

## Skin conductance responses to visual sexual stimuli

Rui Miguel Costa<sup>a,1</sup>, Francisco Esteves<sup>b,\*</sup>

<sup>a</sup> *Universidade Lusófona de Humanidades e Tecnologias, Portugal*

<sup>b</sup> *Instituto Superior de Ciências do Trabalho e da Empresa, Portugal*

Received 4 October 2007; accepted 10 October 2007

Available online 17 October 2007

### Abstract

Previous research showed that the asymmetrical direction of bilateral skin conductance responses (SCRs) remains constant regardless of task (with larger left SCRs in men and larger right SCRs in women). However, SCRs are controlled ipsilaterally by structures also associated with sexual arousal, hence it could be expected that larger right SCRs are specifically elicited by sexual stimuli. In order to test the two competing hypotheses, left and right SCR magnitude to three stimulus categories (sexually explicit, sexually non-explicit and neutral) were compared in 54 subjects (27 females). The direction of the asymmetry remained constant across stimulus types, however, unexpected sex differences occurred, as males had larger right SCRs and there was no lateralization in females. Interestingly, this interaction disappeared after controlling for indicators of subjective sexual arousal, suggesting that a specific (not previously hypothesized) processing of sexual information could take place.  
© 2007 Elsevier B.V. All rights reserved.

**Keywords:** Bilateral skin conductance responses; Sexual arousal; Sexual stimuli; Hemispheric differences; Sex differences

### 1. Skin conductance responses to visual sexual stimuli

There is a growing body of research revealing the brain structures regulating skin conductance responses (SCRs). Nagay et al. (2004), using fMRI found that during biofeedback and relaxation tasks SCRs reflected activation in the striate and extrastriate cortices, anterior cingulate cortex, insula, thalamus, hypothalamus and lateral regions of prefrontal cortex. Brain lesions studies showed that SCRs are consistently impaired as damage occur in the ventromedial frontal region, right inferior parietal region and anterior cingulate gyrus (Tranel and Damasio, 1994), as well as in amygdala (Glascher and Adolphs, 2003). Mangina and Beuzeron-Mangina (1996), based on data collected from direct stimulation of intracerebral sites and simultaneous recording of SCRs, concluded that the latter are under the ipsilateral control of the amygdala, hippocampus and anterior cingulate

gyrus. Hypothalamus also was proposed to be implicated in the ipsilateral regulation of emotional SCRs (Sequeira and Roy, 1993). Besides Rippon (1990), observed that increased EEG beta amplitude in one hemisphere corresponds to larger SCRs to cognitive tasks in the ipsilateral hand.

Furthermore, it has been suggested that primates (including humans) do not have strong functional connections between right and left limbic system, which strengthens the ipsilateral control of the SCRs and minimizes transference effects (see Mangina and Beuzeron-Mangina, 1996).

On the other hand, a sizable literature has shown that SCRs are sensitive to the presentation of sexual stimuli in several modalities: text, fantasy, slides and films (see Rosen and Beck, 1988 for references). Thus it is not surprising that sexual arousal is associated with increased activity in brain structures regulating SCRs. Studies with fMRI showed that brain regions activated during penile tumescence responses to erotic videos are the cingulate gyrus, right insula, and right hypothalamus (Arnou et al., 2002), insula, right anterior cingulate cortex and right thalamus (Moulier et al., 2006), anterior cingulate gyrus, insula, amygdala, and hypothalamus (Ferretti et al., 2005), and during female orgasm, hypothalamus, hippocampus, anterior cingulate gyrus, insula, and amygdala (Komisaruk and Whipple, 2005).

\* Corresponding author. ISCTE - Instituto Superior de Ciências do Trabalho e da Empresa, Departamento de Psicologia Social e das Organizações, Av. das Forças Armadas, Edifício ISCTE, 1649-026, Lisboa, Portugal. Tel.: +351 217903214; fax: +351 217903002.

E-mail address: [Francisco.esteves@iscte.pt](mailto:Francisco.esteves@iscte.pt) (F. Esteves).

<sup>1</sup> R.M. Costa is now at the University of Paisley, United Kingdom.

Exposition to visual erotic stimuli in investigations using fMRI is associated with activation of the anterior cingulate gyrus, insula and amygdala for both genders, plus thalamus and hypothalamus for men (Karama et al., 2002), anterior cingulate gyrus and insula for men (Kim et al., 2006), and left anterior cingulate gyrus, insula and thalamus for women (Park et al., 2001). Investigations with PET in male participants showed increased right insula activation during penile erection (Georgiadis and Holstege, 2005), right prefrontal activation during orgasm (Tiihonen et al., 1994), and increased activity in response to visual erotica in the bilateral (predominantly right) extrastriate cortices and right inferolateral prefrontal cortex (Bocher et al., 2001), anterior cingulate gyrus and hypothalamus (Redoute et al., 2000), and right insula and left cingulate gyrus (Stoleru et al., 1999).

Although a bilateral pattern of brain activity of structures controlling SCRs has been observed during sexual arousal, a greater bias to right hemisphere has also been verified (Arnou et al., 2002; Bocher et al., 2001; Georgiadis and Holstege, 2005; Moulner et al., 2006). Concurrently, sexual excitation has been consistently associated with relatively higher right EEG activity in the parietal and temporal lobes in both sexes (Cohen et al., 1976, 1985; Tucker and Dawson, 1984; Waisman et al., 2003). According to Tucker and Dawson (1984), sexual arousal seems facilitated by cognitive processes that draw on the nonverbal and holistic conceptual orientation of the right hemisphere.

Information processing mechanisms underlying emotion-related brain asymmetrical activation have been addressed by many authors. For Gainotti et al. (1993), right hemisphere appears to be more involved in the basic autonomic components of emotions and in the spontaneous emotional expression, whereas the left hemisphere seems to be more involved in functions of inhibition and intentional control of emotional responses. Glascher and Adolphs (2003) found support for the hypothesis that while the right amygdala mediates the global level of autonomic activation triggered by an arousing stimulus, the left amygdala decodes the arousal elicited by that stimulus and thereby has a regulatory function of autonomic activity, cognition and behavior. More specifically, Waisman et al. (2003) proposed that, on the one hand, male sexual arousal is triggered by the identification of visual configurations in the environment that match with innate and early imprinted brain templates located in the right hemisphere, but on the other hand, this excitation process is under a regulatory control of the left hemisphere by means of sexual triggers or inhibitors, assimilated throughout life, located therein.

As far as we know, SCRs to sexual stimuli only have been recorded unilaterally. The aim of the present study is to verify the pattern of bilateral SCRs to visual sexual stimuli in men and women. According to the sexual response hypothesis, because the processing of sexual stimuli has a predominant association with right hemisphere activity, including several areas regulating autonomic output, it is expected that for both males and females visual sexual stimuli would specifically elicit larger SCRs on the right hand. Additionally, it is expected that reported sexual arousal to the experiment is associated with larger right SCRs.

On the other hand, previous research has shown that the direction of SCR asymmetry remains constant, independently of

task, even when the tasks are intended to activate a specific hemisphere (Martinez-Selva et al., 1987; Miossec et al., 1986; Rippon, 1990; Roman et al., 1987, 1989). Thus, according to the constant direction hypothesis, it is expected that the direction of SCR asymmetry remains constant independently of stimulus content.

Besides the constant direction of asymmetry, SCRs have been found to be larger on the left hand for males and larger on the right hand for females (Martinez-Selva et al. 1987; Miossec et al., 1986; Roman et al., 1987). However, Rippon (1990) found larger left SCRs in both sexes and Roman et al. (1989) failed to find sex differences. In case of the constant direction hypothesis is confirmed, a sex difference pattern according to the general tendency of the findings, that is, with larger left SCRs for males and larger right SCRs for females is expected.

## 2. Method

### 2.1. Participants

This investigation had the participation of 65 Portuguese under-graduate students. Nine left-handers and one ambidextrous were removed from the analyses due to hemisphere-specific functions having been found more consistent in right-handed persons (Springer and Deutsch, 1981). One participant was also removed because she had not a single SCR to any of the experimental stimuli. Thus, the final statistical analyses included 54 participants, 27 females and 27 males, with a mean age of 25.87 years ( $DP=4.51$ ). Two males reported homosexual orientation, and one male and one female reported bisexual orientation. Statistical analyses done without non-heterosexual participants did not change the trend of the results, and their inclusion increased observed effect sizes. For that reason they remained in the final sample.

### 2.2. Measures and material

#### 2.2.1. Manual laterality

The dominant hand was assessed on a 5-point scale: 0) I always use my left hand, 1) I normally use my left hand, 2) I equally use my left and right hands, 4) I normally use my right hand, 5) I always use my right hand. Subjects were considered right-handers if they answered 4 or 5 to this question.

#### 2.2.2. Stimuli

Experimental stimuli were divided in three categories of six slides each. The explicit category comprised scenes of heterosexual sex with explicit genitals; these pictures were taken from internet sites. The non-explicit category comprised scenes of heterosexual foreplay and intercourse without explicit exposure of genitals. Five of these pictures were taken from the International Affective Pictures System (IAPS; Lang et al., 1999) and the other one was available at an internet site concerning erotica. The neutral category included scenes showing landscapes and daily use objects (taken from the IAPS).

An additional rating session was carried out to assess valence and arousal of the pictures taken from the internet. Thirteen

Download English Version:

<https://daneshyari.com/en/article/930958>

Download Persian Version:

<https://daneshyari.com/article/930958>

[Daneshyari.com](https://daneshyari.com)