

FUNCTIONAL ANALYSIS OF THE LEARNING CONTEXT AND ITS RELATIONSHIP WITH CURE

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Abstract

If we consider that (1) mental illness is related to learning and (2) learning happens in a relational context between the subject and his/her environment, we could state that it is possible that a change in the context means changes in subject's health. Therefore, an approximation to the concept of «cure»¹ may include the idea of form and re-form a thought habit and ambit (a pattern of learned behaviour that could be transferred to another space which can be influenced or not by the context involved), which, in turn, can affect the person's quality of life of the. We assume that by modifying a thought habit the subject can change his/her situation and that can mean an improvement in his/her relationships with the environment tending to the re-equilibration, which, in turn, benefits subject's health. In this work we developed this hypothesis and show empiric evidence that support our assumptions.

Key words: functional analysis, learning context, "cure", habit and ambit

Introducción

Despite of being associated with the mind-body separation, which is non-founded, mental health is not a one-discipline patrimony but is an area which crosses through different fields of knowledge, such as cognitive anthropology, medicine, psychology, pedagogy and others. In the case of cognitive anthropology the aim is to elucidate the underlined principles of behaviour assuming that each person (and culture) has its own system of perception and organization of the world-environment.

Mental health is one of the main aspects of human behaviour characterized by a series of standards. We understand that behaviour is a term which designs the actions that organisms exert on their external environment to modify some of their states or to change their relationship with the environment (Piaget, 1978).

The notion of *vection* (Piaget, 1977) means the increasingly wide opening to new possibilities of interaction with the environment, an increase in open behavioural adaptations which tends to expand the cognoscibility and liveability of the environment.

While the occurrence of internal movements, such as blood circulation, and the changes produced by the function of respiration on the atmosphere are not understandable as behaviours, we assume that behaviour tends to modify the relationships between the organism and its environment (Piaget, 1978).

Lahitte (1990) explained the difference between activity and behaviour because speaking about behaviour needs to be referred to a context of significance: the intentional factor of behaviour makes it able to be explained in communicational terms. According to the context of observation the acts will be behaviour or not because the concept of

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behaviour depends on the distinctions made during the observation.

The behavioural relationship is not internal to the subject but it precedes the internal changes. That means that the understanding of behaviour through the concept of relationship yields to a novel logical kind of learning named by Bateson (1993) *deutero-learning*.

In this context we address different kind of learning as changes in behaviour acquired by experience (frequently repeated experience) which tends to the adaptation by means of re-equilibration and self-regulation.

Mental health is closely related to subject's learning:

«Lo que en algún momento entendíamos como enfermedad o patología o desviación social son, en realidad, nuevas propiedades que adquieren los seres humanos cuando alteran su condición de equilibrio. Estas formas que podríamos entender como nuevas propiedades se estabilizan como patologías en las que el sistema, el sujeto en su conjunto es sometido a fuertes condicionamientos del medio (relacional, familiar, escolar...).» (Lahitte y Ortiz Oria, 2005: 89)

If we consider that (1) mental illness is related to learning and (2) learning happens in a relational context between the subject and his/her environment, we could state that it is possible that a change in the context means changes in subject's health. Therefore, an approximation to the concept of «cure»¹ may include the idea of form and re-form a thought habit and ambit (a pattern of learned behaviour that could be transferred to another space which can be influenced or not by the context involved), which, in turn, can affect the person's quality of life of the. We assume that by modifying a thought habit the subject can change his/her situation and that can mean an improvement in his/her relationships with the environment tending to the re-equilibration, which, in turn, benefits subject's health.

In this work we developed this hypothesis and show empiric evidence that support our assumptions.

Learning contexts, cognition and problem solving

It is important to make a difference among the terms instinct, habit and custom. There is very few instincts because everything which is learned and has purpose is not an instinct.

There are five learning contexts which are grouped as follows: positive learning (learning to do), and negative learning (learning to inhibit actions). Two kinds of stimuli are present in both of them, conditioned and unconditioned stimuli. The five learning context to which we are reference are: (a) problem solving, (b) pavlovian, (c) instrumental reward, (d) instrumental avoiding, and (e) serial or mnemonic.

Learning context form thought habits which in the subject work as behavioural premises once formed. We assume that thought habits depend on contexts and stimuli and if we change any of them the habit can become flexible.

Proto-learning and *deutero-learning* are two kinds of learning gradients. We use *proto-learning* or first-order learning (Bateson, 1972/1998) to refer to classic and instrumental conditioning, and mnemonic learning. *Cero-learning* or the reception of signals or external information is a kind of learning which precedes *proto-learning*. Finally, *deutero-learning* or second-order learning is a kind of learning which arises as a *proto-learning* gradient when we apply some repetition or practice on the same issue, as a result of what the execution time or the quantity of mistakes improve progressively. Therefore, we can develop patterns of behaviour which can be transferred to other contexts. This is named learning to learn or *deutero-learning*.

At this point we should state what the meaning of cognition for us is. According to Héctor Lahitte (Lahitte, 1995; Lahitte, 2005) the aim of the anthropologists who work on cognitive anthropology is to notice the observation points from which the *ens universale* is configured and expressed in each society, which generates a cognitive style (Maruyama, 1980, 1992), a general vision shared by every people from this society. The term cognition designs such questions: in a figured sense cognition means what is configured, what is build.

¹ It is important to say that we are presenting an anthropological article as a contribution to an integral and interdisciplinary view of the mental illness but that we are not able to write as if we have the specific knowledge of medicine; therefore we write «cure» between quotation marks.

According to Alan Kamil (from Lahitte, 2006), cognition involves some kind of internal representation of the external world and the organization of sensorial information in internal models. Depending on the circumstances where we cognition is looking to be found, it can be understood as adaptation and neither makes sense in context of maximum variability (to have an internal map does not make a sense if the territory is constantly changing) nor in zero variability contexts.

What is characteristic of human cognition (Tomasello, 2000) is the quality to aggregate cognitive resources in an original manner. Human cultural learning is different from other kind of social learning and includes learning by imitation, learning by instruction and collaborative learning. These three kinds of cultural learning depend on a particular form of social cognition, which is the people ability to understand the others as themselves, with intentionality and mental life. This ability makes people able to put themselves in the other place «so that they can learn not just from the other but through the other.» (Tomasello, 2000: 6)².

Human cognition, according to Tomasello (2000), is the result of a kind of specie-specific cultural transmission. Traditions and artefacts incorporate modifications along the time with a ratchet effect by which some processes cannot go back once they have happened. The process of cultural accumulation requires not only the creative invention but also the social transmission which works as a ratchet to avoid regressions and losses. Therefore, a new practice or artefact preserves its characteristics until a further modification improves it and this improvement will be learned by people, preserved and occasionally modified and so on.

The dynamic of the instruction-learning linkage let us conceive cognition on a different way: not centred in the subject but as a result of a relationship.

According to the assumptions about cognition written above, learning processes are not necessarily placed in the brain; conversely, we understand cognition as an extended process (Clark, 1998, 1999, 2004; Broncano, 2007). We think learning happens in the subject-context interaction, due to what we can speak in terms of learning contexts.

Among the above mentioned learning contexts, the problem learning context is close related to the

concept of transference. We call transference to the ability to expand to new contexts what has been learnt in a given context (Bransford, 2002), which opens the access to an ample group of purposes and intentions.

We make a distinction between (a) simple, automatic procedures, and (b) strategic procedures of problem solving, which are a kind of *deute-ro-learning*.

The first step in procedural learning is occupied by the techniques and sequences of actions developed routinely (Pozo, 2000), which are not single habits learned implicitly by exposition to a reinforcement or a model but are build by sequences of actions learned by repetition until its automation and by explicit, associative training. Techniques are useful to cope with exercises. However, when this simple exercise becomes a problem by variation in any part of the situation, it is necessary to develop strategic learning. This is the second step in procedural learning and consists in the utilization of techniques in new or complex situations (problem situations) where techniques must be adapted to the specific demands. The acquisition of strategies depends on constructive learning, instead of associative learning, in which people develop reflection on their own practice and the re-elaboration of their actions according to self-assessment. There is a special kind of strategy which is to learn learning strategies or the self-monitoring about the own learning. This means to learn to use the reflection about the own knowledge or metacognition. The higher level of procedural learning is learning to learn and problem solving supported by working memory processes (Thompson, 1993; Lezak, 1995; Gray, 2003).

The concept of cognitive flexibility, or at least compatibility of cognitive systems, is shown by observing differences between novices and experts' behaviour, which is the key factor for the distinction between solving an exercise or solving a single problem and problem solving. The difference between merely skilled and highly competent can be observed in a variety of knowledge fields and implies a kind of flexible expertise. The concept of adaptive expertise (Hatano & Inagali, 1986, in Bransford, 2002) provides an important learning model. Adaptive experts are able to approach to new situation flexibly and they can learn along their complete lives. They not only use what they have learnt but also develop their metacogni-

2 Italics are from the original text.

tion and permanently question their expertise level in order to surpass to themselves.

The concept of metacognition was originally introduced in the context of children studies (Brown, 1980; Flavell, 1985, 1991, en Bransford, 2002) and refers to the ability to self-monitor their present comprehension level and to decide when it is not adequate (Bransford, 2002).

Daily problem solving involves cognitive processes related to the access and manipulation of the previous knowledge relevant to an actual problem, the generation of appropriate strategies, the inhibition of inappropriate or routine responses and the ability to judge the efficiency of the solution. Furthermore, daily problem solving involves emotional and social abilities. These daily problems share some properties with neuropsychological problem solving tasks applied in laboratories, in which the sequence can be characterized by recognition, difference-distinction, and type. However, daily problems differ from laboratory ones in that they present a low defined structure, they may have an open and relative end, the existence of competent proprieties depending on the context, and the necessity of include the others' point of view and to have an adequate social-contextual knowledge. Furthermore, the potential consequences of solution alternatives should be examined and pondered (Channon, 2004).

Cerebral fontal dysfunction can be associated with difficulties in several problem solving aspects including working memory; for example, as a result of a memory deficit in the generation of search strategies it can be observed a decrement in the efficiency of using previous knowledge (Channon, 2004).

Behavioural disturbances associated with frontal lobe lesion can be summarised as follows (Baddeley, 1999; Lezak, 1995): 1. Initiation problems: a decrement in a rate of behaviour emission and a decrement or complete loss of initiative, a loss of spontaneity and productivity, and, sometimes, apathy, muteness or the absence of response (respect to some reference from the observer); 2. Perseveration and difficulties in making mental or behavioural shifts; 3. Trouble finishing: loss of control, impulsivity, over-reactivity, disinhibition and difficulties to avoid wrong, not appropriate answers, which are frequently part of a current chain response; 4. Deficit in self-consciousness: problems with self-criticism,

incapacity to see execution mistakes, problems in appreciate the impact of the self on others and adequately evaluate a social situation; the sense of the self in people with frontal lesions seems to be affected; and 5. Concreteness: incapacity to dissociate to themselves from the immediate context, in which objects, experiences and behaviours are understood from their most obvious aspect, yielding to an incapacity to plan and sustain a behaviour driven by objectives. Although several of these patients show an inability to manipulate abstract concepts, others preserve a high degree of conceptual abilities in spite of their loss of perspective and literal consideration (Lezak, 1995).

Problem solving in a mnemonic learning context with people with amnesic and executive deficits: is it possible?

Tower tasks involve problem solving functions and transference in which the examinee must rearrange some discs or little balls by a minimal number of movements in order to make them match with the model or reach the established final objective.

Developed on the basis of the Simon's model of the Tower of Hanoi, tower tasks serve to assess executive functions and problem solving. It is agreed that they primarily involve planning (Anderson, 2001; Lezak, 1995; Newman, 2003; Riccio, 2004; Spreen, 1998): if people plan movements and visualise solutions in advance it is supposed that they would develop a more efficient problem solving strategy.

Tower tasks have rules to follow to reach the final solution which have different structures and ways of assessing execution and vary along the different versions of the tower as well (Riccio, 2004).

The process of solution of tower tasks synthesises two theories about executive functions (Newman, 2003)³: Shallice's theory which was published in 1982 (Baddeley, 1999; Newman, 2003) and Newell's theory which was published in 1990 (Newman, 2003).

According to the first theory, there are two cognitive control paths in executive functions: (a) routine-like, bottom-up and perceptually driven and (b) strategic, top-down and driven by objectives.

³ Even though Newman refers specifically to the Tower of London, we consider that his hypothesis can be expanded to similar tower tasks like the Tower of Hanoi.

On the other hand, Newell's theory poses that problem solving involves a cyclic process of four stages: (a) deliberation, in which all the alternative operators are considered in parallel, (b) preferences computation between different operators, which Lahitte (1981) calls learning in increasing complexity, (c) decision making to select the best operator and (d) application of the selected operator to the current state. However, if any one of the preconditions to apply the operator is not satisfied, it will be necessary to put forward sub-objectives to reach the preconditions before applying the selected operator.

The two models, Shallice's and Newell's theories, work together because while the ordinary approach to solve the tower is guided perceptually, trying to reduce the range between the initial state and the goal state (without taking into account the achievement of preconditions), the strategic approach creates sub-objectives to satisfy preconditions (although they can enlarge the perceptual distance between the initial and the final state of the tower). Once the preconditions are satisfied, the perceptual mode takes back the control to apply the original perceptual operator.

It has been suggested that thinking aloud can help people solve the tower. Instead of representing a mere verbalisation, thinking aloud might be some form of metacognition to produce a self-explanation of the process to reach the solution (Noyes, 2003). We could illustrate this in the following example with the Tower of Hanoi (see below for details of our research). The patient can use the technique of thinking aloud without metacognition (a mere verbalisation) if they say «this ring here, the other there» and «the little ring on the bigger» but their action is dissociated from what he/she is saying. Instead, if patient's words help him/her to understand that they are making a wrong movement and thanks to this comprehension they can change the strategy, they are using thinking aloud as a metacognitive technique.

Considering the depicted conditions in tower tasks, it would be supposed that patients with anterograde amnesia (sometimes retrograde too) and executive problems such as people with Korsakoff's syndrome should not be able to learn to solve the task neither in a mnemonic learning context (proto-learning) nor by the highest level of *deutero-learning*.

We worked with Korsakoff's patients learning to solve the Tower of Hanoi (Anderson, 1995, 2001; Lezak, 1995; Spreen, 1998).

One of the most important characteristic of problems solving tasks is the searching of a se-

quence of steps that let solvers to pass from the current state to the target one (Anderson, 1995), in which planning is the main process. The Tower of Hanoi is useful to measure the subject's planning during a problem solving process. In this task we have a platform with three axes (A, B, and C) and a number of rings which differ in their diameter piled from the biggest (at the bottom of the axis A) to the smallest (at the top of the same axis). The problem is how to form the same pile in axe C following two rules: (a) to move the rings one by one and (b) never to arrange a bigger ring on a smaller one. The Tower of Hanoi has been applied during four repeating sessions with an interval from session to session of one to seven days (Spreen, 1998), which let researchers observe several issues such as the development of a solution strategy, the storage of success and failures during the resolution, and the benefit the patient takes from their own experience. This model of tower tasks has been applied as a problem solving and executive functions test (Numminen, 2001).

In our research we used a commercial version of the Tower of Hanoi (Ruibal S.R.L.). We supposed that the subjects who worked with the Tower along the training sessions, provided an adequate pedagogical support, would be able to solve increasingly complex instances. We understand that an adequate pedagogical support should be a kind of teaching which (a) works according to cognitive neuroscience and the relational framework of the anthropology, (b) take care of the diversity and (c) generates the effective didactic tools. We define the level of complexity by the quantity of rings people is working with, for example if the patient is working with five rings the level of complexity is five. Two crucial issues in our research are: 1. The possibility to learn to solve the task (independently from the quantity of movements and the time consumed in the task), and 2. The quantity of movements of the execution: it is supposed that least amount of movements with successful execution gives rise to a higher execution efficacy.

Results from our research showed that during the pre-test the patients were incapable to solve the tower with a five-ring complexity. Pre-test consisted in a single session of traditional assessment, in which the role of the examiner (M.A. Bacigalupe) was limited to explain to the patients the rules and the task objective with no other kind of intervention but the observation of the patients' behaviour. This mnemonic learning context can be called «traditional context».

During the training sessions the same examiner worked with the patients following the precepts of dynamic assessment, beginning the practise with a minimal number of rings and progressively increasing the level of complexity by adding more rings according to the particularities of each patient's execution. This increment in complexity was developed by an adequate guidance and intervention from the examiner. We called this learning context as «dynamic context». Along the sessions the patients were able to improve not only the level of complexity and completeness of the task but also their self-monitoring.

The post-test consisted in a similar session than the pre-test but each patient was asked to solve the tower with the level of complexity that they had reached during the training. This means that if they had solved the tower successfully with three rings and not with four or five rings, the post-test consisted in solving the tower with three rings.

These results allow us to conclude that the patients not only learned the task (proto-learning) but also improved their execution with practise and training (*deutero-learning*) and reached some level of flexibility and metacognition, which was different from patient to patient.

Conclusions

Along this work we understand the concept of cognition as a mediated, expanded function; therefore we are making an essential methodological and epistemological decision, which involves not only consequences on the philosophy of mind and cognitive sciences but also social and ethical derivations.

One of the consequences of the delineated perspective is the role of educators as learning mediators or vygotskian scaffolds, working on the subject's zone of proximal development and promoting an active inclusion of people in their culture.

Another consequence of this perspective can be found in medical sciences, in which a systemic point of view can consider that people are not ill per se but they are ill only in relation to their

environment. This means that the concept of health and illness depend on a given cultural perspective. Therefore, medical sciences are interested not only in the patient but also in their environment, and look for the social and physical factors which can influence the loss of the equilibrium that frequently defines the term health.

To delineate an idea of «mental health» requires two explanations: 1. To understand the system as healthy or ill, according to the diagnostic criteria of «normality» and «abnormality», and 2. The researcher should accept that the criteria of «normality» and «abnormality» are closely related to a consensus on acceptances and rejections of given behaviours; these behaviours arise from a co-existence of consensual coordination.

This means that «the idea of mental health» is only understandable in the ambit of the social dynamic which delineates it. In other words, this idea depends on the subject or subjects that experience it and the context of recurrent emotional contradictions. This form of learning and showing emotions is which finally can or cannot make people ill.

Attempting to link learning and «cure», and attempting to comprehend whether a cognitive system works adequately, means that understand when and how somebody's behaviour becomes part of a world of meaning which is pre-existent or new and agreed.

It is relevant to this perspective to say that representations have no more a central role, that the «intelligence» is no more the responsible to solve a problem or manipulate several material resources, though it is the capacity to enter in a shared world. This means that we are beyond the measurement of the benefit of changes in the scale and time of the performance in the resolution of specific tasks. Our point of view goes beyond in the same direction but abandoning the temporality to live in a shared world from where emerges the social phenomenon.

The goal is to find an endogenous activity which matches with the optimal codification of the environmental regularity. In a few words, to find a cognitive system in which the endogenous phenomenon and the exogenous one are defined by a viable coupling.

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