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TYPES OF MENTAL REPRESENTATION

Some products of human actions are inseparable from the action. A thought exists as long as someone is thinking. Other actions yield products that can exist longer than the actions which produce them: We speak of "building buildings" and "writing writings". Products of mental actions are not durable, but because of physical actions that usually accompany particular mental action there are durable psychophysical products such as paintings, drawings, sculptures, writings. Durable psychophysical products are termed signs of the nondurable mental products. Language signs are durable (written text) or nondurable (speech) psychophysical products. A psychophysical product, which is a sign of a particular mental product, can itself become a partial cause of the emergence of an identical or similar mental product by evoking a mental action which is identical with, or similar to, the action whence that product resulted.

From the theory of actions and products we realize that there are three basic meanings of the notion of representation: representation as product of a mental action creating an idea, concept or proposition (CR); representation as durable or non-durable psychophysical products of psychophysical action (SR); representation as result of an act of psychophysical reflection of a sign or symbol (ISR). Human cognitive activity is usually a composition of actions yielding all three kinds of representation.

Cognitive processes as intentional processes

Our mental states are in some sense directed at objects and states of affairs in the world. If I have a belief, it must be a belief that something is the case. If I have a wish, it must be a wish to do something. Our mental states could be directed at ideal or nonexisting objects. I can believe that the King of France is bald even if there is no King of France. I can imagine the Pegasus, I can think about fictitious numbers. In other words, every mental phenomenon is characterized by its intentional object. The intentional object of an act of perception is the object of perception. The intentional object of my act of imagination of Pegasus is the imagined Pegasus. The Pegasus could be an object of my thinking and believing. I can believe that the Pegasus exists.

Let us note the following theses on intentional acts:

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1. Every mental phenomenon has its intentional object, it intends something. In other words, all intentional acts refer, that is, are directed toward, or are about, something.
2. For an object to be the object toward which an intentional act is directed, it is not necessary for that object to exist in the material world.
3. Different intentional acts may intend one and the same object.

The object and the content of the intentional act

We can assume that Pegasus is a creature that exists in our external world. This physically existing Pegasus could be an object of my visual perception. The mental action of perception produces (in some sense) the psychological perception of Pegasus. The product of the action of perception exists so long as the action of perception lasts. But if the Pegasus is a material creature, the duration of its existence is longer than the visual per-

Fig. 1

ACT, CONTENT, OBJECT

action or act	content or product	object
painting	the portrait	the model
imagining	the image	the transcendent or material object
perceiving	the perception	the object of perception
speaking	the content	the reference

ception of Pegasus. Another mental action, the action of imagination, can produce an imagined Pegasus. The imagined Pegasus exists even if the material Pegasus does not exist.

The word "object" is used in two senses: on the one hand, for the independently existing entity to which our mental actions are directed, as it were, and, on the other hand, for the mental product, picture, presentation, representation of a real entity which exists within us.

The former is termed (Twardowski, 1984/1977) the transcendent object of mental action, the latter the content of a mental action or the immanent object of this action.

The difference between "content" and "object" of my action of imagining my grandmother is analogous to the difference between the portrait of my grandmother and my grandmother herself.

When the painter is painting the portrait of my grandmother, the portrait results. When I am imagining or remembering my grandmother, the imagination of my grandmother comes into mental existence. When I am speaking about my grandmother, my grandmother is the content of my speech act.

Actions and products

In such pairs as:

- to race - the race, -to jump - the jump,
- to cry - the cry, -to speak - the speech,
- to think - the thought, -to walk - the walk,

the first word denotes an action, the second the product of this action. The difference between the two words is not only one of grammar but also of meaning as the two words have different denotations. When we fight, a fight results; when we think, thoughts result; when we order, an order results. We may say that a jump is the product of jumping, and a song is the product of singing (Twardowski, 1912/1979).

There is a gradation from cases in which a product almost merges with the action of which it is the result to cases in which a product is clearly distinct from the action.

Various kinds of actions and products can be reduced to two basic kinds, namely, physical actions and products, and mental actions and products (Twardowski, 1912/1979). The former category covers:

- to race - the race, -to jump - the jump,
- the latter:
- to think - the thought, -to intend - the intention.

From among physical actions and products we should separate out those that are psychophysical, namely, those in which physical action is accompanied by a mental one which somehow affects that physical action and, accordingly, its product. A product obtained in this way is termed psychophysical. This applies to actions and products such as:

- to cry - the cry, -to sing - the song,
- to speak - the speech, -to lie - the lie.

We predicate many things about products that we do not predicate about actions. We say that certain questions are incomprehensible, which is not to say that posing questions is an incomprehensible action.

In the cases discussed above, the distinction between an action and its product must be substantiated, but there are other cases where that distinction is self-evident. The first kind might be termed **nondurable products**, those products which **exist only as long as the action** that produces them. A cry exists as long as the action of crying continues, a thought, as long as someone is thinking.

True, it is often said that the thoughts or ideas of a philosopher outlive him, but in this

Fig. 2

THEORY OF ACTIONS AND PRODUCTS

actions and products	non-durable	durable
physical	to dance (and) the dance to walk (and) the walk	to build (and) the building to cook (and) the food
mental	to think (and) the thought to perceive (and) the perception	
psycho-physical	to speak (and) the speech to inform (and) the information	to paint (and) the painting to write (and) the writing

case, we do not mean the continuing existence of certain products - an existence independent of any action. What we do mean is a repetition, from generation to generation, of actions and products similar to those produced by earlier generations. By way of analogy, let us say that ideas, beliefs and desires are inherent in that they exist in our minds, even though at a given moment we are not performing the appropriate actions that produce these ideas. This formulation simply means that we have certain psychological dispositions which may make us produce in the future the same products we produced in the past. Hence, we may speak of the continuing existence of products of this kind, meaning either repetition of the same actions and products, or their potential existence. Thus, these products may be termed *nondurable* in the sense of their not actually existing longer than the actions that produce them (Twardowski, 1912/1979).

There are, however, products that can last longer than the action which produces them. Examples of such actions and products include:

- to draw - a drawing,
- to write - a writing,
- to paint - a painting.

We employ etymological figures and speak of "painting paintings", "building buildings" and so on. Products of this kind might be termed **durable products** (Twardowski, 1912/1979).

Certain products may continue to exist after the action from which they result has ended, because these actions are transformed to, or affect, something that existed before the particular action began and continued to exist after the termination of that action. This "something" can be called the **material** of the action. The action itself from which a durable product results consists in transforming, or modifying, the material; the action changes the configuration of its particles or changes it in some other way. The product of that action is merely a new configuration, modification or transformation of the material, since that material existed prior to the action.

Thus, in calling a "drawing" the product of (the action of) drawing, we do not mean that the particles of graphite and the paper are products of the action of drawing, since the product is only a given configuration of particles of graphite on paper (Twardowski, 1912/1979).

Products and expressions

A human footprint in sand is a durable physical product of physical action of someone walking on the sand, if his consciousness is not involved in that action. A human footprint in sand, if made consciously and intentionally, is a durable psychophysical product of a psychophysical action.

Paintings, sculptures, etc., are psychophysical products because they result from psychophysical actions, that is, physical actions accompanied by mental actions which affect the course of these physical actions and hence the products that result from them.

Because of the relationship in such cases between a given psychophysical product which is perceptible to the senses and the corresponding mental product which is not accessible to sensory perception, the psychophysical product becomes the external expression of the mental product. Thus, a cry may be an expression of pain, a movement of the head, an expression of an affirmative judgement. In all these cases, the mental product

is expressed externally in the corresponding psychophysical product since that product results from a psychophysical action and not from a purely physical one.

And so the statement that a mental product finds expression in a psychophysical one can be reduced to two elements: first, that the mental product together with the corresponding mental action is in part the cause of the emergence of the psychophysical product, second, that this mental product, and the corresponding mental action, are not subject to sensory perception, whereas the psychophysical product is (Twardowski, 1912/1979).

A mental product which is manifested in a psychophysical product can be expressed by that psychophysical product. But we can say this only under a certain condition, i.e., if the psychophysical product is a partial cause of the emergence of an identical, or similar, mental product by evoking a mental action which is identical with, or at least similar to the action resulting in that product. Psychophysical products which express certain mental products are also termed "signs" of these mental products, and the mental products themselves are termed their respective "meanings" (Twardowski, 1912/1979).

We accordingly speak of the meaning of a cry, the meaning of a gesture, the meaning of a verbal expression. Thoughts, judgements, ideas find their expressions in psychophysical durable or non-durable products.

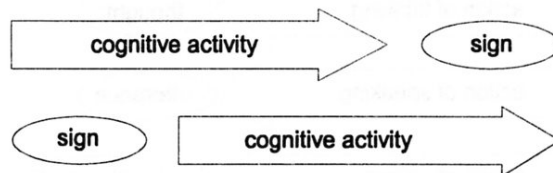
At the moment when a psychophysical action occurs, both the mental product and the psychophysical product exist simultaneously.

As for nondurable psychophysical products, such products vanish at more or less the same moment in time as the mental product. Sometimes the mental product may outlast the corresponding psychophysical product, but not vice versa.

The opposite is the case for durable psychophysical products. Even though an idea has vanished from the artist's (or writer's) mind, the drawing (or the written text) continues to exist. A mental product that no longer exists still finds its expression in a durable product; the nondurable product survives in it. Something similar occurs when a mental product is the meaning of a psychophysical product, i.e. when the latter is a sign of the former. But in many cases, the durable psychophysical product, the sign in which the nondurable mental product had been expressed, is the cause of the emergence of another nondurable mental product. For example, a drawing evokes a mental product in the person (person's mind) viewing the drawing.

There are two cases of sign use:

Fig. 3
SIGN USE AND COGNITIVE PROCESSES



In the first case, ongoing cognitive acts comprising psychological meaning produce a product which is the symbol or expression of that meaning.

In the second case, the symbol is separated from the act that produced it. This symbol in many cases produces another cognitive act.

A mental product is not durable in itself, existing only as long as the mental action that produced it. However, a mental product can come into being a number of times yet will always be nondurable. We can say that a mental product, or a meaning, exists potentially in a psychophysical product, or in a sign. However, all these formulations obviously mean nothing other than that a psychophysical product is one of the partial causes of the emergence of a given mental product, so that a mental product exists potentially in the given psychophysical product. Thus, durable psychophysical products impart to nondurable mental products the appearance of durability by comprising their durable effects and partial causes.

This is why a mental product may become fixed. Fixing is not restricted to mental products but applies as well to nondurable physical and psychophysical products. For instance, we can record the action of singing and dancing with the use of an electronic video-recorder.

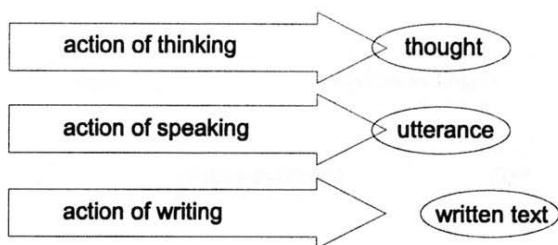
The process of fixing a mental product

Fixing mental products, such as thoughts, ideas, emotions, in writing or in print, is a more complex process. In such cases, we do not directly fix a nondurable mental product, but we fix nondurable psychophysical products that express nondurable mental products (Twardowski, 1912/1979).

In thinking, we are performing the mental action of thinking, and within this action our thought-products come into being. At the same time, we are performing the action of speaking which yields non-durable psychophysical products (the words and sentences we utter).

Finally, we are performing the action of fixing nondurable psychophysical products which yields durable psychophysical products, namely, written signs in the most general sense of the term.

Fig. 4
THOUGHT, LANGUAGE, WRITING



If a durable psychophysical product evokes the mental product expressed in it, it obviously evokes not only a single product, but as many products as there are actions producing them. Such products are not identical, but differ one from another to a greater or lesser extent. However, all these various mental products reveal certain common characteristics. These are elements that the individual mental products share, and are usually considered to be the meaning or content of a given psychophysical product. Therefore we also say that a given sign (or statement) evokes the same thought in various persons, whereas in fact it evokes many thoughts and, moreover, these thoughts are not identical.

Meaning considered in this sense is no longer a specific mental product, but something we attain by the operation of abstraction performed on a given product. Meaning understood as the particular product of an ongoing mental action is termed the meaning 'in concreto', in other words, the **psychological meaning** (Twardowski, 1912/1979). Whereas meaning understood as the common elements that individual psychological mental products share, is termed the meaning *in abstracto*, or **logical meaning**.

Artifacts

Amongst psychophysical products there are some that imitate or replace other products. A human footprint on the ground may be made artificially; it may be modelled by hand. Such artifacts comprise a subcategory of psychophysical products. The actor who assumes a posture to express a certain emotion merely depicts this emotion, so that his posture is not the result of an authentic emotion.

Another example of the use of artifacts is provided by logic (Twardowski, 1912/1979). A proposition as a product of the action of judging is expressed in psychophysical products which result from the psychological action of uttering or making statements. Such statements thus express propositions which are the meaning of such statements. We can, however, produce artificial, or substitute, statements that are not expressions of actual propositions, but of artificial products that are substitutes for actual propositions, namely, propositions that are imagined.

Using substitute products (artifacts) in science and everyday life, we also have no difficulty in using nonsubstitute products independently of the actions that produce them, the more so that actual substitute products very often occur alternately (Twardowski, 1912/1979, sections 42-45). Complex cognitive actions in humans are essentially an amalgam of propositions and concepts whose meanings have been developed in the mind of the thinking subject, an amalgam as well as of abbreviated representations (imagined or abstract symbols) of other propositions and concepts, whose contents have not been fully developed in the mind of the thinking subject (Twardowski, 1924/1965, pp. 22-25).

Thought, sign, representation

Thinking individuals may use products of psychological actions independently of the psychological actions themselves, and do so without having to fully repeat the process that led to the creation of those products. Mental products (signs, symbols, different "records" of judgements) serve not only to enable communication between individuals but also to influence the subject's thinking. An individual can base his/her judgements and reasoning on ready-made symbols received from the exterior and not necessarily resulting from his/her own psychological processes (mental actions).

The child's thinking is a typical example of this, as the child bases his/her reasoning often on natural language, on expressions heard from adults and mechanically memorized (Vygotsky, 1935/1962).

The symbolism of formal logic enables us to use records of propositions which not necessarily resulted from the thinking of the person who avails himself/herself of formal languages.

Using symbols or substitute psychophysical products, instead of substantively developed propositions, simplifies and standardizes human intellectual operations and, at the same time, renders them more foolproof under typical conditions. The possibility of partial or total separation of the products of mental actions from the actions themselves implies that **signs can be used apart from psychological meanings**.

The ordinary and banal character of these phenomena (the possibility of mechanical use of the signs of a semiotic system once it has been invented) hinders our perception of the role these thought "recording" systems play in forming our internal cognitive activities. Writing, formal languages (also computer software) are the ways used practically and universally of availing oneself of products separated from cognitive actions themselves. From the theory of actions and products there are three basic meanings of the notion of representation:

(i) representation as product of a mental action creating an idea, concept, or proposition (**mental product**);

(ii) representation as durable or nondurable product of psychophysical action (**psychophysical product**);

(iii) representation as product or result of an act of psychological **reflection of a sign** or symbol which may be an act of perception of a symbol, its reminiscence or recall.

The first kind of representation I shall call a **creative representation (CR)**, the second, a **symbolic representation (SR)**, and the third, an **inner symbolic representation (ISR)**.

Human cognitive activity is usually a composition of actions yielding all three kinds of representations. Cognitive activity is usually understood and described in terms of mental processes connected with the use of complex signs. From classical psychology and classical meaning theory, any act of sign use is possible in that there exists in human minds a durable and organized meaning (concept, system of ideas). Without the existence of such entities, we could not use complex signs meaningfully (speak, write, engage in polemics). Yet, the theory of actions and products assumes that psychological meaning is a nondurable product of psychological action, and that the product of that action is perceptible to the subject himself for only so long as the action endures. How then can psychological theory explain the process of creating complex signs, or the consistency and order in the repeated use of the same sign?

There are two ways of solving this problem. We can simply reject the assumption of nondurability of products of all psychological activity. But if we wish to maintain this assumption we need to accept that internal psychological actions, together with their nondurable products, do not in themselves ensure the subject's ability to create complex signs. Similarly, consistent use of signs in general depends not only on internal psychological processes. In all cases, physical actions and durable psychophysical products are necessary as well as being supports for psychological action in human beings. In other words, cognitive activity in the broad sense - which essentially consists in the use of signs (Simon, 1980) - does not only depend on the "internal" processes.

The problem (still awaiting resolution) of the relationship between mental and nervous activity is involved in these deliberations. Even if we assume that mental activity is identical with nervous activity (the identity theory), we do not necessarily have to reject the thesis of the necessity of support for internal nervous processes by external means. The Vygotsky (1978, 1966) and Luria (1973) hypothesis on the extracortical organization of higher nervous activity assumes this kind of support: internal mental functions - that is, nervous processes - occur at times due to the existence of functional sets, or systems of activity that are externally supported by cultural "instruments and means". The simplest example of activity based on internal processes and external means is arithmetical calculation which, although possible to undertake without a calculator, necessitates at least a piece of paper and a pencil, together with the socially acquired skill of doing arithmetic on paper.

From the point of view of the theory of actions and products, the belief in the durability of mental products has resulted from human ways of fixing the products of mental actions. The author of the theory pointed to writing, formal languages, and works of art as ways of fixing products of mental actions. Today we could add computer hardware and software to this list.

We accept the thesis that the formalized record of the thoughts of a mathematician or a logician is the reflection of "what is going on in his/her head", but we forget that if the logician's thoughts always had the same structure as the formal records he creates (symbols of formal language), then the perfecting of formal languages would be of importance only for communication between mathematicians and between logicians, and the learning of formal languages would in no way affect learner skills. The history of logic seems to indicate that the requisite progress in this field is the perfecting of logical notation.

The relation of thought to word (or sign) is not a thing but a process, a continual movement back and forth from thought to symbol and from symbol to thought. In many cases, the symbolic expression of mental states and processes is the indispensable condition of thought development.

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