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Central activation of the sexual system

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Summary

The aim of this thesis was to clarify central activation of the sexual system. Using a priming paradigm, differential contributions from unconscious versus conscious information processing were investigated. For a full blown sexual emotion, specific reactions have to be activated (e.g., genital arousal, a subjective experience of sexual arousal) as well as nonspecific reactions (e.g., heart rate changes, a subjective experience of tension). The activation of these reactions is mediated by physiological sensitivity (e.g., androgenic hormones) and environmental variables, such as stimulus context, rules, and opportunities. Also cognitive processes figure prominently. Sex can be construed as an emotion, and emotional reactions depend on appraisal of the stimulus, which includes memory, regulatory, and attentional processes interacting with one another. The focus of this thesis is on these cognitive processes.

Activation of sexual response may be largely determined by unconscious cognitive processing. The subjective experience of sexual arousal certainly depends on conscious processing, the individual's awareness of bodily sensations together with the appraisal of the response as sexual. Yet subjective experience can be seen as contingent on information processing outside of awareness. Sexually competent stimuli may have the capacity of being recognized unconsciously; autonomic responses as well as motor programs may be activated by efferent messages from implicit sexual memory.

In Chapter 1, the research objectives were described. A first objective was to improve the preattentive priming paradigm that was introduced by Janssen (1995); results that were obtained were promising but allow alternative interpretations. A second objective was to extrapolate the findings to a female population and investigate gender differences with respect to activational mechanisms. A third objective was to investigate the clinical applications of the approach. A last objective was to further test, and when necessary modify, our model of sexual arousal (Figure 1.1)

In Chapter 2 to 5 six experiments were reported, three using subliminal prime presentations and three using supraliminal prime presentations. In Chapter 2, we investigated implicit versus explicit activation of the sexual system using a priming paradigm in which sexual slides were preceded by either sexual or neutral primes. In the first experiment, primes were made inaccessible to conscious cognitive elaboration. Recognition of sexual targets was facilitated by sexual primes,

indicating that sexual representations in memory can be activated automatically. In the second experiment, in which primes were presented at a conscious level, identification of sexual targets was decelerated by sexual primes. Primes elicited subjective sexual arousal in Experiment 2 only, demonstrating that the activation of subjective experience requires conscious cognitive elaboration.

The goal of the two experiments reported on in Chapter 3 was to investigate to what extent the results of the first experiment of Chapter 2 (unconscious activation) could be generalized to women. A direct replication in women failed in Experiment 1. In Experiment 2, besides the male-oriented sexual picture set, pictures of two other sets were presented: female-oriented sexual pictures and baby pictures. Effects of the menstrual cycle were also examined. In Experiment 2 only male-oriented pictures showed a facilitation effect. Sensitivity for reproductive stimuli was enhanced during the midluteal phase. Like men, women may unconsciously recognize a stimulus as sexual. This recognition process seems unrelated to the potential of the stimulus to elicit subjective arousal.

The next two chapters were built on the second experiment of Chapter 2 (conscious activation). To elucidate conscious activational mechanisms of sexual response, in Chapter 4 the effects of appraisal of sexual and neutral stimuli were investigated. It was proposed that regulation is activated by attention, furnished by representations from implicit and explicit memory. Participants were asked to respond to target stimuli that were preceded by supraliminally presented prime stimuli. Primes and targets were operationalized by slides with sexual (i.e., romantic vs. explicit) and neutral content. In a cognitive task, participants had to group randomly presented targets as quickly as possible into sexual and nonsexual categories. Categorization of sexual targets was delayed when they were preceded by sexual primes compared to neutral primes. This was interpreted as an inhibitory process and compared with the Sexual Content-Induced Delay (SCID) phenomenon. No gender difference was found. In a subsequent affective task, participants provided an assessment of sexual arousal, followed by an evaluation of the target. This task was hypothesized to result in differential access to memory, where assessments of sexual arousal are influenced mainly by implicit memory, and where evaluations are influenced mainly by explicit memory. Gender differences were most prominent in the evaluation aspect of this task. It was concluded that cognitive processing of

sexual information is similar for both genders, but that gender differences are present in affective processing of sexual information.

Chapter 5 further focused on the SCID phenomenon. SCID refers to hesitancy in decision-making related to erotic material. Empirical evidence about SCID stems from lexical decision tasks. Our previous studies (Chapter 2, 4) also showed SCID effects in sex versus neutral categorization tasks in which pictures were used. In these tasks recognition of sexual pictures is delayed when preceded by consciously presented sexual primes. In the experiment reported on in Chapter 5, two manipulations were added to the categorization task to investigate underlying information processing mechanisms of SCID. Firstly, the appraisal process was influenced by varying the instructions. Secondly, primes with nonsexual emotional content were added to test the specificity of the SCID effect. Participants were asked to categorize sexual and neutral pictures that were primed by sexual, threatening, and neutral primes. Participants ignored or focused prime content dependent on two different instructions. Results showed that the SCID effect only emerged when sexual primes were ignored, however, threatening primes also decelerated recognition of sexual pictures after the ignore instruction. Results of the focus instruction were qualitatively different, that is, participants recognized sexual pictures faster when primed sexually. It was suggested that SCID could be interpreted as the activation of regulatory modules by emotional stimuli in the stage of elicitation of emotional response. In contrast, when the sexual system is already activated, it appears that decisions regarding sexual information are facilitated.

In Chapter 6, practical applications were discussed. This chapter includes two sections: clinical research and directions for the future. Regarding clinical research, a priming study with sexually dysfunctional male patients was described. The origin of the priming paradigm stems from psychological assessment in the diagnosis of male erectile dysfunction (Chapter 1). After we methodologically refined the paradigm and were more certain about the effect it produced, we conducted a patient study to investigate its clinical value. If different patient groups could be distinguished with priming tasks, the paradigm might develop into a noninvasive and objective diagnostic tool. Eighteen participants have been tested, and some preliminary results were reported. Four groups of participants were included: men with psychogenic erectile dysfunction, men with sexual trauma, men with testosterone insufficiency, and a control group of

sexually functional male volunteers. Participants were presented with four experimental tasks, which require different stages of responding. Analyses of the data of the total sample revealed the expected priming effects. We concluded that our manipulations had been successful. From the preliminary results, systematic differences between the four groups of participants were not revealed. With larger groups of participants, systematic differences may occur, yet the relatively small effect sizes seems to make an application to individual differences problematic.

Chapter 7 was a theoretical integration. After a short introduction of cognitive concepts pertaining to the sexual system and a description of unconscious versus conscious processing three hypotheses were discussed. (1) Sexual features are subject of a preattentive search. It would seem to the attentive individual as if the feature commanded attention. (2) Sexually competent stimuli activate motor output by a match with implicit memory; conscious evaluation is not necessary. (3) Hot and cold cognitions were postulated as unconscious products of bodily feedback and explicit memories. Attentional amplification of these cognitions results in conscious experience of sexual feelings and sexual thoughts. These hypotheses about sexual emotions are extrapolations of models of Damasio (2003) and LeDoux (1996). Recent empirical studies were discussed. Finally, we put forward a proposal about a sex module within the brain.

Chapter 8 was the general discussion. Data showed that subliminally presented sexual primes facilitated recognition of sexual targets (Chapter 2, Experiment 1; Chapter 3, Experiment 2). It was hypothesized that sexual responses are activated without the need of conscious evaluation. It was discussed to what extent the data provide support for this hypothesis.

The thesis was ended by a short evaluation of the outcome of our research objectives. A first objective was to improve the preattentive priming paradigm that was introduced by Janssen (1995). In Chapter 2 and 5, I report about experiments that enhanced the interpretations of the priming effects found by Janssen. The main conclusions are: the sexual system can be activated without the need of conscious evaluation (Chapter 2); the deceleration effect of consciously presented sexual primes is dependent of instructions and not specific for sexual response (Chapter 5). The experiments reported in Chapter 3 and 4 relate to the second objective, to extrapolate the findings to a female population and investigate gender differences with respect to activational mechanisms. The main conclusion is

that implicit effects may be weaker in women but qualitatively the same (Chapter 3). Gender differences are present in explicit sexual memory (Chapter 4). A third objective was to investigate the clinical applications of the priming approach. As was stated in Chapter 6, the main conclusion may be that priming effects are too small to have an individual clinical value. A last objective was to further test, and when necessary modify, our model of sexual arousal (Chapter 1, Figure 1.1). Although the experiments provide further support for this model, the search for a suitable physiological dependent variable did not succeed. We did develop the theoretical model and a more precise version was presented in Chapter 7 (Figure 7.3).

The main objective of this thesis pertained to clarify central activation of the sexual system. Unconscious processes set up sexual responding. For sustained response attention to internal or external sexual cues is needed. Also, regulation of the response merely functions through conscious evaluation, for which attention is a prerequisite. Future research along this line constitutes a promising area that could lead to a deeper understanding of pathways of activation of sexual response.

