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RUNNING HEAD: DEFINING IMPLICIT MEASURES

How to define and examine the implicitness of implicit measures

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In less then a decade, implicit measures of attitudes, stereotypes, and other cognitive constructs have become popular in research disciplines as diverse as social, clinical, health, personality, and consumer psychology. Several types of implicit measures have been developed, including reaction time based tasks such as the affective priming task (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Fazio, Jackson, Dunton, & Williams, 1995), the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), and the (extrinsic) affective Simon task (De Houwer, 2003; De Houwer & Eelen, 1998). Despite the popularity of these tasks, it is often not clear what it means to say that a measure is implicit. In this chapter, we start from the definition of implicit measures that was recently provided by De Houwer (2006) and will try to make this definition more precise by linking it with the analysis of the concept automaticity that we recently proposed elsewhere (Moors & De Houwer, 2006). In doing so, we will try to make clear how the term implicit measure is linked to a variety of features of automatic processes and explain how these features can be examined in order to test the implicit nature of measures.

Implicit measures as automatically produced measurement outcomes

The definition of implicit measures that De Houwer (2006) provided originated from the insight that the term measure can refer either to a measurement procedure or to a measurement outcome. Take the example of measuring how much someone weighs. There are several possible procedures for achieving this, one of which is to ask the person to step onto a weighing scale and to read the value that appears on the scale. One can say that this particular course of action constitutes a measure of weight. In this sense, the concept measure thus refers to a procedure, that is, to a specific set of guidelines about which actions to take. Following a measurement procedure generates a measurement outcome, for example, a

numerical value of weight in terms of pounds or kilograms. One can also say that such a numerical value is a measure of weight. In that sense, the term measure refers to a measurement outcome.

The same analysis holds for measures of cognitive constructs such as attitudes. The term attitude measure can refer to a procedure such as a particular questionnaire or reaction time task or it can refer to the outcome of a procedure. Take the example of a racial IAT (e.g., Greenwald et al., 1998). As a procedure, this involves giving instructions to participants, presenting certain stimuli in a certain manner, and registering and transforming reaction times in a certain way. When one says that the racial IAT is a measure of racial attitudes, it thus refers to the fact that the racial IAT is a set of guidelines that can be followed in order to obtain an estimate of racial attitudes. On the other hand, one can also say that the outcome of the IAT procedure (e.g., a difference between reaction times in the compatible or incompatible block or a *d* value as calculated according to the guidelines of Greenwald, Nosek, & Banaji, 2003) is a measure of racial attitudes. Hence, the score on a racial IAT is a measurement outcome that is assumed to reflect racial attitudes.

De Houwer (2006) argued that it does not make sense to use the adjective implicit when the concept measure is understood as a measurement procedure. There is nothing implicit about a measurement procedure because it is simply an objective set of guidelines about what to do. [1] It is, however, meaningful to use the adjective implicit in the context of measurement outcomes. A measurement outcome is meant to reflect a certain construct as weight or attitudes. It can only do so by the virtue of processes by which the to-be-measured construct is translated into the outcome. For instance, the value on a weighing scale reflects the weight of the person because of certain physical and mechanical processes such a gravity

and resistance. Likewise, if someone's score on a racial IAT reflects the racial attitudes of that person, it can only be because there are certain processes by which the actual attitude is activated and somehow influences reaction time performance and thus the IAT score. De Houwer (2006) argued that the concept implicit measure actually refers to the idea that the processes by which the to-be-measured construct is translated into the measurement outcome have certain features, that is, that they operate under certain conditions. For instance, one can say that a measure of racial attitudes is implicit because the measurement outcome reflects the racial attitudes even though participants are not aware of the fact that they possess those attitudes, do not realize that the measurement outcome reflects those attitudes, or have no control over the fact that or degree to which the measurement outcome reflects their racial attitudes. Put more precisely, this means that the processes that translate the racial attitude into the measurement outcome operate even when participants are not aware of the attitude, even when they do not realize that the outcome reflects racial attitudes, or regardless of efforts to control the outcome of those processes. Based on these considerations, we can thus provide a first approximate definition of the concept implicit measure: *An implicit measure is a measurement outcome that reflects the to-be-measured construct by virtue of processes that have certain features.*

As De Houwer (2006) pointed out, this definition has clear implications for how the concept implicit measure should be used and understood. First, the concept has little or no meaning if one does not specify the features to which one is referring. For instance, rather than saying that an IAT score *is* an implicit measure, one needs to specify *in which sense* the IAT score is an implicit measure. For instance, one can say that racial IAT scores provide an implicit measure of racial attitudes in the sense that participants have little control over these

scores (and thus over the processes by which the racial attitudes are translated in the IAT scores). Second, one cannot merely claim that a measurement outcome is implicit in a certain sense, one also needs to provide evidence that the measurement outcome is implicit in that sense, or more precisely, that the processes underlying the measurement outcome do possess those features. For instance, before one can claim that scores in a racial IAT provide an implicit, in the sense of uncontrolled, measure of racial attitudes, one first needs to demonstrate that participants indeed do not intentionally produce a certain score (see Steffens, 2004, for some recent evidence).

Although the definition of implicit measure that we provided above already has important implications, it is obviously limited in that it does not specify which features can be considered as typical of implicit measures. De Houwer (2006) noted that the term implicit if often regarded as synonymous to unconscious. When implicit is understood in this manner, one could argue that only features related to consciousness (e.g., of the to-be-measured construct, of the fact that the outcome reflects the to-be-measured construct, and of the processes by which the construct is translated into the outcome) should be taken into account when defining implicit measures. However, in the existing literature, features that are not related to consciousness have also been mentioned as typical of implicit measure. For instance, measurement outcomes have been described as implicit in the sense that participants have little control over (the processes underlying) them. In order to solve this issue, De Houwer (2006) suggested to regard the concept implicit as a synonym for the concept automatic. The concept automatic is typically defined in terms of a set of features that includes features related to consciousness, but also other features such a uncontrolled, unintentional, efficient, and fast. Moreover, the term automatic and its features are commonly

used to describe the nature of processes. Hence, the term and its features can also be used to characterize the processes that underlie measurement outcomes. Finally, there is a long tradition of theorizing and research on (the features linked to) automaticity. Linking research on implicit measures with this tradition can therefore provide many new insights into the nature of implicit measures.

If one accepts the proposal that implicit should be understood as synonym for automatic, then the definition of implicit measures can be further specified as follows: *An implicit measure is a measurement outcome that reflects the to-be-measured construct by virtue of processes that have the features of automatic processes*. However, this definition leaves unanswered the question of which features are typical for automatic processes, what those features exactly mean, how they are related to each other, and how they can be examined. De Houwer (2006) sidestepped this issue and thus left a large degree of ambiguity in his definition of implicit measures. In the present chapter, we will try to remove this ambiguity by drawing on the conceptual analysis of automaticity that we recently put forward (Moors & De Houwer, in press). In the next part of this chapter, we will briefly summarize this analysis. In the third and final part, we will then discuss the implications of this analysis for the definition of and research on implicit measures.

A conceptual analysis of automaticity

To say that a process is automatic implies that the process can operate under certain conditions. To say that a process possesses a particular feature of automaticity means that it operates under one particular subset of those conditions. One historically important view on automaticity is that there are two sets of mutually exclusive processes, one being non-automatic or controlled processes and the other being automatic processes. According to this

view, which is known as the all-or-none view of automaticity, all non-automatic processes have the same features (i.e., occur only when certain conditions are fulfilled) whereas all automatic processes have the opposite features (i.e., can occur when those conditions are not fulfilled). Features that have been attributed to non-automatic processes are conscious, intentional, controlled, effortful, and slow. Typically, these features are meant to refer to the fact that these processes operate only when people are conscious of them and have the intention to engage in these processes, that the operation of the process can be controlled, and that the operation of the processes depends on the availability of cognitive resources and time. Automatic processes on the other hand, have been characterized as unconscious, unintentional, uncontrollable, effortless, and fast, meaning that they operate even when people are not conscious of the processes and do not have the intention to engage in these processes, that the operation of the processes cannot be controlled, and that the processes operate even when cognitive resources are scarce and time is limited.

It has become clear, however, that this all-or-none view is incorrect. Studies have demonstrated that most processes posses features typical of non-automatic processes but also features typical of automatic processes. Evidence from Stroop studies, for instance, suggests that the processing of word meaning is automatic in that it does not depend on intention, resources, or time, but at the same time occurs only when attention is directed toward the word (see Logan, 1985, 1989, for a review). This and other evidence led Bargh (1989, p. 7) to the conclusion that "all automaticity is conditional; it is dependent on the occurrence of some specific set of circumstances. A cognitive process is automatic *given* certain enabling circumstances, whether it be merely the presence of the triggering proximal stimulus, or that plus a specific goal-directed state of mind and sufficient attentional resources".

An important implication of this conclusion is that one cannot simply characterize a process as automatic or non-automatic. Rather, it is necessary to always specify the sense in which a process is automatic, that is, to specify which automaticity features it possesses and which automaticity features it does not posses. Hence, one needs to adopt a decompositional, feature-based approach of the concept automaticity. Although there are some alternative approaches (e.g., Logan, 1988), it is now widely accepted that a decompositional approach is necessary in order to diagnose whether a process or a certain behavior is automatic (see Moors & De Houwer, in press, for a detailed justification of this claim). However, a decompositional approach makes sense only if it is clear what the different automaticity features are and only if these features can be clearly defined and conceptually separated from each other. In our recent paper on automaticity (Moors & De Houwer, in press), we considered a variety of features and argued that most of them can indeed be characterized in such a manner that the overlap between them is minimal. We will now summarize our definitions of the automaticity features.

Many features such as (un)intentional, goal-directed, goal-(in)dependent, (un)controlled/(un)controllable, and autonomous, are somehow related to goals. A overview of the goal-related features and their definitions can be found in Table 1. Perhaps the most central of these is the feature *controlled*. To say that a process is controlled, implies that one has a goal regarding the process (i.e., the goal to engage in, alter, stop, or avoid the process) and that having this goal actually causes the achievement of the end state put forward in the goal (i.e., the actual occurrence, change, interruption, or prevention of the process). To say that a process is *uncontrolled* can have different meanings. It can refer to the fact that the state of a process alters (i.e., that the process occurs, changes, is interrupted) in the absence of a

goal to achieve this alteration. But it can also refer to the fact that one has a certain goal but the desired effect does not occur. For instance, a process can be called uncontrolled in the sense that the process occurs even when the goal to prevent the occurrence of the process is present. A more subtle meaning of the term uncontrolled refers to a situation in which both the goal and the desired effect are present, but in which the effect was not caused by the goal. Imagine that you have the goal to kneel down in front of your loved one in order to propose marriage. Suppose that you do kneel down not because of your goal but because you are pushed by someone who happens to pass by . In this case, both the goal and the desired effect are present, but it would be wrong to regard this act as controlled because the goal did not cause the desired effect. Hence, the act is uncontrolled. Note that labeling a process or act as controlled thus requires a demonstration of causality, something which might not always be easy to achieve.

Several other goal-related features are closely related to the feature (un)controlled. To say that a process is *intentional* means that one has the goal to engage in a process and that this goal results in the occurrence of the process. Hence, intentional is identical to controlled in the sense of the goal to engage in (rather than the goal to alter, stop, or avoid the process). Intentional processes are thus a subset of controlled processes. Likewise, *unintentional* processes are a subset of uncontrolled processes. Like the concept uncontrolled, unintentional can refer to a variety of situations. It can refer to the fact that the process occurs without the intention to engage in the process, that the goal to engage does not lead to the engagement of the process, or that there is a goal to engage in the process and the process occurs but not because of the goal.

The feature *autonomous* also refers to process-related goals. Moors and De Houwer

(in press) defined autonomous as uncontrolled in terms of every possible processing goal. A process is autonomous when its occurrence does not causally depend on the goal to engage in the process (i.e., is unintentional or uncontrolled in the sense of the goal to engage in) and when the goal to alter, stop, or avoid the process does not result in a change, interruption, or prevention of the process (i.e., uncontrolled in the sense of the goals to alter, stop, or avoid the process). In other words, one can say that an autonomous process is a process that is uncontrolled in every possible sense.

Another feature that is closely related to (un)controlled is the feature goal-(in)dependent. The main difference is related to the type of goals. Whereas (un)controlled processes are defined in terms of goals related to various aspects of the process itself (i.e., the proximal goals of engaging in, changing, stopping, or avoiding the process), goal-(in)dependent processes are defined in terms of any possible goal, including goals that are not related to the process at hand (i.e., remote goals). Moreover, goal-(in)dependence refers only to conditions under which the process occurs, not to conditions necessary for changing, stopping, or avoiding the process. A process is *goal-dependent* when the occurrence of the process depends on the presence of (any type of) goal. For instance, the act of moving one's arm towards an apple may depend on the goal to eat an apple. It is possible that the act of moving the arm is as such not caused by the (conscious or unconscious) proximal goal to move the arm (and can therefore be regarded as unintentional or uncontrolled in the sense of engaging in that act) but the act is goal-dependent in that its occurrence does depend on the remote goal to eat an apple. Goal-dependent processes are thus not necessarily intentional or controlled (because their occurrence may depend on goals other than those related to engaging in a process), but intentional processes are by definition goal-dependent.

Unintentional processes are, however, not necessarily goal-independent. That is, the occurrence of the process might not causally depend on the goal to engage in the process (i.e., be unintentional) but might still depend on other goals. A process is *goal-independent* only when its occurrence does not causally depend on the presence of any type of goal.

A subclass of goal-independent processes are *purely stimulus-driven* processes. These are processes that in addition to being goal-independent (i.e., do not causally depend on any type of goal), also do not depend on other factors such as awareness or attention. The occurrence of these processes depends only on the presence of a stimulus and certain basic conditions which ensure that the stimulus can be physically registered (e.g., in case of visual stimuli, that the eyes are not closed). It should be clear from the above that it is difficult if not impossible to demonstrate that a process is entirely goal-independent or purely-stimulus-driven. The best one can do is demonstrate that the process does not depend on certain remote goals or enabling conditions and make these goals and conditions explicit when describing the process as goal-independent or purely stimulus-driven.

Now that we have discussed all goal-related features, we can turn our attention to the features *conscious* and *unconscious*. It is notoriously difficult to define the concepts conscious and unconscious, which is one of the reasons why we do not like to put these features at the heart of our definition of automatic or implicit. But if one does want to use these features when characterizing processes, it is crucial to specify what is considered to be conscious or unconscious because these features can be used as a predicate of several things. They can be applied to (a) the stimulus input that evokes the process, (b) the output of the process, (c) the process itself, or (d) the consequences of the process such as its influence on subsequent processing (e.g., Bargh, 1994). Therefore, when using the term unconscious, one

needs to specify what it is a predicate of.

It is important to note that there is no complete overlap between the feature (un)conscious and goal-related features. For instance, it might seem reasonable to assume that all intentional processes are conscious in the sense that one needs to be conscious of the goal to engage in the process. However, recent research has convincingly demonstrated that unconsciously activated goals to engage in a process can also be causally effective. The same is true for other process-related goals. Hence, one can have an intention or control without being aware of it. It is therefore important to clearly distinguish between the feature (un)conscious and goal-related features. One way to do this is to use the term (un)conscious as a predicate of goal-related terms such as intentional and controlled. For instance, when a process occurs only in the presence of the conscious goal to engage in the process, the process needs to be described as consciously intentional rather than as simply intentional.

Another correlate of automaticity is the feature *(non)efficient*. A process is defined as efficient when it consumes little or no processing resources or attentional capacity. Efficiency leads to the subjective experience that processing is effortless. Because of this, the terms efficient and effortless have often been used interchangeably. Again there is no complete overlap between efficiency and goal-related features or consciousness. Whereas goals are related to the *direction* of attention (goals may determine the focus of attention), efficiency is related to the *amount* of attention. Likewise, although attention and consciousness are closely linked, some authors have suggested that there is a phenomenal aspect or type of consciousness that can occur outside of the focus of attention (Block, 1995). Moreover, some evidence suggests that unconscious processing also depends on attention (e.g., Naccache, Blandin, & Dehaene, 2002).

The final features that we will consider are the features fast and slow. These can be used to refer either to the duration of the process or to the duration of the stimulus input on which the process operates. These features are clearly gradual. There is no objective threshold for calling something fast or slow, so investigators need to rely on common sense arguments for calling some interval short or long or for deciding whether a process is fast or slow. There is a clear link between the features fast and other features. Processes that are efficient are typically faster than non-efficient processes. Some researchers even consider processing speed as evidence for efficiency (e.g., Smith & Lerner, 1986). Likewise, awareness of the process and of the stimulus input is related to the duration of the process and the input respectively. Some processes occur to quick to allow for awareness. Some stimuli are presented so briefly that one cannot perceive them consciously. Finally, the duration of the process or stimulus input may also have an effect on the (conscious) implementation of goals and thus on the features intentional and controlled. Certain stimulus durations are so brief that they prevent the implementation of the goal to engage in some process, and certain processes occur so rapidly that they cannot be altered or stopped. Despite the overlap among the features fast and these other features, it is very difficult to set a priori time intervals that prevent processing goals or consciousness to take effect. This may be especially difficult considering that the factors time, attention, and intensity (of stimulus input or process) may be interrelated. For example, higher levels of attention and/or stimulus strength (salience) may compensate for short stimulus durations.

Applying the conceptual analysis to the definition and characterization of implicit measures

Based on our conceptual analysis, we can now define implicit measures as

measurement outcomes that reflects the to-be-measured construct by virtue of processes that are uncontrolled, unintentional, goal-independent, purely-stimulus-driven, autonomous, unconscious, efficient, or fast. When claiming that a measure is implicit, one needs to (a) specify that the measurement outcome is based on processes that possess one or more of these features, (b) do this in a manner in which the exact meaning of the specified features is made explicit, and (c) have arguments or empirical evidence to back up these claims. We will now discuss how this can be done for each of the features.

To say that a measure is *uncontrolled* can have several meanings. First, it can refer to the fact that the processes responsible for the translation of the to-be-measured construct into the measurement outcome are not caused by the goal to *engage in* this translation (i.e., the goal to express the construct in the outcome). This means that the goal to engage in the translation is either absent or non-causal. Such a measure can also be called *unintentional*. One can examine this feature by asking participants to report their goals regarding the task or by varying whether participants are instructed to express the to-be-measured construct. As far as we know, such studies have not yet been conducted. Note, however, that these studies do not allow one to assess the presence of *unconscious* goals to express the construct of interest (assuming that such goals can be unconscious).

The second sense in which measures can be uncontrolled is in the sense that participants cannot *change*, *stop*, or *avoid* the translation of the to-be-measured construct into the outcome. To test this feature, one can examine whether the measurement outcome varies as a function of attempts to change, stop, or avoid the translation. Studies like these have already been conducted. For instance, there is evidence that IAT effects are (relatively) unaffected by instructions to fake a certain attitude (see Steffens, 2004). Again, such studies

are limited to assessing the role of conscious goals. It would be interesting to see whether an unconscious activation of goals (e.g., to hide one's true feelings) through subliminal priming or scrambled sentence completion (see Moskowitz, Li, & Kirk, 2004, for a review) has an effect on implicit measures such as IAT effects. Note that in order to demonstrate that a measure is *autonomous*, one needs to show that the measure is uncontrolled in both of the senses that we have discussed above.

Measures are *goal-independent* if the translation of the to-be-measured construct into the outcome does not depend on any (proximal or remote) goal. It is difficult to demonstrate goal-independence because it implies that every possible goal is irrelevant. However, it might be interesting to examine the role of certain theoretically important goals. For instance, there is evidence that the attitude towards a prime stimulus influences responses in affective priming even when participants do not have the goal to evaluate stimuli in their environment (e.g., Bargh, Chaiken, Raymond, & Hymes, 1996; De Houwer & Randell, 2004; Spruyt, Hermans, De Houwer, & Eelen, 2002). This is a remote (i.e., process-unrelated) goal because it is not directly related to the translation of the attitude into the affective priming score. Hence, one can say that affective priming effects can be goal-independent with regard to the goal of evaluating stimuli in the environment. As far as we know, these studies on the role of evaluative goals in affective priming are the only studies on the goal-independence of implicit measures. In fact, with measures such as the IAT, it seems impossible to examine the role of evaluative goals because the evaluation of words is an integral part of the task. As such, it will be difficult to argue that IAT effects can provide an implicit in the sense of goal-independent measure of attitudes. It is even more difficult to demonstrate that the IAT or any other implicit measure is *purely stimulus-driven*. This would imply one to demonstrate not

only that the validity of the measure is independent of every possible goal, but also that it does not depend on other factors such as awareness or attention.

As we mentioned earlier on in this chapter, the feature unconscious is often mentioned as typical of implicit measures. Unfortunately, it is rarely specified in which sense the measure should be regarded as unconscious. Based on our analysis (also see Bargh, 1994), a measure can be unconscious in the sense that the to-be-measure construct is translated into the outcome even though participants are unaware of (1) the stimuli that activate the construct (e.g., the attitude object that is presented during the task), (2) the construct itself (e.g., the fact that they that they possess a certain attitude), (3) the fact that the construct influences performance (e.g., that the outcome reflects a certain attitude), or (4) the manner in which the construct influences performance (e.g., that an attitude leads to faster performance in a compatible than in an incompatible IAT block). As Fazio and Olson (2003) pointed out, researchers almost never examine whether an implicit measure reflects constructs of which participants are unaware (meaning 2), whether participants are aware that a measure reflects a certain construct (meaning 3; see Monteith, Voils, & Ashburn-Nardo, 2001, for a notable exception), or whether participants know how the construct influences the outcome (meaning 4; again see Monteith et al., 2001, for an exception). Nevertheless, it would be easy to examine these issues by simply asking people to express the relevant construct in a conscious manner (meaning 2), to guess which construct is being measured (meaning 3), and to speculate about how the construct could influence performance (e.g., by speeding up performance on some trials compared to others; meaning 4). Although these studies are feasible, one does need to take into account problems that can arise when assessing conscious knowledge (e.g., the assessment needs to be sensitive enough; see Shanks & St. John, 1994).

There are some studies on subliminal affective priming which suggest that participants need not be aware of the attitude object in order to measure the attitude toward that object (meaning 1; e.g., Degner, Wentura, Gniewosz, & Noack, 2005). But other implicit measure such as the IAT require that participants are aware of the attitude object because otherwise they cannot fulfill the task. To summarize, despite the common claim that implicit measures are unconscious measures, these claims are most often ill specified and lack supporting evidence. More research on this issue is urgently needed.

A measure can be called efficient if the processes translating the construct into the outcome use only a minimal amount of attentional resources. The standard manner to examine efficiency is to use a dual-task method and manipulate the mental load of a secondary task. We know of only two series of studies in which this approach was adopted. Hermans, Crombez, and Eelen (2000) asked participants to perform an affective priming task while simultaneously reciting a series of digits. They found that the magnitude of the affective priming effect was unaffected by the degree of mental load imposed by the secondary task, which suggests that the translation of the attitude in the priming effect was efficient. Very recently, Schmitz, Teige, Voss, and Klauer (2005) also examined the impact of memory load on the IAT. They found that an increase in memory load led to an increase in the magnitude of the IAT effect but did not influence external correlations with self-reported attitudes. Hence, these initial results suggest that the translation of individual attitudes in IAT scores is efficient. Note that the dual task approach that is commonly used in studies on efficiency is founded on the single resource view of attention. Some have argue that there are multiple resources and that the two processes in a dual task might draw on different resources. If this is the case, one might observe that two tasks do not interfere with each other

(and thus appear to be efficient) even though they both rely heavily on attentional resources, be it different ones. Some caution is therefore needed when interpreting the results of dual task studies. Finally, efficiency is a gradual feature. For instance, if one does not observe any effect of the mental load imposed by the secondary task, it is always possible that an effect will be found when a more difficult secondary task is used. Hence, one can never conclude that a measure is completely independent of attentional resources.

The features fast and slow are also gradual features. Studies have demonstrated that affective priming effects can be found even when the prime stimulus is presented only briefly before or simultaneous with the target stimulus and target responses are very quick (e.g., Hermans, De Houwer, & Eelen, 2001; Klauer, Rossnagel, & Musch, 1997). This suggests that the attitude toward the prime is translated in the measurement outcome even when the stimulus is presented only briefly and little time is available for the translation to occur. Affective priming effects thus seem to depend on relatively fast-acting processes. The same can be said about other reaction-time based measures such as the IAT and the affective Simon task (e.g., De Houwer & Eelen, 1998).

Conclusion

Building on our previous work (De Houwer, 2006; Moors & De Houwer, in press), we have argued that implicit measures are measurement outcomes that rely on processes that are uncontrolled, unintentional, autonomous, goal-independent, purely-stimulus-driven, unconscious, efficient, or fast. We have defined what these features mean, how they are related to each other, and how they can be assessed. We hope that our analysis will clarify the meaning of the concept implicit measure and will allow researchers to examine in more detail the nature of (the processes underlying) these measures. More research regarding the features

of implicit measures is desperately needed. This research will not only help increase conceptual clarity but will also help develop much needed theories about the processes that underlie the various measures (see Borsboom, Gideon, & van Heerden, 2004). We urge researchers to take up this challenge and to be more explicit and precise in their use of the term implicit measure.

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Footnote

1. Measurement procedures can be described as direct or indirect (see De Houwer, 2006). In direct measurement procedures, participants are asked to self-assess the to-be-measured construct. In indirect measurement procedures, the construct is assessed indirectly on the basis of other behavior.

Table 1. *Overview of goal-related (non)automaticity features and the conditions and effects to which they refer.*

FEATURES	CONDITIONS	EFFECT
Controlled	- Goal pertaining to process (i.e., to engage, alter, stop, or avoid process) is present	- Intended effect is present and caused by the goal
Uncontrolled	- Goal pertaining to process is absent - Goal pertaining to process is absent - Goal pertaining to process is present - Goal pertaining to process is present	- Effect is absent - Effect is present - Intended effect is absent - Intended effect is present but not caused by goal
Intentional	- Goal to engage in process is present	- Process is present and caused by goal
Unintentional	- Goal to engage in process is absent - Goal to engage in process is present	- Process is present - Process present but not caused by goal
Goal-dependent	- Goal is present	- Process is present and caused by goal
Goal-independent	- Goal is absent - Goal is present	- Process is present - Process is present but not caused by goal
Purely stimulus-driven	- Stimulus (+usual background conditions)	- Process is present and caused by stimuli and background conditior
Autonomous	- Goal to engage in process is absent or present - AND goal to alter, stop, or avoid process is absent or present	- Process is present Process is present but not caused by goal - Effect is absent Intended effect is absent