41), which is a drug dose-dependent parameter of autonomic activity (20, 42). This lack of a relation points to a large degree of freedom of cortical interpretive activity, even under moderate hyperarousal.

The cortical-subcortical independence at the level of daily routine and even moderate levels of arousal is also implicit in the results of Marañón's (43) and Schachter and Singer's (44) experiments, in which the set and setting determined the particular cortical inter-

pretation (from "good trip" to "bad trip") of each subject after his subcortical activity had been altered by an injection of 0.5 cubic centimeter of a 1:1000 solution of epinephrine.

It is now common knowledge that the set and setting, as well as the personality, decisively influence the cortical interpretation of hallucinogenic drug-induced changes in subcortical activity (45). What is not fully realized is that set, setting, personality, expectations, and past experiences determine the cortical "effects" of most of the psychoactive drugs when they are used in medically endorsed dosages. In fact, except for the anesthetics and hypnotics, there are no drugs that selectively direct human cognitive (psychological, or, in our terms, cortical) functions.

With rising levels of ergotropic and trophotropic arousal, however, perceptual-behavior becomes increasingly dependent upon (or less free of) the subcortical substratum that generates it. A cat responds to ergotropic hyperarousal with rage, while at the peak of trophotropic arousal the animal always yawns, curls up, and falls asleep. But man may be compelled to interpret these two extreme states of hyper- and hypoarousal as ecstasy and samadhi. This increasing stereotypy (loss of freedom) with increasing ergotropic arousal can be observed, for example, as a decrease in the variability of the EEG amplitude, which Goldstein and others have measured with a Drohocki integrator (46). A decrease in variability is expressed as

the coefficient of variation (see the coefficient of variation values for states ranging from relaxation to catatonia in Fig. 1) (46, 47). Increasing stereotypy also manifests itself as an increase in the S/M ratio (20), thus indicating an intensification of inner sensations, accompanied by a loss in the ability to verify them through voluntary motor activity. Such high S/M ratios are implicit in the statements uttered during both drug-induced hallucinations and the hallucinations of schizophrenics: "of being hypnotized," "of being not free," "of being overpowered," "of being paralyzed," and so on, and in the mystic's inability to experience the subject-object dichotomy of daily routine in the physical dimension.

Apparently, then, an increase in ergotropic arousal is paralleled by a restriction in the individual's repertoire of available perceptual-behavioral interpretations. This restriction implies that certain levels can *only* be interpreted as creative (artistic, scientific, religious) or psychotic experiences (48). Although a religious interpretation is a common feature of catatonia (49), ecstasy, which is the mystical experience of the Oneness of everything, results from a creative breakthrough out of catatonic hyperarousal. During the ecstatic state, there is neither capacity nor necessity for motor verification of the intense sensations. In the mental dimension, in contrast to the physical, the all-pervasive experience of absolute certainty does not require further verification (50) and will be structured according

to current mythology or the belief system of a St. Francis, Pascal, or Ramakrishna. What is one man's loss of freedom, therefore, may be another's gain in creativity.

An increasing stereotypy can also be observed along the perception-mentation continuum of increasing trophotropic arousal (see Fig. 1, right); this enables one to gradually exclude stimulation from without and turn attention inward. Continuous trains of alpha waves accompany these changes, and the dominant frequency of the alpha pattern decreases toward the alpha-theta border region, until some subjects, in a state of reverie, produce long trains of theta waves (51) [see the beta, alpha, and theta waves (52), measured in hertz, in Fig. 1, right]. According to Green *et al.* (17), the "alert inner-focused state is associated with the production of alpha rhythm"; in this state Zen masters show an alpha-blocking response to auditory clicks, but, in contrast to normal controls, do not habituate to these stimuli (51). Since the alpha rhythm is not altered or blocked by flashing lights, sounding gongs, or the touch of a hot test tube during the deep meditation of Indian Yoga masters (53), the Yoga samadhi apparently represents a more intense state of trophotropic arousal than Zazen does and must also express a greater inability to function in physical space-time than Zazen does. In fact, a Yoga master denies noticing *any* outside stimuli during deep meditation, whereas control subjects show alpha-blocking with as

little stimulus as a flashing light (as do the Yoga masters themselves when not meditating).

#### "Self": The Knower and Image-Maker; and "I": The Known and Imagined

We have seen that the departure from the physical dimension during a voyage on the perception-mentation continuum is accompanied by a gradual loss of freedom, which is manifested in the increasing inability to verify the experience through voluntary motor activity (53). At the peak of trophotropic arousal, in samadhi, the meditating subject experiences nothing but his own self-referential nature, void of compelling contents. It is not difficult to see a similarity between the meditative experience of pure self-reference and St. Teresa's description of her ecstasy: in both timeless and spaceless experiences, the mundane world is virtually excluded. Of course, the converse is true of the mundane state of daily routine, in which the oceanic unity with the universe, in ecstasy and samadhi, is virtually absent. Thus, the mutual exclusiveness of the "normal" and the exalted states, both ecstasy and samadhi, allows us to postulate that man, the self-referential system, exists on two levels: as "Self" in the mental dimension of exalted states; and as "I" in the objective world, where he is able and willing to change the physical dimension "out there." In fact, the "I" and

the "Self" can be postulated on purely logical grounds. See, for instance, Brown's reasoning (54) that the universe is apparently

... constructed in order (and thus in such a way as to be able) to see itself. But in order to do so, evidently it must first cut itself up into at least one *state which sees*, and at least one other *state which is seen*. In this severed and mutilated condition, whatever it sees is only partially itself . . . but, in any attempt to see itself as an object, it must, equally undoubtedly, act so as to make itself distinct from, and therefore, false to, itself. In this condition it will always partially elude itself.

In our terminology, the "Self" of exalted states is that which sees and knows, while the "I" is the interpretation, that which is seen and known in the physical space-time of the world "out there." The mutually exclusive relation between the "seer" and the "seen," or the elusiveness of the "Self" and the "I," may have its physiological basis in the mutual exclusiveness of the ergotropic and trophotropic systems (8).

A discernible communication between the "Self" and the "I" is only possible during the dreaming and hallucinatory states, whether drug-induced or "natural." These states can be located approximately between coefficients of variation 10 and 13 on the perception-halucination continuum (Fig. 1, left) and in the 9 to 12 hertz EEG range on the perception-mentation continuum (Fig. 1, right). Such "I"-"Self" communication is the creative source of art, sci-

ence, literature, and religion.

In spite of the mutually exclusive relation between the ergotropic and trophotropic systems, however, there is a phenomenon called "rebound to super-activity," or trophotropic rebound, which occurs in response to intense sympathetic excitation (55), that is, at ecstasy, the peak of ergotropic arousal (56). A rebound into samadhi at this point can be conceived of as a physiological protective mechanism; Gellhorn (8, 9) was among the first to notice that the rebound of the trophotropic system is not confined to the autonomic branches, but also causes significant changes in behavior. Thus, repetitive stimulation of the reticular formation in the midbrain increases the arousal level in awake cats, but this phase is followed by one in which the animal yawns, lies down, and finally falls asleep. This rebound phase is associated with the appearance of theta potentials in the hippocampus (57), just as the corresponding human trophotropic rebound—samadhi—is characterized by theta potentials (17) (see Fig. 1, right). These rebound or reversal phenomena between ecstasy and samadhi (8, 9) are illustrated by the loop (58) connecting the two extreme exalted states in Fig. 1.

The "Self" of ecstasy and samadhi are one and the same, as if the reflecting surface of a lake in Fig. 1 embraced both exalted states. If the level of water in such a lake were gradually raised, it would intersect successive and corresponding hyper- and hypoaroused states. The intersected states represent levels

of gradually diminishing subjectivity (less "Self") and increasing objectivity (more "I"), until eventually the objective "I"-state of the world is reached. Thus, each level of water would connect a hyper- and hypoaroused state with a specific subjectivity/objectivity (or "Self"-to-"I") ratio, implying a similarity between those pairs of hyper- and hypoaroused states that are connected by gradually raised levels of water. This similarity might, for example, be used to account for the success of the widely practiced narcoanalytic technique of abreacting a traumatic, hyperaroused experience in a hypoaroused state of similar "Self"-to-"I" ratio. The similarity between corresponding hyper- and hypoaroused states could also account for the hypermnestic phenomena of the hypoaroused elderly, who clearly recall the hyperaroused experiences of their youth, but do not recall more recent experiences (59).

During the "I"-state of daily routine, the outside world is experienced as separate from oneself, and this may be a reflection of the greater freedom (that is, separateness or independence) of cortical interpretation from subcortical activity. With increasing ergotropic and trophotropic arousal, however, this separateness gradually disappears, apparently because in the "Self"-state of ecstasy and samadhi, cortical and subcortical activity are indistinguishably integrated. This unity is reflected in the experience of Oneness with everything, a Oneness with the universe that is oneself.

### Sign-Symbol-Meaning Transformations

The separateness of subject and object during the daily routine levels of arousal (in the "I"-state) has been elaborated in our customary, rational, Aristotelian logic and language—a two-valued (either-or, true-false) logic that discounts the interaction between observer (subject) and observed (object) (60). This separateness of object and subject, as we have seen, is a reflection of the relative independence of cortical interpretation from subcortical activity and is of survival value in the "I"-state, where the subject must make decisions of life and death by manipulating objects (through voluntary motor activity).

But when we depart along either continuum from the "I" toward the "Self," the separateness of object and subject gradually disappears and their interaction becomes the principal content of the experience. This interaction, again, is a reflection of the gradually increasing integration of cortical and subcortical activity. In this state of Unity, the separateness of subject and object that is implicit in dualistic, Aristotelian logic and language becomes meaningless; only a symbolic logic and language can convey the experience of intense meaning. Apparently, then, meaning is "meaningful" only at that level of arousal at which it is experienced, and every experience has its state-bound meaning. During the "Self"-state of highest levels of hyper- or hypoarousal, this meaning can no longer be expressed in dualistic terms, since the experience

of unity is born from the integration of interpretive (cortical) and interpreted (subcortical) structures. Since this intense meaning is devoid of specificities, the only way to communicate its intensity is the metaphor; hence, only through the transformation of objective sign into subjective symbol in art, literature, and religion can the increasing integration of cortical and subcortical activity be communicated.

The transformation of sign to symbol is also apparent in the visual realm, where the constancies of space and time are replaced by geometric-ornamental-rhythmic structures, the "hallucinatory form constants" of Klüver (61). In the light of my own experience, I would extend Klüver's observations to include hyper- and hypoaroused hallucinatory experiences in general, whether electrically (62), "naturally," or drug-induced (63). The hallucinatory constancies are "magical symbols," visible or audible metaphors within a structure of symbolic logic and language, the language of hyper- and hypoaroused hallucinatory states, and are at the base of the general tendency toward geometric-rhythmic ornamentalization. For example, both the rose windows of Gothic cathedrals and the mandalas of Tantric religious art (64) are ritualized hallucinatory form constants. The tendency toward ornamentalization, however, is not reserved to visual imagery, but also governs the order of poetic and musical rhythm, imposing an all-pervasive metrum and harmony on the hallucinatory creative-religious states (65):

the rhythm of music, poetry, and language corresponds to the geometric-ornamental rhythm of the visual realm. Therefore, the manneristic (66) hallucinatory-creative style of art and literature is regarded as a projection and elaboration of the geometric-rhythmic-ornamental fabric of hyper- and hypo-aroused states.

**State-Boundaries**

Inasmuch as experience arises from the binding or coupling of a particular state or level of arousal with a particular symbolic interpretation of that arousal, experience is state-bound; thus, it can be evoked either by inducing ("naturally," hypnotically, or with the aid of drugs) the particular level of arousal, or by presenting some symbol of its interpretation, such as an image, melody, or taste. "Acquired aversions to tastes following illness are commonplace in humans. The knowledge that the illness was caused by the stomach flu and not the Sauce Bernaise does not prevent the sauce from tasting bad in the future" (67).

Alcohol induces the state of arousal necessary for the recall of a state-bound experience in the film *City Lights*. Here, Charlie Chaplin saves a drunken millionaire from attempted suicide, and so becomes his good friend. When sober, however, the millionaire does not remember Charlie. However (68):

... the millionaire does not stay sober

long. When he is drunk again, he spots Charlie and treats him like a long-lost friend. He takes Charlie home with him, but in the morning, when he is again sober, he forgets that Charlie is his invited guest and has the butler throw him out. Evidently, consciousness extends either between states of drunkenness, or between states of sobriety, but there is complete amnesia between the two discontinuous states of sobriety and drunkenness, states with characteristic and different "Self"-to-"I" ratios.

Charlie's story has been recently re-modeled and scientifically validated by Goodwin *et al.* (69), who had 48 subjects memorize nonsense syllables while drunk. When sober, these volunteers had difficulty recalling what they had learned, but they could recall significantly better when they were drunk again. Bustamante *et al.* (70) also observed amphetamine-induced (20 milligrams) excitatory, and amobarbital-induced (200 milligrams), "inhibitory," state-dependent recall of geometric configurations. His volunteers both memorized and later recalled the configurations under one of the two drugs. I submit, however, that while remembering from one state to another is usually (implying that the individual was confronted with a learning task), extended practice, learning, or conditioning is not necessary for producing "state-boundness." On the contrary, a single experience may be sufficient to establish state-boundness.

Déjà vu experiences and the so-called LSD flashbacks are, I believe, special

cases of the general phenomenon of state-boundness. Note that neither focal lesions nor molecules of a hallucinogenic drug are necessary for the induction of a flashback—a symbol evoking a past drug experience may be sufficient to produce an LSD flashback (72).

An 18-year-old boy had a "bum trip" on "acid" and could not "come down" for two weeks. After he drank wine with a group of friends and was told by one of them that the wine contained a high dose of LSD (which it did not), he experienced hallucinations continuously for 14 days.

And here is the story of a "flashback" involving no drugs whatsoever (73).

I was in love with a college classmate, but he married someone else. I also married, and even after four years and a beautiful baby I still dreamed about this fellow. Whenever I saw a car like his, my heart would pound even though he had left town years before and I knew it couldn't possibly be his.

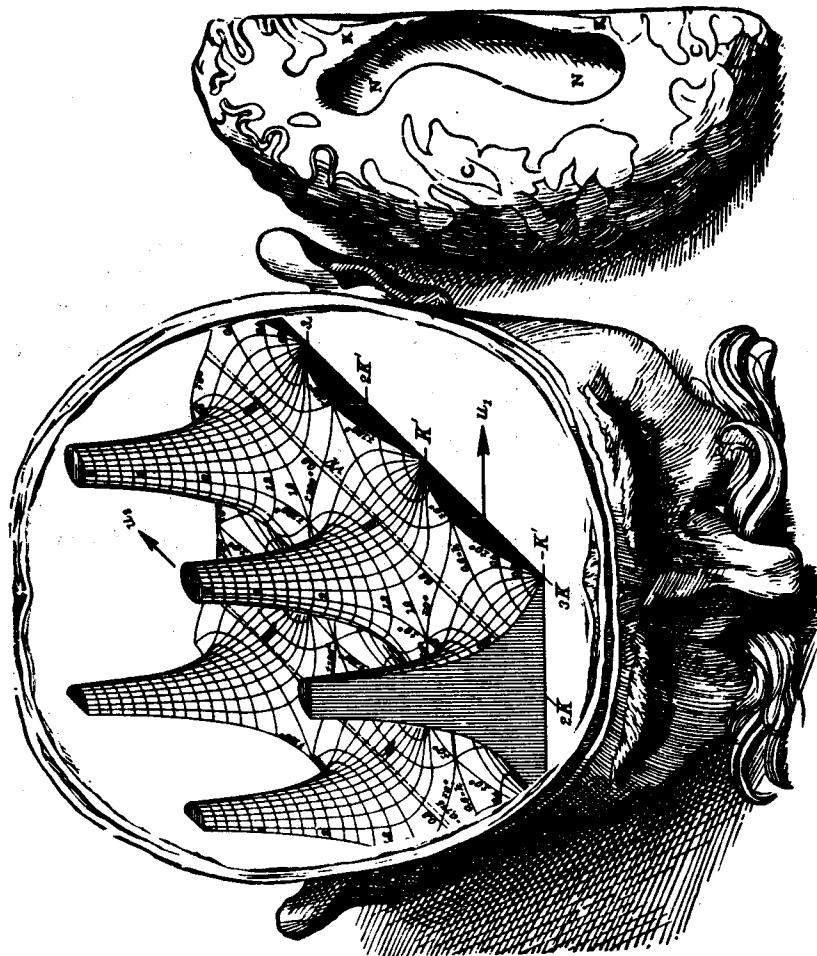
It follows from the state-bound nature of experience, and from the fact that amnesia exists between the state of normal daily experience and all other states of hyper- and hypoarousal, that what is called the "subconscious" is but another name for this amnesia. Therefore, instead of postulating *one* subconscious, I recognize as many layers of self-awareness as there are levels of arousal and corresponding symbolic interpretations in the individual's interpretive repertoire. The many layers of self-awareness, each with its characteristic "Self"-to-"I" ratio, remind one of the captain with girl friends in many

ports, each girl unaware of the existence of the others, and each existing only from visit to visit (that is, from state to state). This is how multiple existences become possible: by living from one waking state to another waking state; from one dream to the next; one amobarbital narcoanalysis session to the next (74); from LSD to LSD (75); from epileptic aura to aura (76); from one creative, artistic, religious, or psychotic inspiration or possession to another creative artistic, religious, or psychotic experience; from trance to trance; and from reverie to reverie.

**References and Notes**

1. W. Hess, *Das Zwischenhirn und die Regulierung von Kreislauf und Atmung* (Thieme, Leipzig, 1938); *Das Zwischenhirn* (Schwabe, Basel, 1949). Ergotropic arousal denotes behavioral patterns preparatory to positive action and is characterized by increased activity of the sympathetic nervous system and an activated psychic state. These states may be induced either naturally or, for example, through hallucinogenic drugs. Trophotropic arousal results from an integration of parasympathetic with somatomotor activities to produce behavioral patterns that conserve and restore energy, a decrease in sensitivity to external stimuli, and sedation. During ergotropic and trophotropic arousal, "alterations in autonomic activity are not confined to the visceral organs, but induce changes in cortical activity" [W. Hess, cited by Gellhorn (9)].
2. R. Fischer, in *Psychiatry and Art*, vol. 2, *Art Interpretation and Art Therapy*, I. Jakob, Ed. (Karger, Basel, 1969), p. 33.
3. R. Gelpke, quoted by A. Hofmann, in *Sonderabdruck aus dem Basler Stadtbuch* (Basel, 1964).
4. R. Fischer, in *Proceedings of the 4th International Congress of Pharmacology* (Schwabe, Basel, 1970), vol. 3, p. 28; *Ann. N.Y. Acad. Sci.* 138, 440 (1967).
5. The word "hyperphrenic" was suggested to me by Dr. Alfred Bader, Lausanne, Switzerland.
6. Saint Teresa, *The Life of Saint Teresa, J. M. Cohen*, Transl. (Penguin, Baltimore, 1957), p. 142.

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8. E. Gellhorn, *Psychol. Forsch.* **34**, 48 (1970).
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15. J. Aschoff, *ibid.* **211**, 325 (1968).
16. K. Gaarder, R. Koresko, W. Kropff, *Electroencephalogr. Clin. Neurophysiol.* **21**, 544 (1966).
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18. R. Ditchburn and D. Fender, *Opt. Acta* **2**, 128 (1955). Immobilization is accomplished by attaching a tiny mirror to a contact lens in such a way that the image will follow the microrystagmoid movements of the eye. Also see R. Pritchard, W. Heron, D. Hebb [*Can. J. Psychol.* **14**, 67 (1960)].
19. K. Behanan, *Yoga, A Scientific Evaluation* (Dover, New York, 1937), p. 223. The cobra has fixed eyes to begin with; therefore, to compensate for the lack of scanning eye movements, it must sway its head rhythmically to fixate the image of its victim. (If nothing else, one practical application of this paper may be the following: whenever you meet a cobra, swing along with him and he won't be able to locate you.)
20. R. Fischer, *Dis. Nerv. Syst.* **31**, 91 (1970); K. Thatcher, T. Kappeler, P. Wisecup, R. Fischer, *ibid.*, p. 181.
21. R. Fischer, *ibid.* **30**, 161 (1969). J. Strauss's evidence also supports this concept of the continuous, nondiscrete nature of perceptual and hallucinatory experience [*Arch. Gen. Psychiat.* **21**, 581 (1969)]. Our definition of hallucinations or dreams as experiences characterized by a high S/M ratio is free of value judgment, thus implying that hallucinatory experience can be labeled pathological, artistic, religious, and so on, according to one's taste [and taste threshold: see R. Fischer, in *Gustation and Olfaction*, G. Ohloff and A. E. Thomas, Eds. (Academic Press, New York, 1971), pp. 187-237].
22. The cross-tolerance between LSD, psilocybin, or mescaline [H. Isbell, A. Wolbach, A. Wikler, E. Miner, *Psychopharmacologia* **2**, 147 (1961); A. Wolbach, H. Isbell, E. Miner, *ibid.* **3**, 1 (1962)] as well as the characteristic square-wave pattern of saccadic movement they elicit [E. Hebbard and R. Fischer, *ibid.* **9**, 146 (1966)] mark these drugs as the hallucinogenic, psychotomimetic, psychodelic, or psychodysleptic drugs. It is implied, therefore, that any state which can be induced by one of these drugs can be duplicated by the others as well.
23. R. Corlis, G. Splayer, P. Wisecup, R. Fischer, *Nature* **216**, 91 (1967).
24. "Constancies" assure the recognition of identity; they refer to what Piaget meant by the "conservation" of area, distance, length, volume, and so on [J. Piaget, B. Inhelder, A. Szeminska, *The Child's Conception of Geometry*, E. A. Lutzer, Transl. (Routledge, London, 1960), p. 390]. For example, wearing prism spectacles results in a variety of visual distortions which, due to the cortical transformation of subcortical (retinal) information, gradually disappear with time. Perceptual-behavioral constancies can be formalized as information (or signal to noise) ratios; that is, as dimensionless quantities [R. Fischer, F. Griffin, R. C. Archer, S. C. Zinsmeister, P. S. Jastram, *Nature* **207**, 1049 (1965)].
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30. H. Remner, *Confin. Psychiat.* **12**, 23 (1969).
31. L. Navratil, *ibid.*, p. 30.
32. R. Fischer and R. Kaelbling, in *Recent Advances in Biological Psychiatry*, J. Wortis, Ed. (Plenum, New York, 1967), vol. 9, p. 183; R. Fischer, L. Ristine, P. Wisecup, R. Fischer, H. Dunbar, A. Sollberger, *Biol. Psychiat.* **1**, 209 (1970).
33. R. Fischer, H. Dunbar, A. Sollberger, *Arzneimittel-forschung* **21**, 135 (1971).
34. L. Bender, in *Psychotomimetic Drugs*, D. Efron, Ed. (Kaven, New York, 1969), p. 267.
35. R. Fischer, *Percept. Biol. Med.* **12**, 259 (1969). The loss of a limb or an organ, for instance, can be regarded as a distortion of corporeal awareness; the phenomenon that corrects for this distortion results in a very real feeling that the lost limb or organ is still there, but this is only a phantom sensation.
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38. A. Hofmann, in *Discoveries in Biological Psychiatry*, F. Ayd and Blackwell, Eds. (Lippincott, Philadelphia, 1970), chap. 7.
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41. The mean increase in pupillary diameter induced by 160 micrograms of psilocybin per kilogram of body weight in 34 college-age male volunteers was 0.93 millimeter, standard deviation = ± 0.52; whereas in 13 females, the mean increase was 0.56 millimeter, standard deviation = ± 0.27.
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50. Pascal recorded, at the peak of his decisive religious illumination: "Fire./God of Abraham, God of Isaac, God of Jacob./not of the philosophers and the scientists./Certainty. Certainty." [M. Arland, *Pascal* (l'Enfant Poète, Paris, 1946), pp. 120-121].
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53. B. Anand, G. Chhina, B. Singh, *Electroencephalogr. Clin. Neurophysiol.* **13**, 452 (1961).
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55. E. Gellhorn, *Acta Neuroveg.* **20**, 181 (1959).
56. Such rebound would be called "inhibition" in Pavlovian terminology [I. Pavlov, in C. Murchison, *Psychologies of 1930* (Clark Univ. Press, Worcester, Mass., 1930), p. 213], and "phase of resistance" by Selye [*Stress* (ACTA, Montreal, 1950), pp. 15-43]. It can also be accounted for within the frame of Wilder's Law of Initial Value, which states that "the higher the initial value of a measured function, the lower is the tendency of the system to respond to furthering stimuli, while the highest as well as the lowest values tend to result in a reversal of action (itatic mine)" [J. Wilder, *J. Psychother.* **12**, 199 (1968)].
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58. The "loop" in Fig. 1 has also been independently suggested to me (on experimental grounds alone) by both Dr. J. H. M. Whitman, University of Cape Town, South Africa, and Marilyn Delphinium Rutgers, Glen-Ellen, California. I am gratefully indebted to them, as well as to Primarius Dr. Leo Navratil, Gugging, Austria, for sharing with me their intuition and scionarship.
59. This example was suggested to me by Primarius Dr. Leo Navratil, Gugging, Austria. For example, neither quinine molecules nor a subject's taste receptors are bitter per se—bitterness results only during interaction of the two. Therefore, no taster, no bitterness (just as there can be no image or sound of a falling tree without a viewer or listener), [See R. Fischer, *Dis. Nerv. Syst.* **30**, 161 (1969)]. The interactional nature of reality is already implicit in the fact that the brain is the only organ that develops through experiencing itself. [See H. Ey, *La Conscience* (Presses Universitaires de France, Paris, 1963), p. 64].
61. H. Klüver, *Mescal and Mechanism of Hallucinations* (Phoenix, Univ. of Chicago Press, Chicago, 1966), p. 66.



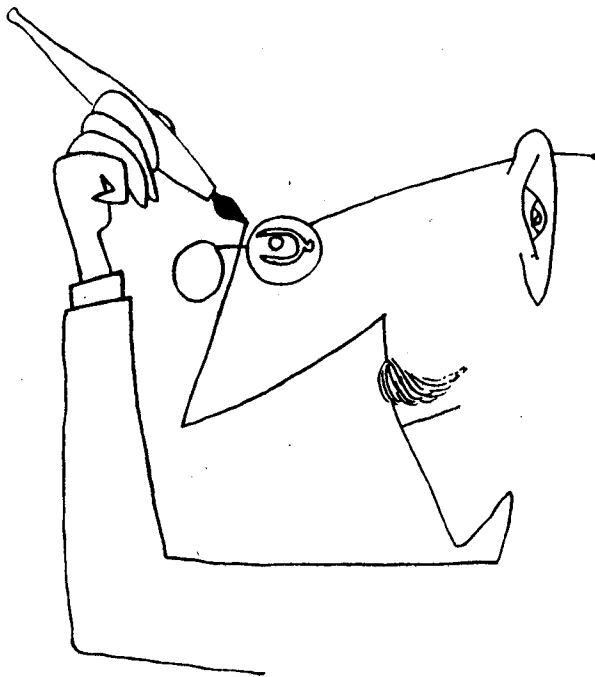
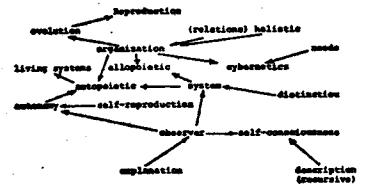
77. Supported in part by National Institute of Mental Health grant 1 RO3 MH17633-01 and general research support grants. I am indebted to Sandoz Pharmaceuticals, Basel, Switzerland, and to Dr. John A. Scigliano, former executive secretary, FDA-PHS Psychotomimetic Agents Advisory Committee, Bethesda, Maryland, for generously providing me with psilocybin (under IND-3530). I am also grateful to Dr. Peter Gwynne, James Scheib, and Pamela Furney for their devoted competence and to my creative artist wife, Irudy, for vital perceptual as well as cognitive illumination.

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66. See L. Navrátil, *Schizophrenie und Kunst* (Deutsches Taschenbuch Verlag, München, 1965), p. 35; *Schizophrenie und Sprache* (Deutsches Taschenbuch, München, 1966), p. 162.
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72. L. Tec, *J. Amer. Med. Ass.* 215, 980 (1971).
73. From "Dear Abby," in *Citizen Journal*, Columbus, Ohio, 13 January 1971, p. 21.
74. Primarius Dr. Raoul Schindler, Vienna, informed me at Linz in 1969 that a patient's thread of thought in narcoanalysis resumes, after an injection of amobarbital, exactly where it left off at the end of the previous session.
75. Dr. Hanscarl Leuner, Göttingen, Germany, also confirms (1970) that his patients in LSD-supplemented or psycholytic therapy regard each LSD experience as a continuation of the last.
76. M. Horowitz, J. Adams, and B. Rutkin [*Arch. Gen. Psychiat.* 19, 469 (1968)] report from the case history of an epileptic girl that the imagery of every aura consisted of "pigs walking upright like people." In early grade school the girl would rip open her blouse during a seizure, but, of course, she would not remember this after the seizure. Nevertheless, her classmates called her a pig, and it was this pig which she saw "walking upright" in each aura.

## SELF-CONSCIOUSNESS

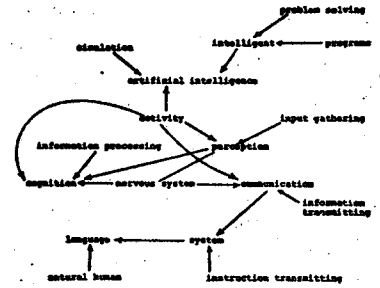
Behavior in the domain of self-observation. This behavior arises by the recursive descriptive interactions of a system with its own descriptive states, so that there is an endless stream of descriptions of descriptions of descriptions...

It follows that for self-consciousness to exist there must be within the system a descriptive component endowed with a language of an infinity capacity, of the kind present in humans. [F.V.]



# COGNITION

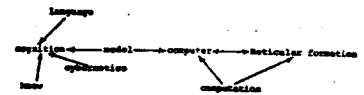
The information-processing activity of the human nervous system, as opposed to perception which is its input-gathering activity or communication which is its information-transmitting activity. [P.G.]



# COGNITION

Cognition comes from the same Latin as know or knowing. Cognition, in practical cybernetics, means the formation of a model that can be represented by a symbol or code. The principal means of acquiring such a model is by vision, reinforced by touch and manipulation, but the model can be acquired also through symbols (language). Comparison of the stored model with incoming stimuli can lead to recognition.

The binocular TV camera and computer in our laboratory can automatically acquire a model of the environment, but it does not yet represent this model by a symbol so it is not cognitive.

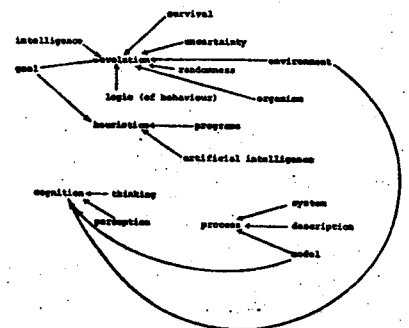


[L.S.]

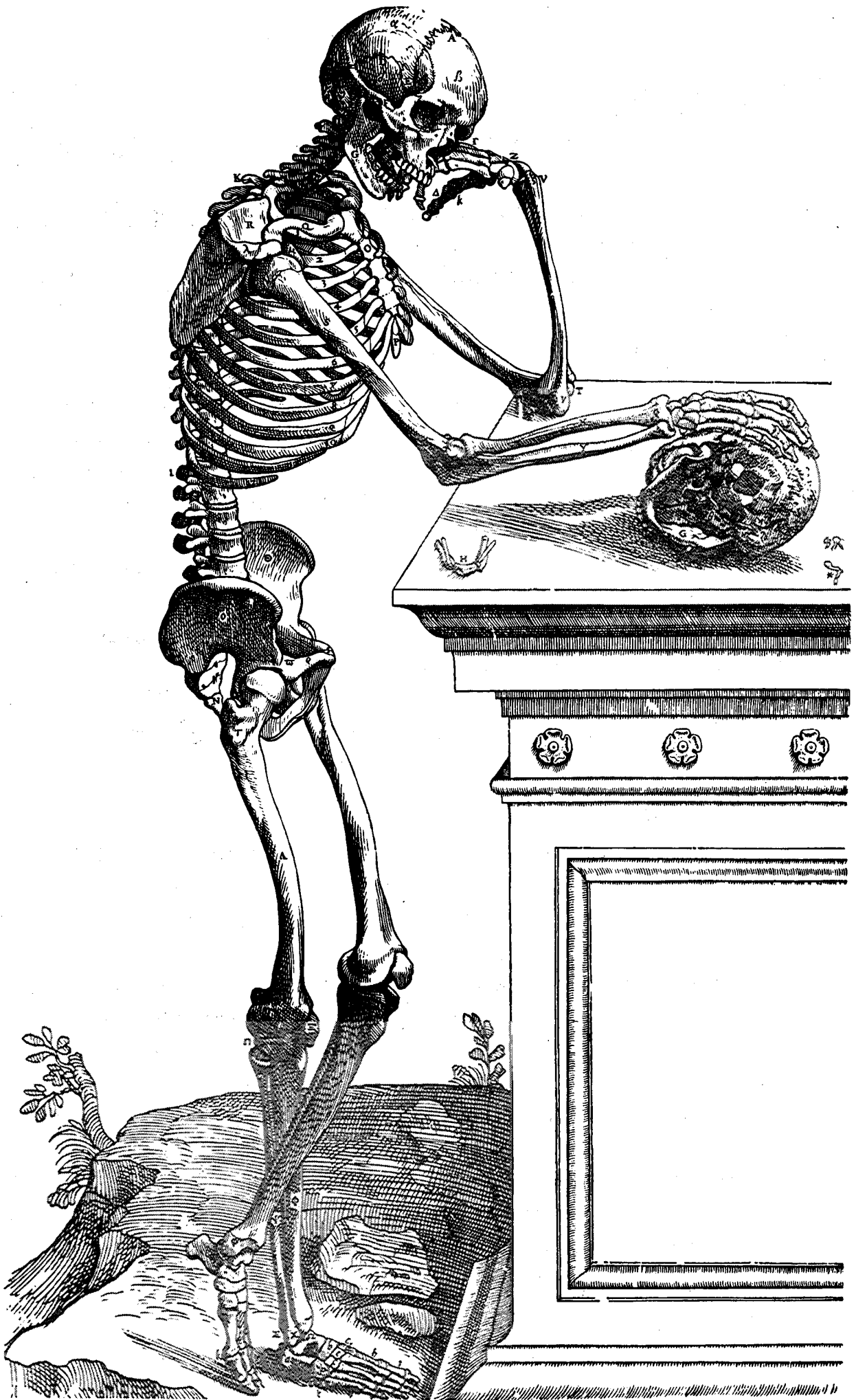
# COGNITION

The process called thinking, the transformation which intercedes between perception and implementation, the generation of models which presume to replicate the external environment and perhaps the modeler itself.

Cognition depends upon the identification of causal relationships based upon observations perceived, transformed and compared to those previously seen (recognition...re-recognition... to know again what is already known). The essence of model building however rests upon the identification of new relationships which arise through the comparison of previously unrelated findings. Thus associative memory is key to cognition, this hinging upon a reflection of the purpose of the behaving organism. [L.F.]







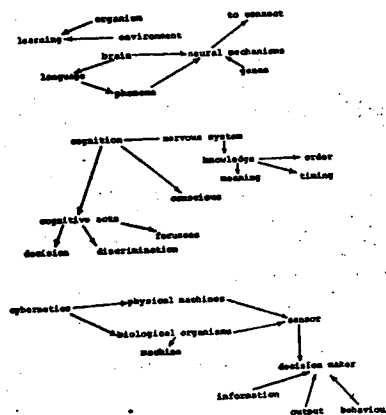
# COGNITION

When a mosquito lands on your neck, drills through your skin, fills her stomach, and flies away, she has performed a cognitive act, mosquito type. Her genes had built a nervous system with knowledge about what to do and how to do it. The meaning of warm skin (go close and land) was built into her chassis, as was the timing and order of each step in the total act. She also had to be conscious, by the way.

Every person in a team engaged in drilling an oil well performs countless cognitive acts every hour. If you watch one of them for a while you see him applying knowledge he has learned in a meaningful way. He makes decisions, discriminates this from that, focusses his attention from here to there, etc., From what he does you deduce he has cognitions.

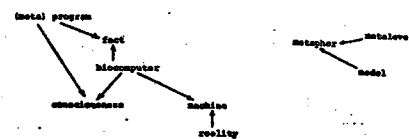
The word cognition originated in the old days when little was known about how a brain works. It was used to cover what transpired inside the head during the purposive, goal-directed acts seen in others, and during the private events only you know about (which cartoonists epitomize by putting the lighted lamp-bulb in the balloon over a character's head). It's an ambiguous word, as well as archaic, and it should be retired, like the word excecate, from the vocabularies of experimentalists.

[R.G.]



# COGNITION

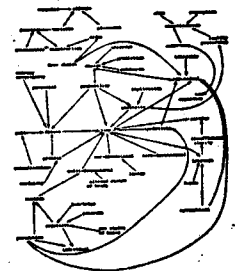
"I am". "I have thunk therefore I can not am". Cogito ergo sum. Cognize I. Ignition co. Light up self. K-OG-NI-SHUN: a martial art (Kung fu) without the use of the body. Shunning the cog, becoming I alone, not cog, not ignition. [J.L.]



## COGNITION

Cognition is distinct in origin and reference from consciousness. The latter is ultimately from con-scire, the primary root being scire linked to the English "to scan," in turn to "skein," a long winding of thread. To be aware thus means to follow the "thread" of the perceived situation or, in more abstract cases, the thread of the argument or reasoning, thus avoiding the jaws of the Minotaur-monster of error as Theseus escaped from the Minoan labyrinth by following the thread of Ariadne, here a beneficent form of Adrasteia or NECESSITY that is the thread of "necessary" or reality-preserving implication. The very word "implication" involves the braiding (French plier) or "plaqueing" of threads.

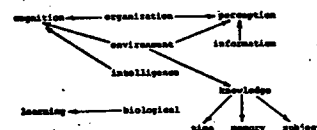
All this is very relevant to but not identical with COGNITION, from the ultimate roots in Greek: gnē "know" < gen "generate," i.e. knowledge is a birth of new awareness in the mind; and in Sanskrit: gan "distinguish," hence "enumerate" < > jan "generate" > gña = jña "know;" cf. jñana yoga, the way of knowledge or gnosis. The formal name of Ganesha, son of Shiva, is Ganapati "lord of number and categories" (to cognize is more than to perceive: it is to categorize or place), all these roots also being related to the English know and began as well as generate. The ultimate meaning of the Greek root GN, the primordial core of COGNITION, is "the arising of a new state of being" (emphasis ours; see p. 309a of Liddell and Scott's unabridged Greek dictionary). Thus the meaning-root of cognition, generate, know, and begin are all the same. COGNITION, then, is a process taking place in an INDIVIDUAL and resulting in the arising of a new state of awareness through the categorizing of a perception. In Cicero's words, "insitus deorum cognitiones habemus" -- "within us we have cognitions of the gods." So we transcend the senses by cognitively using the percepts they so remarkably generate for us. [C.M.]



## COGNITION

(1) In the narrow sense, the study of internal systems of organization in an organism or any other intelligence which help one understand the way that organism is embedded in his environment -- whenever this study is carried out with an epistemological motive.

(2) In the wide sense, almost synonymous with epistemology, i.e., any enquiry-like enterprise in which (a) both the subject of enquiry and all intuitive-conceptual systems, history and awareness that the investigator brings to and engages during inquiring are the subject of enquiry, and in which (b) any perspective or equilibrium that has been reached is suspended as soon as it has been reached and another qualitatively different, overlapping and partly contradictory perspective or equilibrium is sought. [K.W.]



## KNOWLEDGE

(1) In the most general sense, synonymous with "functioning in time" (often also "within an environment," "embedded in a fluid of [individual] memory," and "embedded in environment-memory.")

(2) In the form of "knowledge of" and "knowledge that" (i.e., as "content" or "subject matter"), a concept of ideology fairly specific to western civilization and based on cognitive effects (ultimately spatial, operating over a period of years, and requiring several hours per day of input), according to which an individual automatically constructs realms of fixed and stationary entities (e.g., the realm of items and relationships of a given subject matter area). [K.W.]

