THE PSYCHOLOGY OF NEGATION AND ATTENTION

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Some phenomena designated with a derivate of the verb 'to negate', like 'negativism' and linguistic negation, are considered from the point of view of attention. It is suggested that the operation of 'negating' involves an object of attention. Negativism is connected with resistance to objects or orders one is forced to attend to, i.e. a shift of attention against one's will. For linguistic negation, it should be taken into account that sentences do not convey information through a cognitive vacuum. Sentences appear in a linguistic and an extra-linguistic context. They do not function as descriptions of the context but direct the attention of the listener to specific aspects or specific parts of it. It is argued that negation only makes sense if it is considered an instruction to shift attention.

In the context of beliefs, William James considered negation an incidental complication: 'We never disbelieve anything except for the reason that we believe something else which contradicts the first thing'. Referring to Bradley's *Principles of Logic* he added in a note: 'Compare this psychological fact with the corresponding logical truth that all negation rests on covert assertion of something else than the thing denied', (James William, 1890). This leads to a view of negation as the process of affirming an alternative of a belief or a proposition.

A term related to 'negation' is also used to denote behavioral phenomena. In a condition psychiatrists define as 'negativism', catatonic patients either totally disregard instructions or do the opposite of what is ordered. When the doctor says: 'sit down', while the patient is standing before his desk, he may remain motionless or he may start running around the room or jump or do whatever he happens to consider an opposite of 'sitting down'. Negativistic behavior is characterised either by absence of any response to an instruction; i.e. suppression of all behavior, or by the execution of the opposite, i.e. the affirmation of "the" alternative. At the limit, this suppression of all behavior

can also be considered an affirmation of the opposite, at least if one is willing to consider 'doing nothing' as being contrary to 'executing an order'. The negativistic attitude of the catatonic mind could then be paraphrased as: 'you want me to do something (since an instruction has been given), so I do nothing'. In this way, negativism could be viewed as the process of affirming or executing an alternative of an instruction.

Other forms of negation have to do with other aspects of behavior. A parallel can be seen between statements and behaviors in terms of a correspondence theory of truth and the adaptation of behavior. Statements may or may not correspond to a real state of affairs. Behavior may or may not be adapted to a certain state of affairs. Statements that do not correspond to 'reality' we call 'false' and if we follow James, we believe something else to be the case when we say we do not believe that particular statement. Behaviors are sanctioned directly by reality. When an action leads to success we are rewarded, when it turns out to be a failure, we are negatively rewarded, i.e. punished. At the time, Thorndike developed a 'negative law of effect' which amounted to the view that punishment leads to the suppression of punished behavior. If we accept negative reinforcement as a form of negation, then suppression is, in Thorndike's original view, its concomitant. In punishment theory the Thorndike suppression-view has declined and has been succeeded by what Dunham (1971) calls the alternative-response assumption, which corresponds to James' idea about beliefs. In terms of behavior theory: negative reinforcement weakens a response by strengthening an alternative response. This view has never been validated or invalidated by facts, perhaps partly because the theory is difficult to test. However, it also presents conceptual problems which make it uneasy to accept. Is there no difference between reward and punishment? Can punishing response A be reduced to rewarding response B? Taking into account the educational experiences with rewards and punishments, we should be tempted to consider a more elaborated interpretation. One need not to adhere to B. F. Skinner's view on the efficacy of positive reinforcement and the inefficacy of negative reinforcement to notice that reward

may stimulate and incite a person to more constructive action and that punishment may affect his self-confidence and produce anxiety in such a way that he withdraws from any action. Reward leads toward more exploratory behavior, a greater number of alternatives tried out, while punishment leads to a slow down and suppression of all behavior. Nevertheless, it could be postulated that both reward and punishment involve at the same time the suppression of certain behaviors and the activation of other ones, be it in different proportions. Recent reviews of the punishment problem (Dunham 1971) recognize the necessity to introduce inhibition (suppression) as well as excitation (activation of alternatives) to account for the phenomenon of punishment suppression.

Also some interpretations of negation in natural language present both aspects in terms of alternatives. A classic treatment of the sentence "Socrates is not ill" yields two legal interpretations: either an existing Socrates is in good health (activation of an alternative), or there is no Socrates at all (suppression).

Thus, in the linguistic as well as in the behavioral context, negation displays similar characteristics. Either combined or separated, activation of an alternative and suppression turn up as the operations through which negation becomes effective. Is this specific to negation or does it relate negation to more general aspects of behavioral organisation? Noteworthy, attention seems to operate in the same way.

Attention and the organization of behavior

Most studies of attention are phrased as problems of perception. At any time, a multitude of stimuli impinge upon our eyes and ears. Out of that multitude we select a small portion *to attend to*. We react only to certain aspects of our surroundings. At cocktail parties, we succeed to participate in a difficult discussion within the group we join and avoid listening to the noisy talk in the group next to ours. Colin Cherry's 'Cocktail Party Problem' refers to that ability to attune to a specific

channel of information and disregard other channels. It is one
of the merits of Amosov's *Modeling of Thinking and the Mind*
(1967) to show that the selectivity encountered in perception
governs all levels of behavioral organization. Complex systems
such as human beings and higher animals have built in contra-
dictory tendencies. Meeting an enemy, an animal can be
induced by fear to flee while agression may tempt it to fight.
A selection has to be made and one type of reaction should be
suppressed in favor of the other. Human beings have multiple
goals which they cannot all pursue simultaneously. In order
not to sacrifice one goal for another, they have to appeal to
a partial 'sequentialization' of their multiple endeavors by
means of a time-allocation system (Simon, H.A., 1967). Our
daily schedule assigns an amount of time to several goals
expressing our needs and our aspirations. At each moment we
select a particular goal and we suppress other goals. We decide
to read instead of writing or do some calculations on some
experimental data. Having chosen to read, we have to select
what kind of material. Shall we take the preprint on which
a comment has been asked for, an important article in a journal,
a book that just arrived ? Each of our multiple goals breaks up
into a disjunctive or conjunctive set of subgoals of which
each goal in turn subdivides into subgoals. Having decided in
favor of the book, we have to decide on a particular chapter,
within the chapter we select a particular page and on that
particular page we select a particular group of words to look
at. A skill such as reading is, in a sense, an attention governing
mechanism which segments an amount of text into a sequence
of mangeable portions. The portions form a conjunctive set
since we have to go through all of them if we do not intend
only to 'skim' the text. In a game of chess, some possible
moves in a given situation exclude each other so that, at that
particular level, the set of subgoals out of which one should
be selected, form a disjunctive set. This multi-level decision
aspects of behavior have been made familiar through the wide-
spread use of 'tree search' in artificial intelligence. A trial and
error path on a problem-solving tree traces attention. More
traditional approaches to attention center around particular

levels in the hierarchy of time scales used to describe behavior. Selective attention is related to processes which may range from hundreds of milliseconds to tens of seconds. Research on the span of attention and on the so called 'psychological refractoriness' aims at the unit operations which occur simultaneously within the psychological unit interval of time. The subdivision into subgoals cannot go on endlessly. The manageable portions we fixate when we read consist of patterns we recognize at once. Elements of portions that fall within the range of attention can be processed in parallel so that only one unit of time is consumed to recognize several features. The study of activation and of vigilance deals with phenomena of the order of seconds to hours. Vigilance is connected to the problem of how long a particular selection of one goal and the suppression of many others can be maintained. One aspect of activation leads into biological rhythms. Some decisions about what goals to pursue next are based on biological schedules which prescribe what the organism should select. It's a circadian rhythm that dictates us each nigt to select the state of sleep and to suppress all other interests for seven or eight hours.

Amosov indicates how this activation-suppression-pattern governs behavior from the most elementary reflexes to conscious guided action. On the level of spinal reflexes, lateral inhibition links activation of a particular muscle to suppression of movement in the antagonistic muscle. This principle of mutual exclusion extends to the highest forms of behavior, i.e. those involving consciousness. Probably consciousness reflects attention. Each moment it may be governed by the particular goal or subgoal the organism is pursuing at that time. Excluded from consciousness are all other possible goals and sub-goals. If they intrude on consciousness, they have a disturbing effect on the unity and smoothness of behavior. The structure of the nervous system and the organisation of behavior manifest an equivalence between excitation and inhibition or activation and suppression. Both seem necessary in a complex system with multiple, possibly contradictory, goals. To prevent contradictions to occur, sequentionalization of leading goals

involves temporary suppression of all goals except the one that becomes activated. However, one expects only the positive aspects to become conscious or visible. We do not feel any of the inhibited movements which go together with picking up a cup. We are not aware of the suppressed plans and ideas when engaged in a particular activity. Only what is positively selected seems to fill consciousness. How to reconcile this observation with observations that may seem to point in the other direction, i.e. that attention is attracted to he 'negative' aspects of life.

Attention attracting value of the negative

It is commonly said that one appreciates the value of being in good health only during a state of sickness. A simple headache can monopolize attention and consciousness in such a way that further mental activity becomes impossible. An even simpler toothache can yield te same disruptive effect. A local distortion attracts attention so much as to prevent or block any activity that is more than pure routine.

The idea that consciousness is 'trouble oriented' arises from functionalistic considerations in psychology which seek an adaptive role for the mind. Consciousness seems most intensively involved in those problems for which no instincts or learned habits are available as ready-made solutions. In the older functionalistic context where consciousness has been related to learning (M. Washburn) and intelligence, it could be thought of as essential in adapting to new situations (Claparède's and Stern's definition of 'intelligence'). But whether novel or familiar, consciousness dwells upon problem areas. Most of the time we are worried about something, if not about a personal problem than about a more (biologically) innocent scientific one. If problems are to be evaluated as negative, we should agree that attention is attracted toward the negative, i.e. toward temporarily non adapted aspects of thinking, feeling and conduct. Similar ideas have turned up several times in

various areas of psychology. One form finds expression in the famous Zeigarnik effect which illustrates the attention attracting value (valence) of incompleted tasks. A similar Gestalt-related view has been expressed with respect to design. Architect Christopher Alexander developed mathematical procedures for design in terms of decomposition and recomposition of graphs representing sets of 'misfit factors'. His use of 'misfit factors' is based on the psychological theory that 'it is the aspects of our lives which are obsolete, incongruous, or out of tune that catch our attention' (Alexander, C., 1964, p. 22). A good suit fits well when you are not aware of wearing it. When you become aware of it, it is troubling you. A good house is a house for which there is no fault to find with. It is good not because of any particular good feature, but because of the absence of misfits, conspicious characteristics which stand out against the whole and which disturb the viewer. Another form can be found in functionalistic theories of perception which amount to the view that we perceive a discrepancy in the operation of our activities and the objects they are applied to. Piagetian theory in terms of the basic concepts 'assimilation' and 'accomodation' leads to the conception that we see what resists to our visual schemata, that we feel what resists to our tactile schemata. The perceiving consists in accomodating the non-adapted schemata for assimilation. In a theory in which action precedes perception, perception is connected with the reduction of the non-adaptivity of the action. In this view all knowledge is developed, in a certain sense, to compensate for the action schemata which turn out not to conform completely to 'real world' situations. We learn to know only what disturbs. We do not see walls directly. We learn to know walls and to see walls only after we have run against one. Cybernetic systems governed by the 'negative feedback'-principle show the same general emphasis on 'negativity.' Such systems come into action whenever there is a certain 'discrepancy' between a goal state and an actual state of affairs. They remain at rest when the difference between goal state and actual state is within certain limits.

The idea of 'discrepancy' is essential to all this forms of

'basic negativity'. Organisms adapt to the world by con-
structing a model of it. The model generates what can be
expected and is run against reality. Attention is directed to
discrepancies between what is expected and what actually
occurs, i.e. those aspects of the model that appear wrong and
should be revised or updated. The unexpected is the negative.
One can object to this idea of a general orientation toward
that kind of negativeness in as far as it involves 'negative'
connotations. Recent emphasis on creativity in psychotherapy
shows that a mildly troubled existence leads to a healthier
way of life than no troubles at all. Individuals should kept
busy on seeking solutions for problems according to their
abilities. We can only accept the idea of 'basic negativity', if
it does not imply that it is something to avoid. It is the very
salt of life.

Does this idea of the attention attracting value of what is
negatively evaluated comes into conflict with the activation-
suppression-idea mentioned above? The activation-suppression-
idea is connected with internal contradiction in organisms with
multiple goals. Since each goal can be described in terms of a
discrepancy between an actual state of affairs and a desired
state of affairs, it is obvious that several 'discrepancies' com-
pete to attract attention. Speaking of the attention attracting
value of the negative, we designate an attribute of potential
objects of attention in general: i.e. the set of 'attendable' and
for attention competing objects. Speaking of attention in terms
of activation and suppression, we indicate the way attention
operates on that set. The selection of a particular object of
attention at a particular moment depends on the previous
selections (path on a tree of possible actions, hierarchical
decomposition...) and the attention attracting value ('valence'
in Lewinian terms) of the other objects of the set at that time.
That value may change over time, independently of other
selections: a need may become so urgent or a discrepancy
may become so large as to require immediate action. Emer-
gency can overrule any relationship with ongoing activity.
Specific forms of negation operate upon attention attracting
objects. 'Negativism' as one specific form of 'negating' can

be seen as an attempt to suppress certain actions or goals that intrude upon attention with a certain urgency.

Negativism

Knowledge consists of solved problems. In Piagetian theory, naive realism arises from the discrepancy between the structure of the actions a baby is born with and the structure of the objects they should be applied to. Because his actions are not fully adapted, because he feels resistance at any trial, he comes to the construction of the idea of an opponent: the real world. We know that real world as far as we have eliminated resistances to our actions, whether sensori-motor acts or mental operations. Knowledge is what neutralises those resistances. Piaget's books on sensori-motor development show in detail how the child gradually shifts from a kind of Machian monism towards a dualism between an agent, initiator of all actions and the object, the source of all resistance: the outside-world. However, there are resistances he cannot cope with. After having reconstructed the world as a set of material objects, some entities seem to develop strong resistance to several actions the child initiates. They prevent him from playing with a knife, from touching the stove, from knocking on the window. They order him to wash his hands, to go to bed, to dress... Those entities turn out to be agents capable of interfering with and even of blocking his initiatives. It has been shown that the construction of the Ego-concept is connected with the gradual acceptance of those agents, an acceptance preceded by a negativistic period. The negativism is manifested in attempts to ignore warnings and instructions, in a fit of temper, or in attempts to deflect instructions into alternatives parallel to those described in cases of catatonia. When instructed: 'give me that knife', the child prefers to throw it away rather than force himself to obey. An order is something we are forced to attend to, whether we obey it or not. Negation, in the context of negativism turns out to be an attempt to suppress an attention attracting object which interferes with ongoing action or

thought, either by ignoring it or by neutralising it by means of something else: the selection of an alternative. During the negativistic period in childhood, it is directed toward the principle of interference and his main sources: autorities that cross plans and wishes. However, after the principle has been accepted it becomes an operation with less striking but not less numerous applications. It is probably a familiar experience that repeated failure to repair some simple mechanism, like replacing the spring in a clock or fixing something in a car, can lead to the destruction of the object. If it resists all attempts to repair it, it is thrown against the floor or it is given a bump with a piece of tool. This is at least so familiar that it is a classic in comics to present the destructive bump as the act which finally repairs the object. Negativism should not be considered as lacking any positive value. In the most pronounced form following Webster's dictionary: 'an attitude of mind marked by skepticism about nearly everything affirmed by others', it reminds us of the childish attitude reflecting the inability to accept the other as an equivalent partner. However, in a broader sense it may account for important ideas and theories developed as an alternative to strongly rejected opinions. Some men need great resistance or great opponents in order to accomplish great things. Also the Freudian concepts of 'repression' and 'sublimation' may be relevant in this context. Thoughts or wishes which one does not want to consider but which keep attracting attention require active 'repression' or a strong pursuance of acceptable alternatives. For our purpose, it is important to emphasize that negativism always involves objects or ideas we are forced to attend to, contrary to our wishes and against plans. It is connected with disturbing things or ideas that irritate because they do not behave or develop in the way we expect them to do, things that at a particular time, are incompatible with our goals, our plans, our principles. Negativism is an attempt to avoid occupation with those attention demanding entities. We can only negate what we are tempted to attend to.

Psychological studies of negation

Psychological studies of negation mostly deal either with its psycholinguistic aspects or with its role in concept formation. In general, they confirm the finding of Francis Bacon who noted that the human intellect preferes affirmatives above negatives. Negatives seem more difficult. It takes longer to evaluate negative sentences compared to affirmative ones. It is more difficult to infer the defining attributes of a concept from non-instances than to learn them from inspecting instances, even when the amount of information conveyed through instances and non-instances is kept equal. There have been attempts to explain those differences in terms of different emotional connotations associated with the affirmative and the negative. This could be consonant with the 'Pollyanna Hypothesis' which, following M. Boucher and Osgood (1969) amounts to the idea that 'humans tend to 'look on (and talk about) the bright side of life'' (It appears that languages have, in general, more evaluatively positive words than evaluatively negative words). It would be in contrast with abovementioned theories which credit the negative with attention attracting power. Wason accounted for some of his findings (Wason, 1961) by postulating a conversion of each negative into a positive statement. In a serial model, the conversion is then thought to be responsible for the additional time involved in processing negative sentences. Recent findings (Trabasso, T., Rollins, H., & Shaughnessy, I., 1971), confirm the conversion-hypothesis in concept identification tasks. However, could it be that we have difficulty in handling negatives only because we do not feel at ease with negative terms to such a degree that we prefer to convert all of them into positive terms. Some findings indicate that there is more involved than emotional connotation. An indication might be the acquisition of negation in the syntax of children's language. Based on data on linguistic development of several children, one investigator, Lois Bloom, feels obliged to introduce a reduction transformation to account for the absence of certain elements in negative sentences of her samples. At a given level, negative sentences are simpler than

comparable affirmative ones. The introduction of a negation
seems to occur at the expence of other elements. The negation
of sentences like 'this turn' and 'this dirty' does not yield 'this
no turn' or 'this no dirty' but results in 'no turn', 'no dirty'.
(Bloom, 1971, p. 155). Without attempting to offer a detailed ex-
planation for the omissions in the Bloom-sample of negative
sentences, it could be suggested that the supposed deletions
are possible due to a limited cognitive capacity to deal not
only with 'the number of syntactic operations or the complexity
of grammatical relationship within a sentence' (Bloom's sug-
gestion, p. 169), but also with the pecularities of conceptual
negation ('conceptual' as opposed to 'linguistical') which might
involve problems of attention.

Attention and linguistic negation

Although one could easily think of some of the grammatical
devices as 'attention-governing mechanisms', there seems to
be no interest in psycholinguistic study of attention. However,
the frequently studied passive form might be an example of
such a device. Without changing the meaning of a sentence, it
directs the attention of the listener towards the object of the
sentence instead of towards the subject. All devices used to
emphasize some constituents more than others could be seen
in the same way and it could be studied in how far the
switching of attention enters into the difficulties found with
the processing of sentences. This would involve, among other
things, experimental manipulation of a set of related sentences.
Traditionally, most psycholinguistic experiments center around
the processing of single isolated sentences out of context.
Procedures which involve the verification of sentences against
certain displays take into account a limited extralinguistic
context. However, attention is not controlled for. The sentence
is presented together with the picture: subjects read the
sentence and then look for a plausible interpretation of the
picture. In natural situations sentences are embedded in a
linguistic and situational context. The context determines what

is expected and what is attended to. It induces in the subject
a specific responsiveness toward a very particular class of
stimuli. Razran (1961) illustrated how eye-movements in a
person watching a picture may differ depending on the instruc-
tions. Looking at a portrait, one looks in an other way when
asked to estimate the age than when asked to make some infer-
ences about the character. The same differences can be ex-
pected in listening to sentences. The way in which a sentence is
analysed depends on the topic that is discussed, especially in
terms of the preceding sentences. Isolated sentences are unna-
tural entities, only used by linguists and psycholinguists. Sen-
tences form a series. Attention runs through it like a thread
which connects the different parts and aspects of the story. It
could well be that the difficulty formed with negation in psy-
cholinguistic experiments is an artefact of the experimental sit-
uation. If only isolated sentences are used, there is no attention-
directing context. In a natural context, attention is centered
on a particular aspect or a particular element of the situation.
We would propose that 'natural' negation only involves objects
or elements a speaker or a listener is attending to. Negation
then appears as a 'meta-operator', instructing the listener to
attend no longer to a possibility he is considering. It makes no
sense to instruct a listener to suppress a thought he is not
considering or an idea he is not having. The time needed for
conversion of negative statements into affirmative ones could
well be the time needed for focussing attention on the content
of the statement, a process which is, most of the time, un-
necessary in 'natural' conversation.

Attention and negation in concept learning

In the area concept learning, where the formation of a con-
cept is followed over a number of learning trials, there is an
old issue on the role of attention. It began in animal discrimina-
tion learning. Discrimination learning and concept learning
can be characterized within the same experimental framework.
They involve a situation in which experimental subjects,

animals or humans, are presented with a set of objects or
pictures distinguished from each other by different values on
different attributes. In a simple case, it could be a set of four
objects characterized by binary values on two attribute-dimen-
sions: e.g. shape and color with respectively the values square
and circle, black and white. In discrimination learning, one
wants first to find out if an animal is able to learn a certain
discrimination. Can animals distinguish circles from squares?
In that case, one is interested in questions like: How long does
it take a certain species to arrive at the discrimination, how
many learning trials are involved? Concepts are considered to
be specific combinations of attribute values (BRUNER, J. S.,
GOODNOW, J. J., AUSTIN, G. A., 1956). In one procedure for the
investigation of concept learning, the subject selects at each
trial an object of the set and the experimenter tells him whether
or not the object is an instance of the concept he expects the
subject to learn. This procedure can illustrate the fact that it is
more difficult to learn (conjunctive) concepts from negative in-
stances than from positive ones. In discrimination learning, the
information provided by the experimenter is substituted by po-
sitive and negative reinforcement. Being in a cage, a rat can
choose four exits: two square shaped ones and two circle
shaped ones, further differentiated by means of black and white
paper which can easily be perforated. If the experimenter wants
the rat to learn a discrimination between colors he places food
behind the black exits and nothing behind the white ones. If it
should be a discrimination of shapes, the rewards are distri-
buted accordingly. The attention-issue in discrimination learn-
ing and concept learning deals with the problem of what can be
learned during each trial.

Orthodox behavioristic views suppose that the subjects
learns something about all attributes at each trial. Attention-
oriented views suppose subjects learn only about those attri-
bute's they attend to. The latter view has been formulated
in terms of testing hypotheses. Subjects should start, rats as
well as humans, with a hypothesis about the relevant dimen-
sion(s) and their behavior should be interpreted as a system-
atic attempt to test the hypothesis. If they start taking a white

square which then turns out to be a negative instance, an attention-oriented view would predict that a circle will be tried next (white or black) if the subject is attending to the dimension 'shape', or a black 'exit' or figure (square or circle) if the subject is attending to the dimension 'color'. Subsequent trials should give evidence of the hypothesis chosen. Some attention-oriented views admit that the subject can and will test more than one attribute at a time. For the attention-view it is essential that there is, in principle, a limit on the number of attributes a subject can follow over several trials.

In concept learning a variable has been introduced which reveals some characteristics comparable to some aspects of negation: the reversal and non-reversal shift. Once subjects have learned a certain concept, another concept is introduced in terms of a change in the administration of reinforcement. A 'reversal shift' involves a reversal of the values of the relevant attribute. If the concept has been 'black', it becomes 'white', if it has been 'square', it becomes 'circle'. A 'nonreversal shift' involves the introduction of the irrelevant attribute dimension. If the concept learned has been black, the subject should now learn to shift to 'square'. This yields a situation which permits to study the succession of hypotheses when a concept has to be changed. It has been found that animals and children do better on a non-reversal shift while adult humans do better on a reversal shift (Kendler, H. H. Kendler, T. S., 1962). This means that the first hypothesis tested by adults is related to the previous valid one i.e. an attention conserving strategy. The same explanation has been proposed for the learning of multiple reversal shifts in animals which over-learned a certain discrimination (Mackintosh, N. V., 1969). The first changes tried out remain within the attribute dimension relevant in the preceding situation. There is some evidence that similar phenomena appear in linguistic performance. Remarks of Sinclair (1967) suggest that younger children do not use 'not' in contexts where older children do. The use of 'not' to indicate the opposite of an attribute-value is something that appears long after the word 'not' appears in the vocabulary. The primitive negation apparently only implies 'suppres-

sion' and the activation of no matter what other alternative. With the development and internal organization of a conceptual model of the world, the alternatives tend to remain related to the negated concept. By preference, the opposite is activated, although there is no logical justification for it and it can be quite misleading.

In a casual conversation with talk about nothing in particular, attention drifts. Topics change, but only step by step. The sentences form what Vygotsky (1962) calls a 'chain complex'. There is a certain continuity in that, taken in pairs, the sentences are related and there is no abrupt change in the topic attended to. Negation can be seen as an operation on objects attended to, indicating the necessity to shift attention. Although, logically negation only denies or rejects certain objects, people show a tendency to adhere to a certain continuity and introduce related alternatives. The so called 'reversal of meaning' is only a secondary effect where a related alternative can be activated in opposition to the suppressed object. When cut off in some direction, subjects develop it as a strategy to choose where to go on.

Conclusion

Negation can be analysed in terms of an attention governing mechanism. Attention dictates complex organisms what to look for and what to avoid, by means of activation and suppression. Negation applies only to objects already attended to. It is a correcting device. It introduces a shift in attention: what is attended to becomes suppressed and an alternative becomes activated. This analysis can be applied to behavioral, psycholinguistic and conceptual phenomena and thus reveals the fundamental character of 'negation'.

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