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Emotional and cognitive information processing in web-based medical education

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Abstract

The patient–physician relationship can be conceived as a process of structuring an ill-structured emotional-cognitive problem. So, new methods should be developed in order to capture the relations among emotions and cognitions, and physicians should be educated to recognize the influence of emotions on medical decision-making. The paper describes GRASP, an e-learning application based upon the assumption that cognitions and emotions are dual concepts. The results of a blended e-learning experiment are shown. The students were confronted with a role-playing based illness narrative. Their observations were segmented into information units, and uploaded on the e-learning system DVLN. The set of information units was then transformed into a bipartite graph, and analysed by means of STRUCTURE, an application aimed at grasping the structure of the relations among a set of "objects". The results were compared with Correspondence Analysis. The implications for medical education, medical reasoning, and medical record design are discussed.

Keywords: Emotion; e-learning; Medical education; Graph theory; Structural Analysis; Correspondence Analysis; Illness narratives; Medical decision-making; Medical record

1. Introduction

Dealing with emotions is probably the central focus of health care not only because of their psychological relevance, but also because they have a crucial role in clinical decision-making. From a general point of view, some authors claim that a satisfactory decisional process is impossible without emotions [1]. In fact, emotional and cognitive systems, even if distinct, are strictly interwoven and interdependent, and these interconnections drive an active and appropriate adaptation to the environment.

Emotions are also giving-sense judgment processes. So, they convey an intrinsic cognitive value, and are important in appraising the main problems of the patient and his (her) relatives.

Despite the relevance of emotions, physicians are not educated to recognise the patients' and their own emotions and feelings, and medical diagnosis and treatment choices are implicitly considered as the result of a pure rational decision-making process. Also, medical records (electronic or not) are implicitly conceived as neutral accounts of "objective", "facts", and do not allow capturing and analysing the emotional aspects of medical decision-making. But, due to the importance of emotions in medical decision-making, medical records should include specific sections for emotions organized in a simple and efficient format.

However, one should realize that the registration of medical data is embedded into an emotionally charged interaction among the actors of the care/cure process (ACP). From this point of view, the doctor-patient relation can be conceived as the encounter of two agents who try to structure and solve simultaneously an emotional and a cognitive problem. An example of cognitive-emotional problem is the recognition of the deep meanings that a given patient attaches to the different aspects of his suffering, i.e. his illness narrative.

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The concept of personal illness narrative [2–4] denotes the construction of affective-cognitive meanings of the different aspects of the illness process in which the ACPs are engaged. But, in order to do so, physicians should be educated to be aware of their emotions.

From this point of view, the care-cure process can be conceived as the dynamics of the interactions among different narratives, where each actor tries to structure an ill-structured situation by extracting meanings (interpretations) from a complex dynamical situation. Different actors (e.g. patients and doctors) do extract different aspects from the same complex stimulus–situation leading to different plots of the same scenario [5]. So, different parallel decision-making processes are activated with different goals and priorities which probably are the results of different kinds of information processing due to different cognitive-emotional meanings attached to different aspects of the illness.

The assumption underlying the present paper is that the distinction between emotions and cognitions is somewhat blurred because they are the two sides of the same coin. So, they have an intrinsic dual nature: the emotions felt by a given individual in a given context depend on the way in which (s)he interprets the situation, and in turn the interpretation of the situation depends on the way in which (s)he emotionally reacts to it. So, cognitive problem solving is at the same time also emotional problem solving.

From this point of view, the appraisal of a given piece of information can be conceived as the act of creating a relation between emotions and one or more aspects of a given situation. In other words, [6] emotions themselves are in fact relations over eliciting conditions. So, the selection of one or more features (i.e. observations or interpretations) from a narrative can be conceived as the result of an emotional-cognitive problem structuring and solving. For example, Patel et al. [5] showed that during the physician patient interaction, doctors represent medical problems in terms of biomedical concepts related to the underlying disease, whereas patients represent them as a narrative. *Disease* is the technical description of body dysfunctions, whereas *Illness* is the set of meanings attached to the disruption of the patient's normal life. Also, the laypersons' understanding of disease and risk factors is often at odds with the experts' ones [7].

So, the main problem is to develop a model aimed at grasping the emotional-cognitive meanings that different people extract from complex stimulus–situations, such as illness narratives.

From the educational point of view, the value of the so-called "story telling" for stimulating the acquisition of complex and meaningful knowledge, the crucial role of emotion in attention, planning, memorization, and as a powerful motivational learning tool [8] are widely recognized. The importance of the emotional dimension is also an emerging field in distance asynchronous learning [9], where the lack of visual interactions generates an artificial situation which is partially solved by means of the so called "emoticons", e.g. stylized pictures of facial expressions [10,11]. Emotions are also important in the so called *situated learning* [12], e.g. in learning a foreign language [13] or in hospital training settings.

In this respect, illness narratives provide an ideal scenario in order to engage the students in emotional-cognitive problem structuring and solving, and in turn the analysis of the outcomes of their emotional-cognitive problem solving can help to understand the ways in which they appraise the events both from the emotional and cognitive point of view.

From the methodological point of view, illness narratives are usually expressed as texts, and content analysis is one of the main routes for grasping the manifest and latent meanings conveyed by written documents. Content analysis is centered on the concept of unit of analysis which refers to a great variety of objects such as interviews or diaries. In order to grasp the meaning units, the texts are usually de-structured into segments, and coded. In the field of education qualitative content analysis of narratives was applied to a variety of data [14,15].

From the teaching point of view, dealing with emotions implies three interrelated questions:

- What is the best educational scenario in order to engage the students in the construction of the interpretation of a complex stimulus–situation conveying simultaneously cognitive and emotional meanings?
- What is the best strategy for the integration of this scenario into a distance learning environment?
- What is the best formal method in order to represent and analyse the way in which the students interpret the situation on the basis of their emotions–cognitions?

In this context, role-playing seems to be a suitable candidate in order to solve the first problem because it is the simulation of a real-life-like situation in which the learner is involved either as a direct interpreter (actor) or as a spectator. Role-playing is particularly useful in teaching/learning relational abilities in medical settings [16,17].

So, an illness narrative role-playing based educational scenario can simulate a setting *of situated learning* involving at the same time emotional and cognitive issues.

However, despite its strong emotional-cognitive impact, role-playing seems to be unfitting for distance asynchronous learning settings which are instead appropriate for collaborative meta-reflection on the cognitive and emotional aspects triggered by role playing.

Moreover, the dynamics of the role-playing seem to be unsuitable for mathematical and/or statistical analyses, because it is typically used in small focus groups aimed at interactively evaluating aspects of the doctor–patient relationships that are almost impossible to face by means of classic lessons and seminaries.