



Unconscious perception: Assumptions and interpretive difficulties^{☆,☆☆}

Abstract

Reingold and Merikle's (1988, 1990) critique of the classic dissociation paradigm identified several issues as inherent problems that severely undermine the utility of this paradigm. Erdelyi (2004) extending his prior analysis (Erdelyi, 1985, 1986) points out several additional factors that may complicate the interpretation of empirically obtained dissociations. The goal of the present manuscript is to further discuss some of these commonly neglected interpretive difficulties.

© 2003 Elsevier Inc. All rights reserved.

1. Introduction

Historically, multiple conceptual and methodological sources of confusion underlie the many controversies that characterize the study of unconscious processes (see Dunn & Kirsner, 1988, 1989, 2003; Erdelyi, 1985, 1986; Eriksen, 1960; Holender, 1986; Merikle, 1982; Merikle & Reingold, 1990, 1991, 1998; Reingold, 2003, in press; Reingold & Merikle, 1988, 1990; Reingold & Ray, 2002; Reingold & Toth, 1996). In an important analysis Erdelyi (1985, 1986, 2004) clarified that the study of perception without awareness often involves an attempt to demonstrate a dissociation between measures of *available* perceptual information versus measures of perceptual information that is *accessible* to consciousness. More specifically, the vast majority of unconscious perception studies attempted to demonstrate the availability of perceptual information under conditions in which no perceptual information is accessible to consciousness. Given that this approach dominated unconscious perception research during the last century, Reingold and Merikle (1988, 1990) dubbed it the *classic dissociation paradigm*.

Unfortunately, whereas at least partial availability of perceptual information is clearly implicated when behavioral, physiological, or neural indicators significantly differentiate between the

[☆] Commentary on Erdelyi, M. H. (2004). Subliminal perception and its cognates: Theory, indeterminacy, and time. *Consciousness and Cognition*, 13, 73–91.

^{☆☆} This research was supported by a grant to Eyal Reingold from the Natural Science and Engineering Research Council of Canada (NSERC). The author thanks Elizabeth Bosman and Ava Elahipanah for their helpful comments.

alternative stimulus states, operationally defining null accessibility or null perceptual awareness is not as straightforward. Indeed, as Reingold and Merikle (1988, 1990) pointed out, much of the long-standing controversial status of the study of unconscious perception revolves around the lack of a general consensus as to what constitutes a valid measure of conscious awareness. Instead, a variety of measures have been, often arbitrarily, used as indicators of conscious awareness.

The measures employed to index conscious awareness can be classified into two broad categories: 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 discriminations. Indeed, it was noted that whether evidence of perception without awareness is obtained, crucially depends upon how awareness is operationally defined. Specifically, while perception in the absence of subjective confidence is a very robust phenomenon (see Adams, 1957, for a review), convincing evidence of perception under conditions that establish chance discrimination has not been readily forthcoming.

However, if the assumption that subjective report *exhaustively* reflects all of the perceptual information accessible to consciousness (the exhaustiveness assumption) is invalid, then merely demonstrating perception coupled with claimed null awareness does not necessarily constitute evidence for unconscious perception. This is the case because available perceptual information may simply reflect consciously accessible information that is not indexed by subjective report. Similarly, if the assumption that objective discrimination measures such as forced choice detection *exclusively* index conscious, but not unconscious, information (the exclusiveness assumption) is invalid, then a failure to demonstrate perception under conditions of chance discrimination does not necessarily constitute evidence against unconscious perception. This is the case because if forced choice discrimination performance is sensitive to both conscious and unconscious information, then equating null awareness with chance discrimination may be tantamount to defining unconscious perception out of existence, or at the very least, severely underestimating the magnitude and importance of unconscious perception effects.

Thus, as argued by Reingold and Merikle (1988, 1990), in the context of the dissociation paradigm a valid measure must be both exhaustive and exclusive. Given the enormity of these assumptions, Reingold and Merikle further argued that *no* proposed measure of conscious awareness, should be considered valid on an a priori basis. Instead, they suggested that an important research goal is to identify theoretically derived qualitative differences in an attempt to converge on a non-arbitrary indicator of conscious awareness.

Even if it could be established that a particular measure constitutes an exclusive and exhaustive indicator of conscious perceptual information, the classic dissociation paradigm also requires a convincing empirical demonstration of null sensitivity on such a measure. In fact, studies purporting to demonstrate perception under chance discrimination (e.g., Balota, 1983; Fowler, Wolford, Slade, & Tassinary, 1981; Marcel, 1983) were subsequently criticized as failing to establish null sensitivity (see Cheesman & Merikle, 1984; Holender, 1986; Merikle, 1982; Nolan & Caramazza, 1982). As pointed out by Macmillan (1986) the number of required trials is truly prohibitive if one attempts to distinguish null sensitivity from low-level residual sensitivity (e.g., $d' = 0$ vs. $d' = .5$ requires a 140 trials). Thus, the null sensitivity problem represents a difficult methodological hurdle that further undermines the utility of the classic dissociation paradigm.

In addition to the exhaustiveness, exclusiveness and null sensitivity problems summarized above, Reingold and Merikle’s (1988, 1990) critique of the classic dissociation paradigm

highlighted another issue, namely the task comparability problem. Specifically, measures used to index perceptual availability and conscious accessibility are often very dissimilar in terms of several task dimensions that are implicitly presumed to be irrelevant. However, very often important task differences that were not part of the intended experimental manipulation constitute an unacknowledged confound to any obtained dissociation. Generally, to the extent that dissociated measures are less comparable, obtained dissociations are less surprising or theoretically meaningful.

2. Commentary on Erdelyi (2004)

As described above Reingold and Merikle's (1988, 1990) critique of the classic dissociation paradigm highlighted the validity (i.e., exhaustiveness and exclusiveness), null sensitivity, and task comparability problems. Reingold and Merikle argued that these issues severely undermine the utility of this paradigm. Unless these limitations of the classic dissociation paradigm are adequately addressed, neither obtaining a dissociation nor a failure to do so is particularly informative within the framework of this paradigm.

Let us now consider some of specific arguments advanced by Erdelyi (2004) as they relate to the above discussion.

2.1. Unconscious perception versus memory and variation in the relative sensitivity of dissociated measures as a function of time

Erdelyi (2004) points out that a sharp demarcation between perception and memory in the context of the study of unconscious processing is not possible given that participants' responses are always produced after a certain interval or lag following stimulus presentation. Acknowledging that fact highlights the possibility of deliberately manipulating the lag or time variable. In addition, such a focus may lead to the emergence of a more comprehensive approach to the study of unconscious processes that integrates theory, methodology, and findings related to perception, learning and memory without awareness. However, although it may never be possible to totally isolate the role of memory in perceptual tasks, it may be possible to establish that information that was perceived consciously, was subsequently retrieved without awareness. Thus, determining the extent of conscious accessibility at the time of encoding is still an important issue even in studies that focus on awareness at the time of retrieval.

2.2. The direct versus indirect terminology

Erdelyi (2004) cautioned against the association of the direct and indirect measures with conscious and unconscious processing respectively. Similarly, Reingold and Merikle (1988, 1990) warned against any one-to-one mappings between tasks and processes. However, it is precisely because of this issue, that Reingold and Merikle suggested that direct versus indirect terminology is still preferable to any terminology that is used to refer to both tasks and processes, such as the commonly used explicit and implicit terms, or for that matter, the availability and accessibility labels used by Erdelyi (2004). Specifically, according to the framework outlined by Reingold and

Merikle (1988, 1990), direct versus indirect measures are defined respectively by the presence versus absence of reference to the discrimination of interest in the task instructions. There is no assumption concerning underlying processes that mediate performance on these tasks. Thus, direct and indirect measures may reflect conscious, unconscious, or both conscious and unconscious information.

2.3. *The null sensitivity problem*

Erdelyi (2004) argues that null awareness is not a necessary component of the dissociation paradigm and that all that is required is to show that perceptual availability is greater than conscious accessibility, even when the latter is greater than zero, thereby bypassing the null sensitivity problem. Erdelyi (2004) suggests that the relative sensitivity paradigm introduced by Reingold and Merikle (1988, 1990) is an example of such a formulation. However, this reference to the relative sensitivity approach obscures important distinctions across paradigms. Whereas the dissociation paradigm as formulated by Erdelyi (2004) requires a valid measure of conscious accessibility, the essence of the relative sensitivity paradigm is an attempt to study unconscious perception by comparing the relative sensitivity of *comparable* direct and indirect measures while professing ignorance, or uncertainty, as to the nature, and the composition of the processes that mediate performance on these tasks.

Instead of assuming that direct or indirect measures exclusively, and/or exhaustively index conscious, or unconscious processing, the relative sensitivity paradigm is based on the most minimal a priori assumption that still permits the implementation of the logic of the dissociation paradigm. Specifically, this approach assumes that the sensitivity of a direct discrimination is greater than, or equal to, the sensitivity of a comparable indirect discrimination to conscious task relevant information. Thus, if empirically we find an indirect measure which is more sensitive than a comparable direct measure, then because the superiority of the indirect measure cannot be attributed to conscious information (by assumption), it must by default indicate that performance on the indirect task is informed, at least in part, by unconscious information. Note also that task comparability is a cornerstone of the relative sensitivity paradigm and a neglected issue in the classic dissociation paradigm. Thus, despite the assertion by Erdelyi (2004), it is unclear how a solution to the null sensitivity problem can be found within the framework of the classic dissociation paradigm.

2.4. *The quest for qualitative differences and the validity problem*

In arguing the merits of the qualitative differences approach to the study of unconscious processes, Reingold and Merikle proposed that an important research goal is to identify such differences between conscious and unconscious processing in an attempt to converge on a non-arbitrary indicator of awareness, and to establish the importance of the conscious–unconscious distinction. If it can be shown that theoretically predictable qualitative differences are correlated with a particular behavioral measure, then this measure may constitute a valid indicator of awareness. Furthermore, discovering predictable qualitative differences may constitute a critical test for determining the value of the conceptual distinction between conscious and unconscious processes. More specifically, if the difference between conscious versus unconscious processing is

quantitative, rather than qualitative in nature, then the merit of agonizing over this distinction becomes highly questionable. Erdelyi (2004) acknowledged that to date there is no solution to the validity problem severely undermining the utility of the classic dissociation paradigm. It is therefore somewhat surprising that Erdelyi (2004) criticizes the qualitative difference approach, which constitutes the best, and perhaps only, hope for progress in confronting this difficult challenge.

3. Concluding remarks

An important aspect of the study of the relation between consciousness and perception concerns the development and implementation of experimental methods that will more conclusively document the separate existence, as well as the unique aspects, of conscious versus unconscious processes. Equal emphasis on methodological rigor, as well as conceptual clarity, is imperative if progress is to be made toward the attainment of this goal. In this regard, the most recent effort by Erdelyi (2004) provides important questions and insights that will hopefully stimulate further empirical research and theorizing concerning the complex and controversial study of unconscious processes.

References

- Adams, J. K. (1957). Laboratory studies of behavior without awareness. *Psychological Bulletin*, 54, 383–405.
- Balota, D. (1983). Automatic semantic activation and episodic memory. *Journal of Verbal Learning and Verbal Behavior*, 22, 83–104.
- Cheesman, J., & Merikle, P. M. (1984). Priming with and without awareness. *Perception & Psychophysics*, 36, 387–395.
- Dunn, J., & Kirsner, K. (1988). Discovering functionally independent mental processes: The principle of reversed association. *Psychological Review*, 95, 91–101.
- Dunn, J., & Kirsner, K. (1989). Implicit memory: Task or process?. In S. Lewandowsky, J. Dunn, & K. Kirsner (Eds.), *Implicit memory: Theoretical issues* (pp. 17–31). Hillsdale, NJ: Erlbaum.
- Dunn, J., & Kirsner, K. (2003). What can we infer from double dissociations. *Cortex*, 39, 1–7.
- Erdelyi, M. (1985). *Psychoanalysis: Freud's cognitive psychology*. New York, NY: W.H. Freeman.
- Erdelyi, M. (1986). Experimental indeterminacies in the dissociation paradigm of subliminal perception. *Behavioral and Brain Sciences*, 9, 30–31.
- Erdelyi, M. (2004). Subliminal perception and its cognates: Theory, indeterminacy, and time. *Consciousness and Cognition*, 13, 73–91.
- Eriksen, C. (1960). Discrimination and learning without awareness: A methodological survey and evaluation. *Journal of Psychological Review*, 67, 279–300.
- Fowler, C., Wolford, G., Slade, R., & Tassinary, L. (1981). Lexical access with and without awareness. *Journal of Experimental Psychology: General*, 110, 341–362.
- Holender, D. (1986). Semantic activation without conscious identification in dichotic listening, parafoveal vision, and visual masking: A survey and appraisal. *Behavioral and Brain Sciences*, 9, 1–23.
- Macmillan, N. (1986). The psychophysics of subliminal perception. *Behavioral and Brain Sciences*, 9, 38–39.
- Marcel, A. (1983). Conscious and unconscious perception: Experiments in visual masking and word recognition. *Cognitive Psychology*, 15, 197–237.
- Merikle, P. (1982). Unconscious perception revisited. *Perception & Psychophysics*, 31, 298–301.
- Merikle, P., & Reingold, E. (1990). Recognition and lexical decision without detection: Unconscious perception? *Journal of Experimental Psychology: Human Perception and Performance*, 16, 574–583.

- Merikle, P. M., & Reingold, E. M. (1991). Comparing direct (explicit) and indirect (implicit) measures to study unconscious memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 17, 224–233.
- Merikle, P., & Reingold, E. (1998). On demonstrating unconscious perception: Comment on Draine and Greenwald (1998). *Journal of Experimental Psychology: General*, 127, 304–310.
- Nolan, K., & Caramazza, A. (1982). Unconscious perception of meaning: A failure to replicate. *Bulletin of the Psychonomic Society*, 20, 23–26.
- Reingold, E. M. (2003). Interpreting dissociations: The issue of task comparability. *Cortex*, 39, 174–176.
- Reingold, E. M. (in press). Unconscious perception and the classic dissociation paradigm: A new angle? *Perception & Psychophysics*.
- Reingold, E., & Merikle, P. (1988). Using direct and indirect measures to study perception without awareness. *Perception & Psychophysics*, 44, 563–575.
- Reingold, E., & Merikle, P. (1990). On the inter-relatedness of theory and measurement in the study of unconscious processes. *Mind and Language*, 5, 9–28.
- Reingold, E. M., & Ray, C. (2002). Implicit cognition. In L. Nadel (Ed.), *Encyclopedia of cognitive science* (pp. 481–485). London: Nature Publishing Group.
- Reingold, E. M., & Toth, J. P. (1996). Process dissociations versus task dissociations: A controversy in progress. In G. Underwood (Ed.), *Implicit cognition* (pp. 159–202). Oxford: Oxford University Press.

Eyal M. Reingold
Department of Psychology
University of Toronto
100 St. George Street
Toronto, Ont., Canada M5S 3G3
E-mail address: reingold@psych.utoronto.ca