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Revisiting the James versus Cannon debate on emotion: startle and autonomic modulation in patients with spinal cord injuries

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Abstract

James' hypothesis that impaired peripheral physiology in patients with spinal cord injuries (SCI) impairs emotional processing, as manifested in the modulation of physiological responses and in the subjective component of emotions, was examined in the present study. A pilot study confirmed the utility of Lang's picture viewing paradigm in a group of 78 students using the Spanish norms of the International Affective Picture System. In the main study, 19 patients with SCI and 19 well controls matched for sex, age and education were examined. Results showed: (1) no differences between SCI and control participants in the valence and arousal ratings of the pictures; (2) similar heart rate modulation in both groups, i.e. the unpleasant pictures produced greater deceleration than the pleasant ones; and (3) no decrease in emotional experience in the SCI group compared with the control group. The implications of the results for the James versus Cannon controversy on the theory of emotions are discussed.

Keywords: Emotions; Spinal cord injuries; Startle; Heart rate; Skin conductance

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1. Introduction

Psychologists have repeatedly debated the implication of peripheral bodily responses in the experience and expression of emotions. The old debate between supporters of the James (James, 1884, 1890, 1894) and Cannon (Cannon 1914, 1927, 1929) theories established the coordinates from which later theories have evolved: peripheralism versus centralism, bodily responses versus cognition, and specificity versus dimensionality. These dichotomous perspectives have remained present throughout the history of psychology, the emphasis varying according to the dominant paradigm—behaviorist versus cognitive—with few attempts being made at integration.

One of these attempts is that proposed by Lang in the context of his bioinformational and hierarchical theory of emotions (Birbaumer and Öhman, 1993; Bradley, 2000; Lang, 1979, 1994, 1995; Lang et al., 1997, 2000). Basically, Lang's model understands human emotions as action dispositions that are determined by the activation of specific brain circuits. These circuits are located in deep cortical and subcortical structures, being closely related to two primary motivational systems: the appetitive and the defensive. When these circuits are activated, the physiological, behavioral and subjective manifestations of emotions arise, exerting a modulatory effect on the brain's other processing operations, including the potentiation or inhibition of simple exteroceptive reflexes. Lang's model assumes that the functional architecture of emotion is hierarchically organized along elements that are both specific and dimensional, physiological and cognitive, and peripheral and central, providing a new theoretical context in which the old James–Cannon debate can be tested. Research data supporting Lang's model have mainly been obtained using two paradigms: mental imagery and picture viewing (Lang, 1985, 1995).

A line of research specifically designed to investigate the James–Cannon controversy on emotion, yet to be studied under Lang's paradigms, is that examining patients with spinal cord injuries (SCI). Ever since the seminal paper by James (1884), patients with different degrees of reduction in their peripheral feedback have been considered ideal participants for testing these theories. Studies on emotions in participants with spinal cord lesions have almost exclusively used self-report measures (Dana, 1921; Hohmann, 1966; Richards et al., 1982; Lowe and Carroll, 1985; Chwalisz et al., 1988; Bermond et al., 1991), with their associated methodological biases, including investigator bias due to social desirability and demand characteristics. Indeed, the results of these studies do not all point in the same direction and have been criticized for methodological flaws (Chwalisz et al., 1988; Trieschmann, 1980; Tucker, 1980; Reisenzein, 1983; Richards et al., 1982), for absence of a complete lesion (Fehr and Stern, 1970), or for failures to control for medication and other relevant variables (Chwalisz et al., 1988).

The aim of the present study was to examine the emotional modulation of psychophysiological responses in patients with SCI using Lang's picture viewing paradigm. This paradigm combines the visualization of affective pictures with the presentation of a brief burst of white noise to elicit the startle reflex. In addition to