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Measuring Transference Phenomena with fMRI

Andrew J. Gerber and Bradley S. Peterson

Columbia University

Transference has been a core concept of the psychoanalytic model of the mind ever since its introduction by Freud in 1895 (Laplanche and Pontalis 1967). Throughout the many controversies and vicissitudes of psychoanalytic theory over the past century, the emphasis on transference as a reliable psychological phenomenon and essential ingredient in psychoanalytic treatment has not weakened. Moreover, while many psychoanalytic concepts have either been adopted into mainstream psychology (e.g., somatic drives, the unconscious, defense mechanisms) or marginalized (e.g., the death instinct, penis envy), transference has maintained its status as an essentially psychoanalytic concept not integrated into other models of the mind or other modes of psychotherapy.

In a seemingly unrelated sphere, cognitive psychology, cognitive neuroscience, and diagnostic psychiatry have been moving over the past decade to a greater emphasis on social cognition and interpersonal functioning (Insel 1997; Ochsner and Lieberman 2001). Quantitative researchers who historically have emphasized concrete cognitive processes such as those directly related to intelligence, memory, and perception, or related psychiatric symptoms, now acknowledge the importance of having a better understanding of social interactions and associated cognitions. Research has begun to link neurocognitive developmental deficits in certain disorders to impaired social cognitive processes (Akshoomoff, Pierce, and Courchesne 2002). There is also growing evidence that affect dysregulation, as in borderline personality disorder, is associated with impairments in specific areas of social cognition, a finding that begins to explain the strong association between early traumatic experience and later psychiatric illness (Fonagy et al. 1996; Paris et al. 1999).

The importance of processes such as transference and social cognition becomes most clear in a third domain, that of psychotherapy process and outcome research. Though psychotherapy research has been relatively unsuccessful in its attempt to show which treatments work best for which patients in which circumstances, studies consistently demonstrate that the nature of the relationship between patient and therapist, whatever the therapeutic modality, is a powerful predictor of outcome (Frank and Gunderson 1990; Piper et al. 1991). This dimension is found as well in studies of pharmacological treatments and the placebo effect (Mayberg et al. 2002).

We propose that a generalized concept of transference, defined as an unconscious aspect of social cognition, is an emerging core concept that can be used to unite theoretical and empirical investigations into normal mental functioning, psychopathology, and psychotherapeutic change. We intend to explore and more precisely describe these phenomena using a paradigm developed over the past fifteen years by Susan Andersen, a cognitive and social psychologist at New York University (Andersen and Baum 1994; Andersen and Berk 1998; Andersen and Chen 2002; Berk and Andersen 2000; Glassman and Andersen 1999). This paradigm is guided by the theory that a normal person's perceptions and affective responses vis-à-vis the self and others are heavily influenced by the activation of significant relationship representations from the past.

In the basic version of Andersen's paradigm, college students participate in two sessions, two weeks apart, which they are led to believe are unrelated. During the first session, the students are asked to describe significant others in their lives and then to rank the importance of sentences they use to describe each one. In the second session, the students are told that the experimenter is studying social interactions and that they will be observed interacting with a (fictional) stranger (called the target) seated in the next room. The subjects are then shown a series of sentences describing the target. In the experimental condition, half of these sentences are drawn from the subject's own description of a significant other. In the control condition, half of the sentences are drawn from a significant-other description given by another subject (the "yoked-control"). Subjects are next shown a second series of sentences and asked to rate how likely it is that they have just been shown these descriptions about the target. Some of these sentences are taken from those that were actually shown; others are from the original significant-other description and were not shown in the second session.

Andersen and her colleagues demonstrated that when subjects are asked to rate their remembrance of sentences presented in the second session but taken from descriptions of their own significant others, they *falsely* remember having been shown other sentences, not presented, taken from those same descriptions. This does not happen, however, when the sentences are taken from the yoked control's significant- other description. This supports the conclusion that hearing about someone who resembles a significant other activates a representation or transference pattern that influences social memories. Andersen and her colleagues also demonstrated that resemblance to a significant other affected, in predicted ways, a subject's conscious mood and feelings about the target (Andersen and Baum 1994; Andersen et al. 1995), self-concept (Hinkley and Andersen 1996), facial affect, expectancies, motivation to meet the target (Andersen, Reznik, and Manzella 1996), and even conversation patterns (Berk and Andersen 2000). This was true even when significant-other descriptions were presented subliminally (Glassman and Andersen 1999).

Given the reliability of this behavioral task and its strong relevance to transference and social cognition, we believe that the next step is to adapt a version for the fMRI environment, confirm the behavioral findings, and study the activation of brain regions associated with this process. If successful, we plan to use this adapted paradigm for three long-term lines of research. First, we hope to demonstrate a link between performance on the Andersen paradigm and certain areas of psychopathology. Specifically, we predict that character pathology, such as that associated with borderline and histrionic personalities, will be associated with higher-than-normal effects of transference on memory, affect, motivation, and self/other representations. Autism and Asperger's Syndrome should be associated with lower-than-normal effects of transference. In making these connections, we believe that our transference paradigm is a more clinically relevant and specific measure than other frequently used tests of social cognition, such as theory of mind or facial affect recognition (Baron-Cohen et al. 1999; Calarge, Andreasen, and O'Leary 2003; Fletcher et al. 1995; Grady and Keightley 2002; Gregory et al. 2002). Second, we hope to adapt the transference paradigm to children and adolescents and conduct a series of studies demonstrating the development of transference patterns and its association with normal or pathological affect regulation over time. The behavioral and neuroimaging components of the paradigm could then be linked to other developmentally useful concepts, including attachment and mentalization. Finally, we intend to use the transference paradigm to study the process and outcome of psychoanalysis and psychotherapy. We believe that a major shortcoming of current psychotherapy research has been the absence of measures that reliably capture the structural changes brought about by an effective treatment (Gabbard, Gunderson, and Fonagy 2002; Westen, Novotny, and Thompson-Brenner 2004; Westen and Shedler 1999). The transference paradigm could tie a reliable behavioral and neurobiological measure of psychological structure to therapeutic change in psychoanalysis, as well as in other effective treatments.

Methods

We have designed an fMRI-compatible version of the Andersen transference paradigm that involves measuring the effects of transference on recognition memory and affect. For our pilot study, we will recruit ten normal college-age adults (18 to 25 years old). In the first session they will undergo a composite interview, based on Westen's Clinical Diagnostic Interview, that will elicit elaborate descriptions of at least four significant others and obtain clinical information that can be used to assess the subject's personality, relationships, and dominant character defenses. Subjects with active DSM Axis I or Axis II diagnoses, or those with lifetime histories of substance abuse, mental retardation, or pervasive developmental disorders, will be excluded. Standardized measures will be taken of intelligence, memory (both declarative and procedural), psychiatric symptoms, social adjustment, and interpersonal functioning. In the second session, subjects will undergo an extended fMRI scan, during which they will be presented, sequentially, with descriptions of eight targets (four based on their own significant others and four on the yoked control's) and tested on their memory of, and affective response to, these descriptions.

Our data analyses will begin with analysis of variance and regression to confirm the behavioral findings, reported by Andersen, related to recognition memory and affective response. We will also examine associations (correlations) between various measures of intelligence, memory, social and interpersonal functioning, character pathology, and transference phenomena. Finally, fMRI analyses will be used to compare brain activation when subjects are engaged in a transference situation (during either the learning or the memory recognition portions of the paradigm) and when they are not. We will study regions of interest associated with the "social brain" (fusiform gyrus, orbitofrontal cortex, amygdala, dorsolateral and dorsomedial prefrontal cortex, and cingulate), hypothesizing that transference will be associated with differential activation in these regions.

Discussion

We believe it is crucial to the success and relevance of this project to tie it continuously to the clinical phenomena that psychoanalysis describes in such detail. We hope that by sharing the conceptual features and other details of our paradigm here, we will create an opportunity to discuss the design with psychoanalytic clinicians and other researchers and so will be able to improve our paradigm as we continue to pilot it. It is crucial that the paradigm be designed for optimal reliability and clinical relevance at this stage, before it is applied broadly to questions of development, psychopathology, and psychotherapeutic change.

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