

A new virtual reality approach for the assessment of the attachment behavioral system

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Background

During experiences of distress, people of all ages can carry out various behaviors, such as looking for safety, social support and physical proximity. Experiences of loneliness, separation, threat, and loss can activate interpersonal implicit behaviors of attachment that can help to control and soothe them to promote individual's well-being (Ditzen et al., 2008; Schmidt et al., 2002; Maunder et al., 2005; 2006).

Attachment paradigm represents one of the models that attempted to explain the formation of social and close relationship patterns. According to Bowlby (1969) the first parent-child interactions, characterized by attentional and emotional responsiveness by the attachment figure, lead to individual differences in attachment styles and behavioral patterns (Ainsworth et al., 2015; Bowlby, 1969, 2005; Main, 1985). The differences in styles depend on the cognitive and emotional representation, called "internal working models" (IWM) that will later drive the self and other's perceptions.

Traditionally, in clinical psychology the most widely measures used, for assessing attachment, are interviews and projective methods, while in experimental research self-report questionnaires are more commonly used (See the review of Ravitz et al., 2010). All these measures provide a good validity and reliability but a limited ecological validity in the assessment of real attachment behaviours. The observation of behavioral patterns is costly, labor-intensive, and it is hard to create social situations in laboratory settings, however observation of actual attachment behaviors could be particularly informative.

General and specific objectives

We proposed virtual reality (VR) as a new approach to measure real attachment behaviours. VR allows simulating various stimuli and situations, recreating internal and external experiences and maintaining high levels of experimental control and ecological validity. Furthermore, VR allows multi-dimension assessment that will be useful to capture more attachment facets. Currently, the most psychological VR applications concern the treatment of various mental disorders but not the assessment, that it is mainly based on paper and pencil tests. In this framework, the first studies on attachment by VR showed the potentiality of this approach in the assessment of attachment behavioural system. To improve the assessment during the VR experience, we proposed stealth assessment as a new method. Stealth assessment could represent an innovative and powerful way to ensure the validity of numerous psychological measures in real-time during the experience in a rich and interactive virtual environment. Finally, the possible use of this method in psychology could be to generate a more complete, exhaustive, and accurate individual's psychological evaluation

Main stages of research development.

Stealth assessment is a performance-based assessment in which the assessment is interlaced in activities or games, highly interactives and immersive. The user performance data are continuously collected during the VR experiences and stored in a dynamic model of user (Shute et al., 2009). Stealth assessment proposes to remove or reduce traditional test anxiety and response bias without sacrificing validity and reliability (Shute, 2008). In order to develop a valid and reliable VSA, the evidence-centered design (ECD) represents the theoretical framework of reference, and it can be divided in three models: the competency model refers to identify the attributes that we want to assess; the structural model concerns the identification of those behaviors that can elicit the attributes that we want to assess; finally, in the task model situation and problems are developed to activate that behaviors linked to the attributes (Mislevy et al., 2003). Recollected information is maintained within the subject model and may include cognitive as well as non-cognitive information comprising an accurate and up-to-date profile of the subject.

The research development will be conducted in four stages:

Stage one: Theoretical development of competency model for attachment

Identification of the attachment attributes that we want to latently assess by using literature. Since, attachment paradigm is a composite psychosocial model, we will consider cognitive functioning, as attention, cognitive flexibility, emotional patterns such as regulation and expression in social relationships, and behavioral responses, such as quality of relationship, proximity or distance from others (Figure 1).

Stage two: Development of structural model for attachment

Identification of the observables behaviors that can elicit the attributes that we want to assess. For each attribute will be generated explicit behaviors indicators that we will allow to assess specific concept. For example cognitive flexibility could be assessed measuring the numbers of errors committed by the user in changing the strategy for solving a problem, as well as the time for solving it.

Stage three: Development of task model for attachment

Generation of situations, tasks and problems by using questions selected from a number of validated psychological questionnaires.

The initial draft of the situations will include the most distress situations (loneliness, threats, and lost) and each situation will contain 4 tasks for each identified cognitive and emotional pattern.

Stage four: Development of virtual reality environment and tasks

Development of the virtual play and environment with the relative characters by using the attachment theory and psychological questionnaires. Implementation of the tasks in the virtual environment (Figure 2 and 3).

Stage five: Experimental validation

The sampling population for factor analysis will be composed by: control subjects (who have never received a diagnosis of mental disorder) and patients with a diagnosis of depression.

The virtual assessment will be divided in session of 45 minutes each for a total of 4 sessions. Before the first experimental session, control subjects and patients filled questionnaires online.

The statistical analysis will compare the traditional assessment by using questionnaires with the behavioral indices that will be collected during the game.

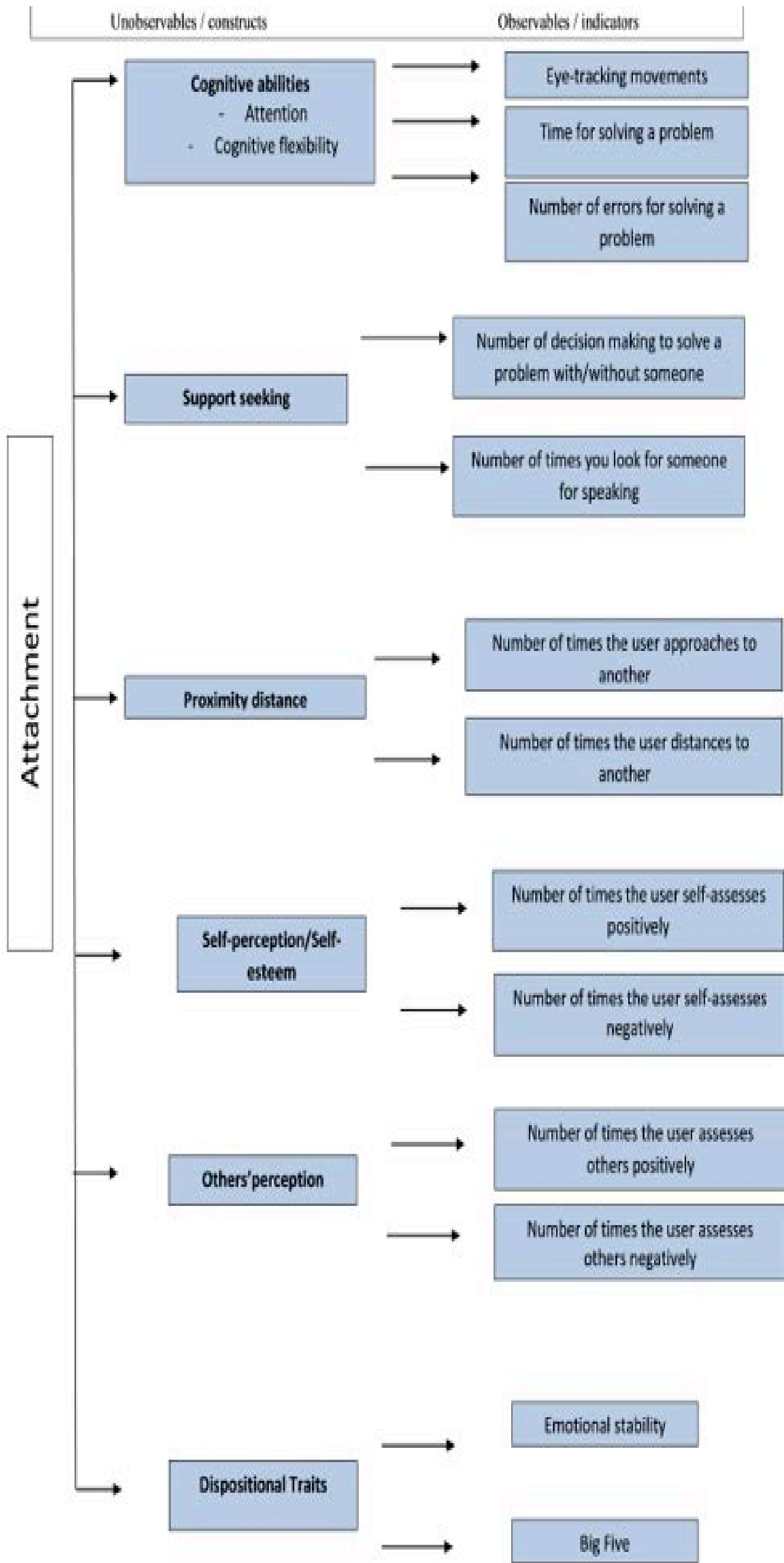


Figure 1. Competency and structural model of attachment



Figure 2. Virtual character



Figure 3. Virtual environment



Figure 3. Virtual environment

Expected results and potential profits

The expected results, first, will concern the determination of the validity of stealth assessment for attachment paradigm. We will also be examining the attributes related to attachment, including cognitive and emotional patterns. Furthermore, the data collected will be compared to the traditional assessment methods with the main aim to find significant correlation.

The research can expand in a number of general directions. First, we (and/or others) can explore the development of stealth assessments for other psychological concepts that have been shown to play crucial roles in mental disorders such as self-esteem, self-efficacy, and etc. Then, we can look at the development of stealth assessments relating to content that is directly aligned with the common core standards. Second, we can push the bounds of our stealth assessments relative to implementing the models in additional virtual games to determine the range of environments that may employ the same competency and evidence models, for a scalable, cost-effective, and engaging solution to the assessment of complex competencies. And third, we can examine any added value of including exploratory, data-mining methods to stealth assessment's more theoretically driven approach relative to the quality of the assessment.

Regarding future research related to psychology, stealth assessment has the potential to be quite useful for diagnostic purposes due to the fine-grained analysis of patient behavior in situated contexts. In addition, real-time information about patient competency states can be useful to support treatments.

Conclusions

The attachment system is a composite paradigm for understanding relationship processes, traditionally assessed by valid and reliable interview, projective, or self-report measures (Ravitz et al., 2010), but with a limited ecological validity in the assessment of real attachment behaviors. VR and SA provide a new approach and method to measure them in real-time, allowing to simulate various attachment situations, maintaining high levels of experimental control and ecological validity. Several studies support VR as a treatment technology but not for the assessment, mainly based on paper and pencil tests. SA will allow for a multi-level assessment of attachment that could be useful to catch real behaviors during the virtual experience (Shute, 2009). Finally, the possible use of this method in psychology could be to generate a more complete, exhaustive, and accurate individual's psychological evaluation.

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