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## Reflection: A Socratic approach?

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**Reflection: A Socratic Approach**

**Inge C. M. Van Seggelen – Damen\***

Open University of the Netherlands

**René Van Hezewijk**

Open University of the Netherlands

**Anne S. Helsdingen**

CEDE Ecole Polytechnique de Lausanne

**Iwan G. J. H. Wopereis**

Open University of the Netherlands

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**Abstract**

Reflection is a fuzzy concept. In this article we reveal the paradoxes involved in studying the nature of reflection. Whereas some scholars emphasize its discursive nature, we go further and underline its resemblance to the self-biased dialogue Socrates had with the slave in Plato's *Meno*. The individual and internal nature of the reflection process creates difficulty for studying it validly and reliably. We focus on methodological issues and use Hans Linschoten's view of coupled systems to identify, analyze, and interpret empirical research on reflection. We argue that researcher and research participants can take on roles in several possible system couplings. Depending on who controls the manipulation of the stimulus, who controls the measuring instrument, who interprets the measurement and the response, different types of research questions can be answered. We conclude that reflection may be validly studied by combining different couplings of experimenter, manipulation, stimulus, participant, measurement, and response.

**Key words:**

coupled system, Linschoten, reflection, reflective practice, Socratic dialogue

### Reflection: A Socratic Approach

Ever since Plato, the philosophically good life has been propagated as a life that is permeated by reflection, that is, a life that aims at wisdom, at finding truth about our existence, and achieving a moral balance in our actions (Plato, 1997). “Man’s place in creation” was an accepted object for reflection. St. Augustine’s confessions (circa AD 400), for instance, demonstrated a possession with reflections on the relationship of the individual person to God and their conscience (Pusey, 1999). Ages later it became “Man's place in Nature” (Huxley, 1906), and Edmund Husserl tried to find the foundation of science and logic in unbiased reflection (e.g., Husserl, 1900-01, 1936).

Reflection stems from the Latin verb *reflectere*, meaning “to bend” or “to turn back on the self” (Reflection, n.d.). From an etymological origin a variety of meanings were derived, including whether and how persons can know or relate to themselves (Wiley, 1994).

Reflection can be considered “a highly personal, cognitive process ... in which a person takes an experience from the outside world, brings it inside the mind, turns it over, makes connections to other experiences, and filters it through personal biases” (Dewey, 1910/1933, p. 9). Definitions of reflection often depict a cognitive activity of questioning (e.g., Boud, Keogh, & Walker, 1985; Daudelin, 1996) alleged to have explorative, developmental, and interactive merits (e.g., Boud et al., 1985; Boyd & Fales, 1983; Brookfield, 1988). The role of self is prevalent in making sense of one’s own experiences (e.g., Boud et al., 1985; Boyd & Fales, 1983; Daudelin, 1996; Seibert & Daudelin, 1999).

These definitions illustrate that reflection is considered a highly individual and internal process resembling a dialogue with oneself, and mainly inaccessible to others such as researchers. Nevertheless, we found reflection to be a tool of many trades. The process of reflection as well as its effects have been studied by scholars in philosophy, pedagogy,

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3 management, and organizational psychology. Many studies either explicitly or implicitly refer  
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5 to reflection as an inner dialogue between the self as a subject and an object (or object's  
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7 processes). However, due to the nature of reflection, it is hard to avoid the temptation to use  
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9 one's reflective capacities to study reflection, and, like in Socrates' dialogue with the slave, to  
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11 interrogate oneself, thus becoming one's own slave. The subject of reflection scores high as a  
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13 psychologist's dilemma: to subject the self to science or science to the self (Leary, 1990). On  
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15 the one hand, no mental activity asks for more validity and reliability for both science and  
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17 self; yet, this can easily be confused (Halligan & Oakley, 2015; Krause, 2005).  
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21 What is needed for reflection to be reliable and valid is an anchor point in a "reality"  
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23 that is accessible to others for critical discussion. Ultimately, both researchers and reflecting  
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25 individuals want reliable and valid conclusions about the perceptions, feelings, arguments,  
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27 conclusions, and thoughts of their inner selves, often referring to these as "honesty" or  
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29 "integrity." In what follows, we suggest a useful approach to analyze and categorize the  
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31 conceptual and methodological problems of studying reflection that was inspired by Hans  
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33 Linschoten's ideas of coupled systems<sup>1</sup> (1964). Linschoten considered the relationship  
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35 between a psychological researcher and their experimental "participant" as one in which two  
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37 persons have roles in several possible system couplings. Application of his coupled systems  
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39 approach to a methodologically diverse set of reflection studies reveals possible  
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41 improvements to studying reflection that we will describe in the last part of this paper<sup>2</sup>.  
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### 47 **Selected Studies on Reflection**

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52 Reflection is a popular research topic across various scientific disciplines. Within these  
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54 disciplines methods like experiments, surveys, and qualitative studies have been used to  
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56 uncover it. With the intention to provide a cross-sectional image of reflection studies, we  
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3 selected a methodologically diverse sample of the literature on reflection. Table 1 provides an  
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5 overview of 18 articles that served as a base for our discussion.  
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19 A comparison of the articles suggests that reflection has frequently been studied in the  
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21 scientific domains of education, management, psychology, and philosophy. Psychology and  
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23 management studies often focused on reflection *effects* (e.g., Anseel, Lievens, & Schollaert,  
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25 2009; Masui & De Corte, 2005) and the development and validation of reflection *measures*  
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27 (e.g., Schippers, Den Hartog, & Koopman, 2007; Trapnell & Campbell, 1999). Contributions  
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29 in the education literature pursued the identification of reflective practices (e.g., Bruno,  
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31 Galuppo, & Gilardi, 2011; Rogers, 2001). Some articles addressed reflection's neurological  
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33 location (e.g., D'Argembeau et al., 2005), personality features (e.g., Livengood, Sytsma,  
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35 Feltz, Scheines, & Machery, 2010), and logical pitfalls or paradoxes (e.g., Davis & Klaes,  
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37 2003).  
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41 In general, reflection is considered a cognitive process to which individuals have to  
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43 provide some effort (e.g., Bruno et al., 2011; D'Argembeau et al., 2005; Grant, Franklin, &  
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45 Langford, 2002; Gürtner, Tschann, Semmer, & Nägele, 2007). In some studies, the affective  
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47 process has been addressed as well in order to stress the emotional factors at stake (e.g.,  
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49 Jordan, 2010; Kember & Leung, 2000; Mann, Gordon, & MacLeod, 2009; Rogers, 2001;  
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51 Trapnell & Campbell, 1999). Apart from the interest in individual, cognitive, and affective  
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53 processes, some articles discuss collective and reflective processes (e.g., Schippers et al.,  
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55 2007; Van Woerkom & Croon, 2008).  
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Conceptual comparison reveals three different approaches toward reflection. The first approach involves reflection in the presence of *self-awareness*. This approach emphasizes the investigation of personal knowledge structures by means of introspection (e.g., Mann et al., 2009; Procee, 2006). The second approach considers reflection in terms of *self-reference*. Self-reference pays attention to the self-other relationship and stresses the evaluative rather than critical nature of reflection (e.g., Gürtner et al., 2007; Van Woerkom & Croon, 2008). The third approach is referred to as *self-inquiry*. Self-inquiry includes “epistemic” interest in the self by means of questioning assumptions one previously has taken for granted (e.g., Livengood et al., 2010; Trapnell & Campbell, 1999).

The different concepts of reflection have been classified according to timing (e.g., Jordan, 2010; Rogers, 2001; Schön, 1983, 1987), cognitive effort (e.g., Larrivee, 2008; Schippers et al., 2007) and level of reflection (e.g., Davis & Klaes, 2003; Kember & Leung, 2000).

Stimuli and intervention techniques give some indication of what makes people reflect. Practicing or learning-by-doing is considered an important stimulus for reflection (e.g., Jordan, 2010; Masui & De Corte, 2005). As such, reflection is used as a learning strategy, from which one can benefit the most when thinking back afterwards or even instantly about the effect or efficiency of the practices at hand. Feedback provided by relevant others (e.g., Mann et al., 2009) as well as behavioral evaluation (Schippers et al., 2007) are frequently mentioned as stimuli for reflection (see Table 1). Intervention techniques for reflection involve self-reports (e.g., Kember & Leung, 2000), evaluating task performance (e.g., Gürtner et al., 2007), coaching (e.g., Jordan, 2010), and journaling (e.g., Bruno et al., 2011).

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3 The main purpose scholars have attributed to reflection is the assessment of cognitive  
4 functioning (e.g., D'Argembeau et al., 2005; Trapnell & Campbell, 1999). Here, reflection is  
5 used to determine a person's critical thinking skills. Other purposes are sense-making (e.g.,  
6 Bruno et al., 2011; Jordan, 2010) and redirection or self-regulation skills (e.g., Anseel et al.,  
7 2009; Procee, 2006). Livengood et al. (2010) have emphasized the importance of reflection as  
8 a merit or legitimization of one's (cognitive) behavior. Other studies have suggested that  
9 reflection enhances performance. In their article, Mann et al. (2009) mentioned mixed effects  
10 of reflection on performance. This supports the negative and mixed effects from reflection on  
11 well-being (e.g., Lyke, 2009; Trapnell & Campbell, 1999). With regard to understanding,  
12 again some studies demonstrate mixed or positive effects (e.g., Davis & Klaes, 2003; Grant et  
13 al., 2002; Jordan, 2010; Livengood et al., 2010; Rogers, 2001).

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16 The above suggests that a person reflects to qualify their own cognitive functioning in  
17 terms of task performance and critical understanding and to manage their own behavior.  
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19 When a person's thinking ends in vicious circles, reflection hampers well-being rather than  
20 improving performance. However, all studies seem to be caught in a chicken-and-egg  
21 situation: They suggest that reflection has positive results for cognitive functioning and for  
22 performance, but depend on the very same person's reports about their cognitive functioning,  
23 their performance, or the reception of a stimulus—if not incentive—to reflect.

### 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 **Problems Studying Reflection**

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49 Recent discussions seem to concentrate more on the methodological nature of the challenge  
50 than on the deeper problem residing in research on reflection. Experimental tasks that aim to  
51 investigate reflection vary enormously within and across domains. They vary from  
52 demonstrations of internalized learning of study skills (Masui & De Corte, 2005), to written  
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3 individual and group discussions (Gürtner et al., 2007), elaboration with and without feedback  
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5 (Anseel et al., 2009), solving math problems (Livengood et al., 2010), and reflecting on the  
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7 self, others, or social issues during PET scans (D'Argembeau et al., 2005). With the exception  
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9 of the neuropsychological experiment of D'Argembeau et al. (2005), they show little relation  
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11 with self-reflection as studied through surveys. Only some of the studies have tried to  
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13 distinguish levels of self-reflection. Moreover, many confounding factors surface, such as  
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15 new ways of processing information (e.g., by email), using multiple-choice items (which  
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17 seems a distinct type of activity from reflection), or learning to learn, which was not related to  
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19 reflection as such. There was only limited transfer (or the measurement thereof) to other  
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21 domains and limited long-term knowledge of applying reflection in resembling domains.  
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23 Furthermore, authors found hardly any distinction between individual and group processes. In  
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25 other words, a unifying paradigm has not yet been found, and if it is found it will not be easily  
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27 related to the qualitative variations involved in reflection. The reporting of procedures,  
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29 participants, and results not always conforms to what unequivocal conclusions require.  
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34         However, as alarming as these methodological problems may be, they may obscure a  
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36 deeper problem in reflection research. This has to do with the nature of reflection and the  
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38 temptation to use one's reflection capacities to study reflection, and like Socrates reflected in  
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40 interrogating oneself, thus becoming one's own Socratic slave. However, simultaneously  
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42 addressing who reflects on what and what is represented reveals a paradox in reflection,  
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44 resembling the infamous *reflective paradox* involving self-contradicting premises (Ashmore,  
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46 1989; Bartlett & Suber, 1987). Combining the premises "Lying means not telling the truth,"  
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48 and "I now do not tell the truth," results in the paradox "I am now lying (about my telling the  
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50 truth)." Since the act of combining both premises and the act of "lying" refer to the same  
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52 person (the self), the truthfulness of the conclusion is uncertain. In other words, the subject  
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3 and the object of lying become identical. In reflection issues, the same seems to be the case:  
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5 The actor and the observer of reflection are identical.  
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8 Turning ourselves into objects overlooks the fact that this act of objectification is  
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10 subjective in itself (Cunliffe & Jun, 2002). Or, in Hegelian terms, the subject has a permanent  
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12 blind spot. Hegel illustrated this by a reflecting pole that can only see the other pole (the  
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14 “reflectee”) and not itself (Wiley, 1994, p. 79). Or as Kant’s picture metaphor illustrates,  
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16 “whenever the knower tries to know the knower it thereby turns the knower into the known.  
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18 The knower knows the known, but not the knower” (Organ, 1987, discussing Kant, p. 115).  
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20 Apparently, we can only discriminate these two elements in an analytical sense and not in a  
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22 physical or statistical sense when confronted with locus issues.  
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### 27 **Linschoten’s System Couplings**

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32 The problem may be illustrated with a view we borrowed from Dutch psychologist Hans  
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34 Linschoten. Linschoten (1964) observed that psychologists seem to believe the position that  
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36 all psychological knowledge about human beings is self-implicating. That is, psychologists’  
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38 scientific knowledge is also referring to themselves, and therefore self-committing and self-  
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40 biased. In other words, psychologists should apply whatever they know about human beings  
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42 to psychologists as well. Consequently, the biases and prejudices psychologists observe  
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44 human beings to have apply to psychologists as well (i.e., “Idols of the psychologist”<sup>3</sup>).  
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3 Linschoten considered the relationship between a psychological researcher (E) and their  
4 experimental “subject” (O; now “participant”) as one in which two persons have roles in  
5 several possible “system couplings.” In an experiment (Figure 1.1), a psychologist with the  
6 role of experimenter E has control over stimulus situation (x) and measuring instrument (m),  
7 whereas the observed participant (O) “controls” the response (r) to E’s manipulation (x).  
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Figures 1.2, 1.3, and 1.4 reflect other couplings in which psychologists gain knowledge about the *validity* of the instrument (Figure 1.2), the *reliability of the observer* by comparing observations with those of others (Figure 1.3), and *properties or traits of the participant*, as in using questionnaires (Figure 1.4). In system couplings 1.3 and 1.4, E does not manipulate the stimulus to know its effect, but studies reactions to a “given” stimulus in order to get more insight into the properties of the measuring instrument or in characteristics of participants. Below, we further discuss the different couplings of systems involved in research, and give some examples.

### Examples of Coupled Systems in Reflection Studies

Reflection has been studied by means of experiments, surveys, and qualitative studies. Researchers determine what to measure, how to measure, and how to interpret measurement outcomes; participants are subject to measurement and sometimes are (non)deliberately able to influence measurement outcomes. However, clear-cut as it seems, there is still some leeway. Earlier, we mentioned paradoxes and blind spots that are typical for reflection. The paradoxical nature of reflection is not restricted to the object of study, but often also involves measurement. For instance, how autonomous is the “self” that initiates reflection? Is reflective behavior probed by researchers distributing reflective tasks similar to “spontaneous” reflective behavior that is self-reported by participants? Whose reflective behavior is at stake:

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3 that of the research participants, the researchers, or both? For example, on the one hand  
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5 participants involved in an empirical study on their reflective behavior are subject to  
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7 paradoxes and blind spots such as biased memories. Researchers, on the other hand, do not  
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9 only have to identify participants' blind spots, but also have to deal with their own paradoxes  
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11 and blind spots. Linschoten's coupled systems are informative to analyze these issues in  
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13 empirical studies.  
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16 Below we give some examples of reflection studies that can be characterized by the  
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18 way systems are coupled. We do not pretend to cover all the studies and mixed methods  
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20 published. To illustrate how in reflection research systems are coupled differently, we only  
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22 discuss some striking examples.  
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#### 24 25 26 27 *Coupled System #1: The Experiment* 28

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31 In experiments, the researcher (E) has control over the stimulus ( $x$ ) and the measurement  
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33 phase ( $m$ ). After stimulation, the participant (O) responds ( $r$ ). The focus in this coupling is on  
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35 the effect of  $x$  (independent variable) in terms of  $r$  (dependent variable), and  $m$  is used to  
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37 establish the effect.  
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41 For instance, in an experiment by Masui and De Corte (2005) young participants had  
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43 to formulate study recommendations for themselves and for peers, and establish relations  
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45 between their personal study behavior and good and weaker study results in two previously  
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47 followed domain-specific courses. The experimental treatment involved training sessions in—  
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49 as well as practice and transfer tasks on—self-regulated learning. These sessions and tasks  
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51 included the self in relation to social relations and the self in relation to consequences of study  
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53 behavior (“the future profession”). In this coupled system (#1), the experimenter had control  
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55 over the stimulus (a set of instructions) and the measurement (attribution and reflective  
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3 behavior measurements, as well as academic achievements); the participant had control over  
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5 the response, that is, his reflective behavior. According to Linschoten's systems criteria,  
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7 Anseel et al. (2009) conducted an experiment investigating the effect of reflection on  
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9 performance. They provoked experimental "reflection" in feedback or no-feedback task  
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11 conditions. The authors (E) defined four task conditions (x) in which participants (O) had to  
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13 select an answer to different work emails and (a) write down examples of their own strong  
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15 and weak task performance based on performance feedback (reflection/feedback task), (b) do  
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17 so without such feedback (reflection/no feedback task), (c) not write down anything but  
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19 receive feedback, or (d) write down and not receive feedback. Next, they had to do similar  
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21 email-response test tasks (r), and performances (m) between the four different  
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23 feedback/reflection conditions were analyzed. Feedback with reflection generated highest test  
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25 performance.  
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### 32 *Coupled System #2: Calibration*

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36 In calibration studies, the main aim is to establish the *validity* of the instrument (Figure 1.2).  
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38 In other words, the psychologist is interested in the precise way the measuring instrument  
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40 relates to responses by participants. Studies use the measured strength of the stimulus in  
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42 relation to the kind and/or strength of the response. The focus in this coupling is on the  
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44 validity or standardization of  $m$ , using the effect of  $x$  (independent variable) on  $r$  (dependent  
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46 variable) in case  $m$  is used to establish effects of  $r$ .  
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49 One way to validate findings in reflection research is to triangulate methods, such as  
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51 interview, observation, and document analysis (see Denzin, 1978). In an extensive study,  
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53 Carson and Fisher (2006) "raised the bar" by indicating how the reflective quality of student  
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55 writings can be established by using identification procedures of values, beliefs, assumptions;  
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3 changes in these values, beliefs, and assumptions; their making connections to political,  
4 social, and cultural values; and changing their habits. Scott (2009) empirically tested the  
5 usefulness of portfolios as learning tools. The research question in this “calibration study”  
6 was straightforward: “Is student portfolio use positively associated with reflection?” (p. 62).  
7  
8 In other words, can we use portfolios to establish serious reflection? Portfolios were offered to  
9 students as a stimulus to reflect on learning and performance in an MBA course. The effect on  
10 reflection performance was established by measuring the level of reflection exhibited in an  
11 exam paper. Apparently, that was not the only aim of her study. The portfolio stimulus used in  
12 the study was also validated by a qualitative evaluation of the students’ excerpts from their  
13 portfolios to establish whether the stimulus actually elicited reflection.  
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### 27 *Coupled System #3: Self-Calibration*

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32 According to Linschoten, self-calibration takes place when the focus of the researcher is on  
33 improving the interpretation of the measurement instrument. In a more straightforward  
34 measurement situation the focus is on preventing “reading errors” of instruments, the correct  
35 interpretation of test results, and so forth. The experimenter does not control the stimulus, but  
36 is interested in the question of whether he or she rightly interprets the measured response.  
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43 Christie and Menhuir (1997) studied (E) what a “reflective practitioner” means and  
44 how the process of reflection can be operationalized and evaluated in the context of the  
45 continuing professional development (CPD) of those who work in the field of early education.  
46 This is an example of how teachers (O) can be supported to evoke (x) more reflection  
47 techniques in their pupils (r), and at the same time it gives an example of how they can “self-  
48 calibrate” their method of establishing progress (m) in their students. Another example is  
49 Jordan’s study (2010) who, as a participant observer (E) observed and interviewed (m) novice  
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3 nurses (O) of an anesthesiology department to become reflective practitioners, addressing  
4 different dimensions of reflective attitudes, and how to interpret the “measurement” of them.  
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7 Jordan investigated how organizational practices (x) fostered reflection-in-action in a high  
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9 reliability context (r), by categorizing her field observations of seven novice nurse anesthetists  
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11 (verbal and nonverbal communication), narratives, interviews, or document analyses into  
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13 different theoretical dimensions that structured the thick descriptions (an ethnographic  
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15 approach).  
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#### 20 *Coupled System #4: Measurement*

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25 There are many examples of studies in which there is negligible or no stimulation by the  
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27 researcher. The researcher, however, controls the measuring instrument, as in a survey or  
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29 questionnaire, and establishes any response of a participant that can be interpreted as a  
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31 reflective practice. Another way to ascertain an external effect more independently is to use  
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33 modern neuropsychological technology during reported reflection in order to obtain more  
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35 objective measurements of reflective activity. For example, Northoff et al. (2006) and Saxe,  
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37 Moran, Scholz, and Gabrieli (2006) used neurological measurements. In their  
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39 neuropsychological experiment, D'Argembeau et al. (2005), (E) used three topics to evoke (x)  
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41 reflection: reflection on one's personality, reflection on someone else's personality, and  
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43 reflection on social issues. To identify the dependent variable (r)  
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49 immediately after each scan, subjects were asked to verbally report the thoughts,  
50  
51 images, and/or memories they had had while they were reflecting on the topic. Then  
52  
53 they rated several aspects of the mental activity they had experienced during the scan,  
54  
55 including amount of thoughts (i.e., total amount of thoughts experienced, whatever  
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3 their content); relative amount of thoughts about the self; thoughts about other  
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5 persons; memories; physical sensations and combined those ratings with  
6  
7 measurements of brain metabolism patterns through PET scans. (p. 620)  
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10  
11 They inferred that self-reflection differs from reflection on others or society and from a  
12  
13 resting state, although during rest some similar patterns were visible, both in the metabolism  
14  
15 scans and in the self-ratings. Apparently, self-reflection plays an important role during rest.  
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21 *Coupled System #5: Spurious Coupling*  
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25 For our study, *spurious coupling* is a most relevant system coupling. Linschoten referred to  
26  
27 number five as “spurious” because, as he called it, “science appears as power” (1964, p. 157).  
28  
29 No reliable or valid *knowledge* is collected (p. 157). The psychologist or their client wants a  
30  
31 certain result of the study, and stimulates and measures just long enough to attain the wanted  
32  
33 result. His examples seem to refer to applying power that disguises as scientific knowledge, as  
34  
35 you often see in advertisements of dubious products, using the phrase “scientifically proven.”  
36  
37 For instance, we forbid our client to use the word polar bear and we observe that the client  
38  
39 does not use the word polar bear, or worse: we report that the client does not *think* about polar  
40  
41 bears. In our study, reflection could border on spuriousness if we use reflections to “prove”  
42  
43 how—or that—reflection has the effect we wished for. For instance, in a study on distributed  
44  
45 shared sense-making, Ladewski, Krajcik, and Palincsar (2007) theorized that  
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50  
51 inquiry and reflection are mutually constitutive processes that play a key role in  
52  
53 human flexible shared sense-making, enabling sense-making systems (individual and  
54  
55 collective) to “open” to consider multiple possible options and then to “close” to the  
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3 “best fit” option for a particular situation based on criteria such as reproducibility,  
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5 coherence, and fruitfulness. (pp. 45-46)  
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9  
10 They tested their theoretical frame by documenting reflections and prediction or what they  
11 called “sense-making activities” of students and do not collect other performance data or data  
12 from comparison classrooms. In a post-graduate course for pharmacists, Black and Plowright  
13 (2010) exposed their students to a systematic reflective learning strategy and a written  
14 *reflective portfolio*. Next, they asked focus groups and individuals in an interview to reflect  
15 upon reflective learning, resulting in a multidimensional model of reflection. They argued that  
16 reflective learning is more complicated than usually described. In both cases it seemed that a  
17 model of reflection that the investigators already must have had in mind was used to reflect on  
18 the model of reflection that was under construction. It is a Socratic situation.  
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29 Table 2 classifies types of studies based on Linschoten's coupled systems, including an  
30 extended meretricious coupling (to be discussed below).  
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39 PLEASE INSERT TABLE 2 HERE  
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#### 45 *An Additional System: The Meretricious Coupling*

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49 In addition to the original set of five couplings, our analysis suggests a sixth one. In this  
50 situation, the participant's (or subject's) role (O) cannot be distinguished from the role of the  
51 psychologist (E), and the measurement (m) and response (r) have faded into the mind of the  
52 experimentalist/object as well. The psychologist as his/her own object, as it were, administers  
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3 his/her own stimulus (x) and has the response “in his/her head,” and designed the  
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5 measurement as well. As a name, we propose “the meretricious coupling.” We suspect that  
6  
7 the meretriciously coupled system relates to spurious coupling. The reflecting individual  
8  
9 actually plays two if not three roles: to be their own psychologist, to be their own object, and  
10  
11 to be their own judge of successful reflecting. In spurious coupling, two parties are involved,  
12  
13 the researcher and the client who wants to get the result of the study that he or she demanded;  
14  
15 in meretricious coupling, both parties are one and the same person. Figure 2 demonstrates the  
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17 spurious interdependency of meretricious coupling.  
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24 PLEASE INSERT FIGURE 2 HERE  
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32 Conceptually, this seems to be the basic problem if not paradox with reflection as a technique  
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34 for thinking about our own behavior, thinking, learning, and its improvement (in the eyes of  
35  
36 which beholder?). In the Cartesian situation, I can observe another’s behavior (but not their  
37  
38 inner experience), and they can observe my behavior (but not my inner experience). This  
39  
40 resolves the question of whether we deal with a knower who is open to the external world  
41  
42 (although it is internally represented), or with a self-contained knower, closed to the world,  
43  
44 for whom all things that seem real are the mere product of imagination and construction:  
45  
46 Descartes versus Vico, Popper versus Wittgenstein, Munz versus Rorty (Munz, 1984, 1985;  
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48 Rorty, 1980). Regardless of whatever insight we gain about ourselves, we can only be our  
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50 own judges of the validity of insight. In terms of objectivity, there is no way that for insight  
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52 and the test of its validity, traces of the knower can be removed or ignored.  
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3 Therefore, we cannot reasonably be sure that we are honest and reliable instruments for the  
4 assessment of the truthfulness of our reflections. Notwithstanding its personal worth and  
5 explorative value, all personal diaries, log books, and other journaling, blogging, and vlogging  
6 initiatives fit this meretricious coupling, at least whenever authors use them as arguments for  
7 the validity and reliability of reflection.  
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12 We consider it defensible that any attempt to design experiments that go deeper than  
13 looking at the effect of alleged reflection tasks will result in serious problems as soon as  
14 reflection is seen as a mental process in which words are used as definite indicators of inner  
15 thought processes. Experiments that report effects of what only roughly is indicated as  
16 “reflection” may demonstrate that *instructing* to reflect can *help*. They do not demonstrate  
17 that *reflection works*, let alone how it works. Many seem to claim to be effect studies but fail  
18 to be so and are at best calibration or self-calibration studies.  
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30 A way to approach this problem is to look at the opportunities offered by triangulation,  
31 for instance with neuropsychological data. It is not our aim to study brain processes during  
32 mental activities to find the exact spot where reflection is located. However,  
33 neuropsychological evidence can help to validate whether or not an alleged mental process  
34 corresponds with a related brain process (Wegner, 2002). We discuss this approach in the next  
35 section.  
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### 45 **Implications**

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48 From the above we can conclude that the concept of reflection can have many different  
49 meanings and interpretations. Is reflection considered thinking? Is it conscious thinking? Or  
50 thinking about consciousness? Consciousness of what (DaSilveira, DeSouza, & Gomes,  
51 2015)?<sup>4</sup> Does reflection occur intentionally, and if it does, to what extent should we consider  
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3 it truthful if it concerns only conscious and intentional thinking? How do we manage self-  
4  
5 bias? Is the scope of reflection restricted to actions rather than to thinking?  
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7         The objects of reflection, and especially the self as object, are often subject to  
8  
9 discussion. Reflection is doubted as a reliable source of representing reality, including one's  
10  
11 own place in reality. Most of our cognitive processes are inaccessible to consciousness. Since  
12  
13 there are, for now, no means of observing the contents of personal thought independently of  
14  
15 thought, the self-reflecting person is trapped in a reflexive paradox. This includes the  
16  
17 psychologist and results in considering reflection to be a state of mind where attitudes and  
18  
19 intentions are invented as explanations of one's behavior during events or phases one  
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21 happened to participate in. It results in a self-constructed story.  
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### 27 **Research Program on Reflection**

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31 To overcome the problems of the self-implicated nature of reliable and valid psychological  
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33 knowledge about reflection, and the “meretriciousness” of reflection, we will now briefly  
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35 suggest additional ways to investigate the true nature of reflection. The actual issues are  
36  
37 twofold: (a) does the participant really reflect on his/her focal problem and (b) what processes  
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39 are involved in reflection?  
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47 PLEASE INSERT FIGURE 3 HERE  
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54 Based on Linschoten's coupled systems, we suggest an “ideal” research design, consisting of  
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56 multiple research waves. The first wave involves a basic research design that refers to coupled  
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3 system 1. Next, subsequent waves serve to separately validate Linschoten's coupling elements  
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5 X, O, r, m, and E. As such, coupled system 1 is more or less "quintangled" to arrive at an  
6  
7 ideal design for a research program in which each separate element is controlled for. For  
8  
9 instance, the reflective task or prompt (x) is compared with a self-reflective task—asking the  
10  
11 participant to suggest a relevant question for him/her to start reflecting (cf. content validity).  
12  
13 Participants' (O) consequent and unadulterated responses to the reflective and self-reflective  
14  
15 tasks are checked by means of combining intentional verbal responses with unintentional  
16  
17 physical responses (cf. criterion validity). To validate participants' responses (r) in itself,  
18  
19 comparisons with "relevant others," for example, friends and relatives (cf. 360-degree  
20  
21 feedback) as well as between cultures could be helpful. With regard to measurement (m),  
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23 combination of multiple methods such as fMRI (e.g., what are the active brain parts), eye-  
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25 tracking (e.g., selective and first attention), and verbal responses (e.g., self-reports, diaries)  
26  
27 could be informative. Finally, the activities of the researcher or experimenter (E) are validated  
28  
29 by testing his/her interpretations and first focus (e.g., eye-tracking of reading fMRI results) in  
30  
31 relation to other relevant researchers (cf. inter-encoder or interrater reliability).  
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36 For time, access, and budget restrictions, a research design containing five waves may  
37  
38 be Utopian in itself. However, each wave addresses subsequent questions<sup>5</sup> that are necessary  
39  
40 to answer in order to disentangle reflection. Even a triple wave design using fMRI or PET  
41  
42 scans can help to avoid some of the pitfalls and biases that impair many studies on reflection.  
43  
44 For instance, being involved in a reflective task, research participants could be shown a  
45  
46 photograph expressing a universal emotion. Next, participants' immediate responses could be  
47  
48 traced by measuring a physiological response (fMRI), signal first attention (eye-tracking), and  
49  
50 asking for a comment (interpretation). This would help researchers detect becoming aware of  
51  
52 the activities involved in reasoning about a certain human emotion. To investigate a self-  
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54 reflective task would involve another wave in which participants are invited to feedback on  
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3 their own behavior. For instance, participants could be asked to describe and explain their  
4 emotions when seeing the photograph. Additionally, they could be encouraged to suggest  
5 some reflective questions themselves, which in their mind would help to make sense of the  
6 photograph.  
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11 Although it is not our aim to find the location of the “organs” of reflection (if they  
12 exist at all), we hypothesize that there are processes involved in reflection that differ from, for  
13 example, “mere” thought or problem-solving. To investigate, two elements must be observed.  
14 One concerns the nature of the “experimental task,” the other the probable nature of reflection  
15 as a Socratic dialogue.  
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23 Traditionally, the approach has been to ask the participant to reflect on a certain  
24 problem and report the results. Concerning the experimental task, we suggest that the  
25 approach taken long ago by Shepard (1982) and Shepard and Cooper (1986) to present  
26 participants with a binary imagery problem and ask for the right interpretation, can act as an  
27 example. Shepard and Cooper presented their participants briefly with a 3D block structure,  
28 and next again briefly with a rotated version of it, or with a rotated and mirrored version.  
29 Participants were to answer the question whether or not the second one was the mirrored  
30 version of the first one. The experimenter’s measurement was whether the participant had it  
31 right, which lead to an unequivocal conclusion: Does he/she use mental imagery effectively or  
32 not? Transposing this to the reflection problem would lead to experiments in which the  
33 participants are asked to use reflection to “solve” a problem with two possible answers, one of  
34 which the experimenter knows is right. Similarly, regarding the task used by Livengood et al.  
35 (2010), who presented participants with mathematical problems from the Cognitive  
36 Reflectivity Test developed by Frederick (2005), it could be argued that this involves not so  
37 much reflection, but mere problem-solving or thought. To deal with that, we would like to  
38 suggest several comparisons. One comparison is between fMRI scans of participants’  
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3 activities while solving mathematical problems from the Cognitive Reflectivity Test and  
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5 fMRI scans of participants' activities answering the following question: "Think of what  
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7 questions the researcher should ask you to establish what you are considering when reflecting  
8  
9 on a subject of your own choice." The latter question is an open question. However, it  
10  
11 prevents the criticism that participants do not reflect but only solve the problem of what to say  
12  
13 when the experimenter asks to reflect about a specified subject. It is our impression that a  
14  
15 question like this invites true reflection. Additionally, we suspect that the comparison of the  
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17 fMRI scans of both tasks indicates different brain processes that might be involved in  
18  
19 reflection other than mere thought or problem-solving, thus giving the opportunity to check  
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21 on "real" reflective activity.  
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24  
25       Though very difficult to realize, another more complicated way to study the  
26  
27 phenomenon allows answers to some deeper questions. In the meretricious coupling situation,  
28  
29 the supposed subsystems of experimenter and participant are not independent but coupled  
30  
31 systems, as they are in an experimental situation. Actually, experimenter and participant are  
32  
33 one and the same person. In philosophical terms, this is the reflection situation in optima  
34  
35 forma. With an open attitude, and with every self-inspired question to ask oneself, an honest  
36  
37 and fair answer is possible. However, psychologically speaking, there are many reasons why  
38  
39 this will not result in honest and fair answers. The temptations of self-protecting and self-  
40  
41 indulging answers, let alone self-implicating biases and self-betrayal, are unavoidable.  
42  
43 Following the interesting suggestions made by D'Argembeau et al. (2005), our suggestion is  
44  
45 to investigate the involvement of the ventromedial prefrontal cortex (vmPFC) in meretricious  
46  
47 coupling. That is, the experimenter/participant should be followed during the whole process  
48  
49 (or all phases of the process) involved in reflection. The reason for this is that on the one  
50  
51 hand, it appears necessary to gain insight into the reflection process as a whole from self-  
52  
53 posed questions to self-given answers, and on the other hand to control for self-serving biases.  
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3 Technical and practical problems provided, we think these are what conceptually seem to be  
4 necessary steps. It gives room for the phenomenologically or philosophically suggested  
5 typical features of reflection, while it constrains the experimental situation sufficiently to  
6 provide reliable and valid answers.  
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## 11 12 13 14 **Caveats and Conclusions**

### 15 16 17 18 *Reflection on Reflection*

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23 One caveat that can be made to our suggestions is that reflection has been given many  
24 meanings. As one reviewer of our original manuscript adequately remarked, reflection and  
25 self-reflection should be distinguished. Of course, the reviewer is right. However, we think  
26 there is no fundamental difference. Both involve the self as the locus or subject of a reflection  
27 as well as the object or focus of the reflection. One could reflect on, say, the sentence, “Even  
28 the president of the United States sometimes must have to stand naked” (Dylan, 1965, 7th  
29 stanza, Lines 5-6), but this would only be called reflection if it involves the self's own inner  
30 experiences with that sentence. If not, it would be called, perhaps, critical thinking or artistic  
31 interpretation. It naturally implies that reflection always involves a reflecting person's  
32 thoughts and other experiences. “The self” cannot be the focus of a reflection other than,  
33 either, the word self (in which case it is a thought of a person about a word), or of the self (in  
34 which case it is a thought of a person about a person that happens to have the same identity).  
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50 The first case is trivial, the second probably impossible.

### 51 52 53 54 *Blind Spot (Reflective Paradox) of Psychology*



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3 Another caveat concerns the reflective paradox of psychology or what could be called its  
4  
5 blind spot. Indeed, as William James (1890) identified as “the great snare of the psychologist”  
6  
7 (p. 196), it is easy for psychologists to confuse what their participant thinks with what the  
8  
9 psychologist thinks. When I see a hole somewhere under a tree, it is easier for the  
10  
11 psychologist to think that their participant also sees a rat hole, if the psychologist knows about  
12  
13 rats and their holes (as many of them seem to do). It is the blind spot of the psychologist to  
14  
15 not realize that his or her participant might just see a rabbit hole. Again this includes what can  
16  
17 happen in reflection research: Is it reflection in the eye of the beholder or in the eye of the  
18  
19 psychologist?  
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#### 25 *Socrates' Slave and Socrates' Self*

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29 Having found multiple problems at several levels in studies of reflection, we conclude that a  
30  
31 more thorough understanding of the conceptual problems involved in reflection is needed.  
32  
33 Our analysis suggests that reflection could still be seen as a substitute dialogue with another  
34  
35 person. The psychology of reflection might be inspired by methods used for a century or more  
36  
37 in penal law. Asking a person to self-reflect with the possibility that a third person might “fact  
38  
39 check” all assertions might help to unravel the methodological and conceptual knots  
40  
41 psychology is in. It would be of key value for attaining positive results.  
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45 Another inspiration might be found in the way the use of mental imagery is tested by  
46  
47 presenting participants with two-choice questions about 3D structures (Metzler & Shepard,  
48  
49 1982; Shepard, 1982). It would resemble the Socratic method, though not so much as a  
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51 rhetorical device, but as a forced choice designed to check true reflectivity.  
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3 A different approach will come from neuropsychology. We do not suggest that  
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5 reduction of neurological events gives definite answers. Nevertheless, neurological evidence  
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7 can help to control for claims about the relationship between behavior and internal intentions,  
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9 reflected or otherwise.  
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11 In general, claims that reflection helps to improve action by learning to better respond  
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13 to complex situations could benefit from triangulation, if not quadrangulation or  
14  
15 quintangulation, of methods that are insufficient on their own. Reflection as an inner  
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17 argument needs anchor points to reality. As in law, stories of what happened (who did what,  
18  
19 why did he do it, is it punishable behavior?) need anchor points for a judge or jury to decide  
20  
21 on prosecution.  
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24 Overall, we suppose that reflection is truly Socratic. Superficially, it resembles a  
25  
26 dialogue and could be called discursive, as suggested elsewhere (Larrain & Haye, 2012). On a  
27  
28 deeper level, we suggest that reflection resembles the actual content of what Socrates  
29  
30 presented to the docile slave. Socrates gave him rhetorical questions, that is, answers phrased  
31  
32 as questions to which the obedient slave could only answer with a “yes” or, depending on the  
33  
34 question, with a “no.” The slight difference with the “real” Socrates is that our inner Socrates  
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36 cannot avoid any demand characteristics (Orne, 1962), and that our inner slave has a self-  
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38 interest in the answer.  
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### Author Biographies

INGE VAN SEGGELEN - DAMEN is an assistant professor of Work and Organizational Psychology at the Open University of the Netherlands. She received her Ph.D from Organization Studies at Tilburg University. Her research interests include reflection and reflective questioning, rumination, career and talent management, and self-organization.

ADDRESS: Faculty of Psychology and Educational Sciences, Open University of the Netherlands, NL-PO Box 2960, 6401 DL, Heerlen, the Netherlands. Email: [inge.vanseggelen@ou.nl]

RENÉ VAN HEZEWIJK is an Emeritus Professor of Psychology, and Emeritus Dean of the Faculty of Psychology and Educational Sciences at the Open University of the Netherlands. He has published on a variety of subjects in the theory and history of psychology, evolutionary psychology, and theories of perception and cognition. He has an interest in matters of philosophy of science in relation to psychology, especially where the metaphysical cores and heuristics of its research programs are concerned, into historical backgrounds of the role of evolutionary thinking in psychology, and into the relation of mind to culture. He was co-editor of three volumes of proceedings of ISTP conferences He was the Editor of the *Nederlands Tijdschrift voor Psychology*, and the Editor of the *Netherlands Journal of Psychology*. He was Co-president Europe as well as Treasurer of the ISTP in the nineteen nineties. With Henderikus J. Stam as a co-author, he is currently writing a biography of Johannes Linschoten (Van Hezewijk & Stam, 2008).

ANNE HELSDINGEN works as project manager for massive open online courses at the Center for Digital Education at EPFL in Lausanne. Anne has a PhD in educational psychology. She has 20 years of experience in human factors research, training and training

1  
2  
3 development, academic teaching and (research) management. ADDRESS: CEDE Ecole  
4  
5 polytechnique fédérale de Lausanne, RLC D1 740, Station 20, CH-1015 Lausanne,  
6  
7 Switzerland. Email: [annechien.helsdingen@epfl.ch]  
8  
9

10  
11 IWAN WOPEREIS is lecturer and PhD candidate in educational sciences at the Open  
12  
13 University of the Netherlands. His research interests are in instructional design, information  
14  
15 literacy, and creativity. ADDRESS: Faculty of Psychology and Educational Sciences, Open  
16  
17 University of the Netherlands, NL-PO Box 2960, 6401 DL, Heerlen, the Netherlands. Email:  
18  
19 [iwan.wopereis@ou.nl]  
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## 24 25 End Notes

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28 <sup>1</sup> Linschoten's Christian name was "Johannes." In everyday life he liked to be called  
29  
30 "Hans" which is the usual abbreviated form of "Johannes" in Dutch. In the text we refer to  
31  
32 "Hans" and in references we use the name Johannes. In his publications he used either  
33  
34 "Johannes" or "Prof. dr. J. Linschoten." However, the American translation of his volume on  
35  
36 William James, published after his death, used "Hans."  
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39 <sup>2</sup> For more information about Linschoten's study see Van Hezewijk & Stam (2008).

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41 <sup>3</sup> Note that "idols" is used here in the Baconian sense of obstacles facing humans to  
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43 find truth about nature. Bacon suggested idols were the unintended consequence of our  
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45 language, of the market, tribe, etc.  
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49 <sup>4</sup> We would like to follow the phenomenologist observation that consciousness is not a  
50  
51 function that can be studied in and of itself; consciousness is always about something. We  
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53 cannot go into further detail here. The reader could refer to Linschoten's study of the work of  
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55 William James (Linschoten, 1968).  
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<sup>5</sup> The accompanying research questions may be too simple, but must more or less

involve:

x: What is the object of reflection? What initiates the reflection process?

O: What (who) is the subject of reflection?

r: How do (effects of reflection) manifest themselves?

m: What cues can be taken to refer to the reflection processes? What physical and mental processes and/or effects can be observed? How do we (researchers) define and operationalize reflection? How do researchers cope with the subjectivity and selectivity of own interpretations?

E: Who controls the spectator (see Davis & Klaes, 2003) that observes reflection by another subject? Additionally, how do the spectator and the reflecting subject relate to one another? How do we demarcate the research design, to avoid endless relativity?

Table 1

*Selected Studies on Reflection and Inclusion Criteria*

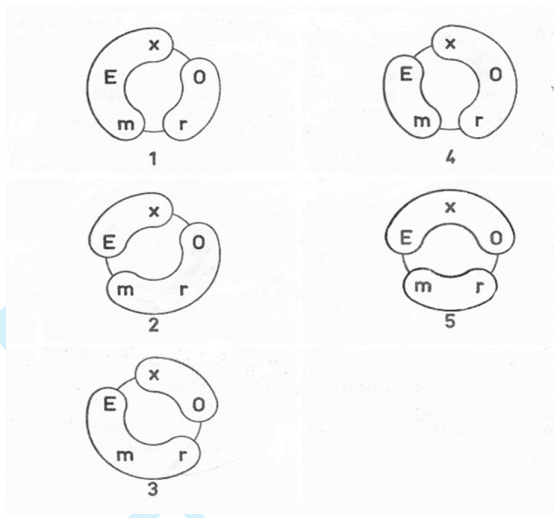
Author	Journal	Method	Reflection Stimulus		Intervention Technique	
1. Anseel et al. (2009)	Organizational Behavior and Human Decision Processes	Experiment	Feedback	F	Coached reflection	C
2. Bruno et al. (2011)	European Journal of Psychology of Education	Qualitative study (Content analysis)	Become a trainer "for a day"	P	Writing a personal journal	J
3. D'Argembeau et al. (2005)	NeuroImage	PET, (f)MRI	Focus mental activity on specific topics	S	Reflective tasks	TP
4. Davis & Klaes (2003)	Journal of Economic Methodology	Essay/ Literature review	There is more than one possible strategy to respond to the various dimensions of reflexivity.	E	Considered as phenomenon rather than intervention technique	TP
5. Grant et al. (2002)	Social Behavior and Personality	Survey	Journal of diary keeping	S	Questionnaire	SR
6. Gürtner et al. (2007)	Organizational Behavior and Human Decision Processes	Experiment	Training by means of guided reflection: team-based military air-surveillance task	P	Reflexivity intervention	TP
7. Jordan (2010)	Management Learning	Qualitative study (Ethnography, narrative)	Explicit and indirect reference to diversity and the necessity of asking questions Monthly rotation Interactive on-the-job training Alternation of	P	Question routinized ways Interactive practices	C

			peripheral and full participation (learning-by-doing) Case-based teaching Emphasis on reconstructing abstracted rules			
8. Kember & Leung (2000)	Assessment & Evaluation in Higher Education	Survey	Class evaluation	F	Questionnaire	SR
9. Larrivee (2008)	Reflective practice	Survey	Emotionally supportive learning climate Mediation processes	F	Prompts Journaling Non-judgmental questioning	J
10. Livengood et al. (2010)	Philosophical Psychology	Experiment	Personality, Philosophical training	P	Cognitive reflection test	SR
11. Lyke (2009)	Personality and Individual Differences	Experiment	Psychotherapy	E	Questionnaire	SR
12. Mann et al. (2009)	Advances in Health Sciences Education	Essay/ Literature review	Awareness of a need or disruption in usual practice Anticipatory phase Appropriate supervision Novel or challenging situations Intellectually and emotionally supportive environment	P F	Observational methods Analytical methods	SR C
13. Masui & De Corte (2005)	British Journal of Educational Psychology	Experiment	Training	P	Questionnaire	SR
14. Procee (2006)	Educational Theory	Essay/ Literature review	Reflection partners Exercise Empathy	P	Intelligence (Kant's Verstand) Judgment	TP

					(Kant's Urteilkraft)	
15. Rogers (2001)	Innovative Higher Education	Essay/ Literature review	Coaching Uncertainty	E	Journaling Role modeling Use of questions Critical incidents	J
16. Schippers et al. (2007)	Applied Psychology: An international review	Survey	Team work	E	Questionnaire	SR
17. Trapnell & Campbell (1999)	Journal of Personality and Social Psychology	Survey	Self-focus	S	Questionnaire	SR
18. Van Woerkom & Croon (2008)	Personnel Review	Survey	Experience	P	Questionnaire	SR

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Figure 1. Five ways that an experimenter, his instruments and his participant can be coupled. See text for explanation.



Peer Review



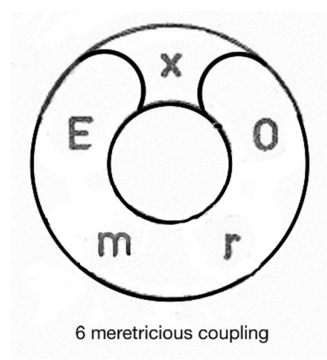
Table 2

*Classification of Empirical Studies on Reflection, Based on Linschoten's Coupled Systems, with One Added by the Present Authors*

Coupled System	Researcher Influences the Experimental Intervention X	Participant Influences Response R	Measurement's Function
1 The experiment	Yes	Yes	Researcher tests effect of intervention
2 Calibration	Yes	Yes	Researcher tests validity of measurement
3 Self-calibration	No	Yes	Researcher tests validity of his/her own interpretation
4 Measurement	No	No	Researcher measures an external, non-controlled for effect
5 Spurious coupling	Yes	No	Researcher intervenes and measures to obtain a wanted result
<i>Addition:</i> 6 Meretricious coupling	No	Yes	Researcher = participant

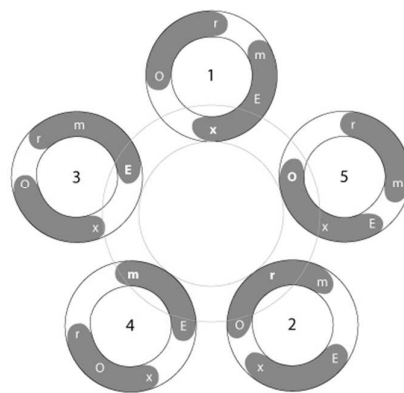
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Figure 2. Meretricious coupling #6 (inspired by Linschoten, 1964).



For Peer Review

Figure 3. "Ideal" research design in which coupled system 1 is "quintangulated."



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