diaphanousness

**diaphanousness** See TRANSPARENCY

**dissociation methods** Perceptual and cognitive processes and associated mental representations cannot be directly observed or measured. Consequently, researchers attempt to infer their existence by measuring changes in brain and behaviour that are produced by variations between experimental conditions or groups. Typically, the term *dissociation* is used to denote a pattern of differential responding to experimental manipulations across several indicators of performance. Such a pattern is often considered to be evidence against theories or models which postulate that a single cognitive process or system underlies observed changes in brain and behaviour. Claimed demonstrations of unconscious influences on perception, learning, or memory are by definition set in opposition to a *single-process conscious performance model*. Indeed, findings of dissociations and related methodological paradigms constitute the cornerstone of the argument that both conscious and unconscious processes mediate observed behaviour.

During the past three decades, studies investigating dissociations between cognition and awareness have rejected the notion of a single-process conscious performance model and argued instead for models based on the distinction between explicit vs implicit processes. For example, Graf and Schacter (1985:301) stated that 'Implicit memory is revealed when performance on a task is facilitated in the absence of conscious recollection; explicit memory is revealed when performance on a task requires conscious recollection of previous experiences'. More recently, the distinction has been extended to the study of conscious vs unconscious perception, as exemplified in the following definition by Kihlstrom et al. (1992:22). 'Explicit perception refers to the person's conscious perception of some object or event in the current stimulus environment... By contrast, implicit perception is demonstrated by any change in experience, thought or action that is attributable to some event in the current stimulus field, even in the absence of conscious perception of that event'.

Similar definitions have also been proposed for implicit and explicit *knowledge*. As described by Berry and Dienes (1993:2), 'explicit knowledge is said to be accessible to consciousness, and can be communicated or demonstrated on demand, whereas implicit knowledge is said to be less accessible to consciousness, and cannot be easily communicated or demonstrated on demand'. Finally, in reviewing the implicit learning literature, Shanks and St John (1994:368) pointed out that 'different authors have used a variety of definitions to capture the fine detail of the explicit/implicit learning distinction, but the key factor is the idea that implicit learning occurs without concurrent awareness of what is being learned, and represents a separate system from that which operates in more typical learning situations, where learning does proceed with concurrent awareness (i.e., explicitly)'. Thus, with respect to recollection, perception, knowledge, and learning, implicit processes are invariably defined by the absence of consciousness or awareness.

To illustrate the concept of a dissociation between cognition and awareness, consider the contrast between two phenomena: *cryptomnesia* (or unconscious plagiarism) and *confabulation* (a type of false memory). Cryptomnesia occurs when a person falsely believes they have generated a novel idea (i.e., an absence of an awareness of remembering), when in fact they are retrieving an idea that they were exposed to in the past (i.e., objective evidence of memory retrieval). Cryptomnesia occurs in a variety of fields, including music, literature, politics, and academia. For example, George Harrison was sued because his song 'My Sweet Lord' resembled a song from the 1960s, called 'He's so Fine', by the Chiffons. Although the lawsuit was successful, it was believed that Harrison's use of the song was not intentional and instead reflected an unconscious memory influence. In contrast, confabulation involves a situation in which an individual might recount a vivid, detailed, and coherent recollection (i.e., a subjective phenomenal experience of remembering), which objective evidence suggests is false (i.e., no objective recollection). Confabulations are not due to psychosis, delirium, or other mental disorders and confabulators are not lying or deliberately intending to mislead. In fact, some brain injury patients who produced bizarre confabulations (e.g., claiming to have dated a famous movie star) strenuously insist their memories are true and accurate (e.g., Stuss et al. 1978). Taken together, cryptomnesia and confabulation constitute an impressive demonstration that objective evidence of memory retrieval and subjective awareness of remembering are distinct and dissociable.

Currently, implicit or unconscious memory research represents one of the dominant themes in the study of human memory. Underlying this surge in popularity was the development of numerous indirect or implicit memory tasks. In all of these tasks participants are not instructed to refer back to the original study phase. Instead, an effort is made to disguise the linkage between the study and test phases of the experiment.

A prototypic example of an implicit memory task is word-stem completion. In this task, participants are given word stems (e.g. DEF _ _ _) and are instructed to complete them with the first word that comes to mind. In an earlier study phase of the experiment participants are exposed to words that are potential completions for...
some of the stems (e.g., DEFEND). Typically, stem completion is presented as a new and unrelated task in order to disguise the link between this task and the earlier study phase of the experiment. Memory for words presented in the study phase is measured as an increase in the tendency to produce these words (as opposed to other possible completions such as DEFINE, DEFER, DEFACE, DEFRAY, etc.) as responses to the stems.

Perceptual identification is another common implicit task. Participants are presented with words during a study phase, and are then required to identify briefly flashed words at test. Perceptual identification is enhanced for recently presented study-phase words, even when participants are unaware of the link between the study and test phases. Such facilitation effects are referred to as priming. Performance on implicit or indirect memory tasks is often compared to performance on traditional explicit memory tasks, such as recognition and recall. In explicit or direct memory tasks, participants are instructed to reflect back to the study phase and to retrieve study items.

Numerous studies have compared the effects of independent variables on explicit vs implicit measures of memory in both amnesic patients and normal subjects (for reviews see Moscovitch et al. 1993, Roediger and McDermott 1993). The basic aim of these studies was to demonstrate functional dissociations between explicit and implicit measures of memory. Briefly, a functional dissociation is observed if the nature of the effect of an experimental manipulation differs across the explicit and implicit tasks (see Dunn and Kirsner 1988 for a critique of the functional dissociation paradigm).

To illustrate this paradigm, consider a seminal early demonstration of a functional dissociation that was reported by Winnick and Daniel (1970). In this study, performance in an explicit recall task was contrasted with performance in an implicit perceptual identification task. During the study phase of the experiment participants either read words or generated words from pictures and definitions. Generated words were better recalled than read words. In marked contrast, read words were better identified than generated words. Such a pattern of results in which an experimental manipulation (e.g., generate vs read) produced opposite effects on an explicit vs an implicit task is referred to as a double dissociation and is considered by many investigators to be a conclusive demonstration of processing without conscious awareness (but see Dunn and Kirsner 1988 for a counter-argument).

In addition to the functional dissociation paradigm, several other methodologies were developed in order to document unconscious/implicit influences on cognition including the process dissociation procedure (see memory, process-dissociation procedure), stochastic independence, reverse association, and the relative sensitivity paradigm (see Roediger and McDermott 1993 for a review). An examination of these paradigms is beyond the scope of this entry. Instead, we focus on the classic dissociation paradigm, as it constitutes the most influential methodological framework designed for investigating perception, learning, or memory without awareness. This paradigm establishes three prerequisites for demonstrating unconscious cognition: (1) a valid measure of cognitive information available to consciousness must be selected, and compared with another measure of cognitive processing; (2) the measure of conscious awareness indicates null sensitivity, or null awareness; and (3) the second measure of cognitive processing must be shown to have greater than zero sensitivity. Although the logic underlying the classic dissociation paradigm is relatively straightforward, research guided by this framework resulted in widespread controversy. Specifically, the same empirical findings that some researchers argue provide little or no evidence for unconscious processing are considered by others as conclusive and overwhelming proof of performance without conscious awareness. To better understand this puzzling state of affairs, some of the issues underlying the controversy are briefly outlined here (for a more thorough discussion see Reingold and Merikle 1990, Reingold and Toth 1996).

Much of the long-standing controversy surrounding the study of unconscious processing revolves around the lack of a general consensus as to what constitutes an adequate operational definition of conscious awareness. In the absence of an agreed-upon operational definition of consciousness, a variety of measures have been, often arbitrarily, used as indicators of conscious awareness. Two general approaches to the measurement of conscious awareness were used in the context of the classic dissociation paradigm: the subjective approach employing a subjective report or claimed awareness measure, and the objective approach that defines awareness in terms of performance on tasks that measure perceptual or cognitive discriminations.

The subjective approach is based on the idea that conscious content is accessible to introspection and as such participants can meaningfully report on their subjective phenomenal awareness in general, and on their confidence that they possess task relevant information, in particular. For example, in the earliest studies of unconscious perception, the behavioural measure used to index conscious awareness was based simply on an individual’s subjective confidence that they detected or could identify briefly presented or degraded stimulus information. The results of these studies, as well as subsequent investigations, provided ample evidence that observers can make above-chance perceptual
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discriminations even when they report that their perceptual experiences are inadequate to guide their choices and that they are simply guessing. In fact, perception in the absence of claimed awareness is a relatively easy phenomenon to demonstrate, and the phenomenon is so robust that Adams (1997), who reviewed many of the early studies in this area, suggested its use as a classroom demonstration (see PERCEPTION, UNCONSCIOUS).

Even more dramatic demonstrations of perception, learning, and memory without subjective confidence are based on observations of cortically blind and amnesic patients. Specifically, case studies of brain injury patients with lesions in their visual cortex that result in scotomas (blind regions) in their visual field demonstrate that such patients perform perceptual discriminations (e.g., detection, location, orientation) concerning stimuli presented in their blind field well above chance, while at the same time proclaiming to be purely guessing. This phenomenon has been termed *blindsight* (see Weiskrantz 1986 for a review). Similarly, the amnesic syndrome constitutes a powerful demonstration of retention in the absence of reported subjective phenomenal awareness of remembering (see Moscovitch et al. 1993 for a review). Consider the famous case of H. M. who became amnesic after an operation was performed in order to alleviate his epilepsy attacks by bilaterally removing parts of his temporal lobes. As a result of his surgery, H. M. became severely amnesic and seemingly unable to commit new material to memory. For example, after his operation he was very poor at learning the names or recognizing the faces of people he met, or at remembering an article he read just hours before. However, upon closer examination, H. M. was found to have retained information for experiences that occurred following his surgery. This preserved learning capacity by H. M. included, for example, the ability to learn the mirror-drawing task. In this task the participants must carefully trace the outline of shapes (e.g., a star) while viewing their hands and the shapes through a mirror. H. M. performed this task on consecutive sessions. Although at the beginning of each session he strongly denied having performed this task before, his performance improved across sessions.

However, the measurement of conscious awareness solely in terms of subjective reports has been often criticized. This is because it is difficult to know what criteria individuals use to decide that they are guessing. Statements indicating an absence of subjective confidence may only reflect an individual’s own theories of how their subjective experience guides their behaviour rather than a true absence of task relevant conscious information. For example, some participants who report null awareness may disregard having conscious access to partial or degraded information regarding a stimulus or an event, while other participants may use such information as the basis for reporting awareness of perceiving a stimulus or remembering an event. Another factor that may negatively impact the validity of subjective report is the tendency of participants to respond on the basis of what they perceive to be the goals or expectations of the experimenter. This tendency is referred to as demand characteristics. It is therefore likely that subjective report, at least on some occasions, may fail to reflect all of the relevant information that is accessible to consciousness. Thus, the validity of the subjective report approach to the measurement of awareness critically depends on distinguishing between the participants’ response bias, affected by factors such as preconceived notions and demand characteristics, and their subjective phenomenal experience.

Given the problems associated with subjective confidence as a measure of awareness, many researchers instead measure conscious awareness by asking participants to make discriminative responses concerning relevant stimulus information. This approach is often referred to as the objective approach to the measurement of awareness to distinguish it from the subjective approach described above. For example, in recent investigations of unconscious perception, typical indices used to measure awareness are forced-choice discriminations among a small set of stimulus alternatives or present-absent decisions, which require participants to distinguish between the presence of a stimulus and a null stimulus. Methodologically, measures of discriminative responding have an important advantage over measures based on subjective reports. This is because measures of discriminative capacity allow the assessment of perceptual sensitivity with considerable precision, and independent of any possible influence of response bias.

Unfortunately, robust and replicable findings of unconscious processing under conditions of chance-level discriminative capacity have proved very difficult to obtain. For example, both Eriksen (1960) and Holender (1986) forcefully advocated for the use of the objective approach to the measurement of awareness and, after extensively reviewing the literature on unconscious perception, concluded that there was no convincing evidence for perception in the absence of discriminative responding. Consequently, these authors argued in favour of a single-process conscious perception model. A similar conclusion has been reached by Shanks and St John (1994) in their review of the literature on learning without awareness.

The most important problem with the objective approach to the measurement of awareness is that it involves a one-to-one mapping of tasks and processes. Specifically, above-chance discrimination performance is considered a necessary and sufficient condition for
establishing conscious awareness. However, discriminative responding may constitute a valid measure of awareness if and only if it is influenced exclusively by conscious processing. If, on the other hand, a measure of discriminative responding is sensitive to both conscious and unconscious information, then equating awareness with discriminative responding may result in at best underestimating the magnitude unconscious processing, and at worst defining it out of existence.

Thus, neither the subjective and the objective approaches to the measurement of awareness can be justified on an a priori basis. Given that a valid measure of conscious awareness is a vital prerequisite for the use of the classic dissociation paradigm, employing this paradigm in the absence of such a measure is clearly problematic; hence the ensuing controversy. Specifically, whether strong evidence of processing without awareness is obtained crucially depends upon how awareness is operationally defined. While processing in the absence of subjective confidence is a very robust phenomenon, evidence of unconscious processing under conditions that establish chance discrimination has been elusive.

What appears on the surface to be a debate over empirical findings is more often a reflection of differences in implicit theoretical starting points or assumptions. To interpret any obtained dissociation as evidence for unconscious processing, such a measure must be assumed to be sensitive to all task-relevant conscious information. In addition, to interpret the absence of a dissociation as evidence against processing without awareness, the selected measure of conscious awareness must be assumed to be sensitive only to conscious, but not unconscious, task-relevant information. In their critique of the classic dissociation paradigm, Reingold and Merikle (1988, 1990) termed these assumptions the exhaustiveness assumption and the exclusiveness assumption respectively. The controversy and polarization concerning the validity of unconscious processing is a direct consequence of the relative emphasis assigned to the exhaustiveness and the exclusiveness assumptions by different investigators. The problematic aspect of the subjective approach to the measurement of conscious awareness is related primarily to a failure to satisfy the exhaustiveness assumption, while a failure to satisfy the exclusiveness assumption underlies the interpretive problems associated with the objective approach.

The idea that cognitive processes can be meaningfully classified as conscious or unconscious has a long history in philosophy and psychology. However, the empirical explorations of the conscious–unconscious distinction have been marred by a preoccupation with trying to prove or disprove the existence of the unconscious and by the quest for a theory-free methodological silver bullet. Progress in the study of the relation between consciousness and cognition will require going beyond existence proofs and towards the development of multiple conceptual and methodological frameworks in order to converge upon a satisfactory exploration of this complex and controversial topic. No amount of methodological rigour could replace the urgent need for the development of more comprehensive theoretical frameworks that would provide testable predictions and guide future research in a fruitful direction.

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