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Referential processing and competence as determinants of congruence between implicit and explicit motives

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Referential processing and competence as determinants of congruence between implicit and explicit motives

In this chapter, we approach the issue of self-knowledge from an information-processing perspective on the dissociation between implicit and explicit forms of motivation. We will argue that the dissociation between these types of motivation is due to differences in the way that implicit and explicit motivational systems process information, namely as nonverbal and verbal-symbolic codes, respectively. Therefore, congruence between both systems can be achieved through referential processing, that is, the translation of verbal codes into nonverbal codes and vice versa. This can happen as the result of the strategic translation of verbally represented goals into the imagined experience of goal pursuit and attainment, or as the result of individual differences in referential processing ability (referential competence). We will review various measures of referential competence, their development, convergent and discriminant validity, and their ability to account for individual differences in motivational congruence. In closing, we will discuss the role of referential processing in the coherence of personality and in affective disorders.

1. Conceptual overview: Two-systems model of motivation

From the perspective of motivation psychology, the issue of self-knowledge can be framed as an issue of *motivational congruence*, that is, the accurate explicit (i.e., conscious) representation of one's implicit (i.e., nonconscious) motives. For more than 50 years, researchers have examined this issue by devising a large variety of self-report instruments to measure explicit beliefs about one’s motives, and correlating these with content-coding measures of implicit motivational needs, such as the Thematic Apperception Test (TAT; Morgan & Murray, 1935) or its descendant, the Picture Story Exercise (PSE; McClelland, Koestner, & Weinberger, 1989; Schultheiss & Pang, 2007; Smith, 1992). The self-report instruments were originally devised to measure the same motives assessed by the TAT and PSE, namely people's needs for power, achievement, or affiliation (e.g., the Personality Research Form or PRF; Jackson, 1984). Other self-report instruments were developed to assess personal goals in these domains of motivation (e.g., Brunstein, Schultheiss, & Grässmann, 1998; Pöhlmann & Brunstein, 1997) or the motivational themes of people’s wishes (e.g., King, 1995).

However, when these explicit measures were correlated with the implicit measures of motives--the TAT or PSE-- the variance overlap was usually in the minuscule positive range, despite the fact that, as we will see shortly, both types of measures are valid predictors of various types of goal-directed behavior. Low correlations between implicit and explicit motive measures indicate that while some people hold explicit views of their motivational needs that are congruent with their implicit motives, there are roughly as many whose explicit views do not fit their implicit motives. Thus, the former have valid self-knowledge, the latter do not. A growing body of literature shows that lacking congruence between implicit and explicit levels of motivation is associated with impaired life satisfaction and emotional well-being, increased psychosomatic complaints and medication use, and clinically relevant levels of depressive symptoms (e.g., Baumann, Kaschel & Kuhl, 2005; Brunstein et al., 1998; Hofer, Chasiotis, & Campos, 2006; Pueschel, Schulte, & Michalak, 2011; Schüler, Job, Fröhlich, & Brandstätter, 2008; Schultheiss, Jones, Davis, & Kley, 2008). Therefore, an emerging key question in the field is why implicit and explicit motive measures show such little overlap with each other and why some individuals have better insight into their implicit motives than others.

Building on earlier work by McClelland et al (1989; Weinberger & McClelland, 1990) and others (Cantor & Blanton, 1996; LeDoux, 1996, 2002; Rolls, 1999) as well as on current concepts in the cognitive sciences and biopsychology (see Berridge & Robinson, 2003; Rolls, 2005; Schultheiss, 2007; Squire, 2004), Schultheiss (2001, 2008; see Figure 1) has described the properties of the implicit and explicit motivation systems as follows: The implicit system is comprised of a limited number of biologically-based motives, of which the needs for power, affiliation and achievement (often abbreviated as n Power, n Affiliation, n Achievement) have been most thoroughly studied in humans over the past 50 years. Each implicit motive represents a relatively stable capacity to experience a particular class of incentives as pleasurable. Thus, individuals high in n Power delight in having impact on other people, individuals high in n Affiliation cherish close, friendly contact with others, and individuals high in n Achievement get a kick out of mastering challenging tasks. Implicit motives preferentially respond to nonverbal stimuli, such as facial expressions, gestures, etc. (e.g., Klinger, 1967; Schultheiss & Hale, 2007) and influence nondeclarative (i.e., procedural or autonomic) measures of motivation, such as hormone changes, cardiovascular responses, response speed on performance tasks, instrumental conditioning, nonverbal communication, and intuition-guided behavior (e.g., Brunstein & Maier, 2005; McClelland, 1979; Schultheiss & Brunstein, 2002; Schultheiss, Wirth, Torges, Pang, Villacorta, & Welsh, 2005; Stanton & Schultheiss, 2009). Thus, the implicit system is geared towards processing nonverbal information and generating automatic, incentive-driven behavior aimed at maximizing pleasure.

The explicit system, in contrast, contains individuals' stable language-based beliefs about themselves, that is, the motivational needs and values that people endorse and ascribe to themselves on questionnaire scales related to power, affiliation, or achievement. It also houses the long- and short-term goals people pursue in their daily lives, that are represented as verbal codes (e.g., "I want to become a doctor", "I want to practice my piano skills daily", "I want to spend more time with my partner"), and whose content and importance reflects the structure of peoples' explicit motivational values (Weinberger & McClelland, 1990). Owing to the demands and affordances of the sociocultural context individuals live in, the number of different values and goals present in the explicit system can be quite large and is not inherently limited. The explicit system responds most readily to verbal incentives (such as demands, requests, suggestions) and influences declarative criterion measures of motivation, such as people's decisions, judgments, goal choices, and controlled forms of behavior. In summary, the explicit system is geared towards representing and processing verbal information in the service of effortful behavioral regulation.

The validity of this two-systems model of motivation is supported by research that documents that implicit and explicit motive measures are statistically distinct and predict different kinds of outcomes in response to different kinds of incentives (e.g., Biernat, 1989; Brunstein & Hoyer, 2002; Brunstein & Schmitt, 2004; Brunstein & Maier, 2005; Craig, Koestner, & Zuroff, 1994). A meta-analysis on achievement motivation by Spangler (1992) summarizes the main findings of a large body of research as follows: (1) Implicit and explicit motive measures have only marginal variance overlap (correlations typically settle in the low positive range of $r \sim .10$; see also Köllner & Schultheiss, in preparation); (2) implicit motive measures are good predictors of spontaneous, intuition-guided forms of behavior (such as making inventions or showing leadership behavior), particularly in the presence of nonverbal incentives; (3) explicit motive measures are good predictors of controlled and declarative forms of behavior (such as judgments, attitudes, grades), particularly in the presence of verbally transmitted social incentives.

2. Role of strategic referential processing in motivational congruence: Evidence from studies on goal imagery

According to the information-processing model proposed by Schultheiss (2001, 2008), the degree to which the implicit and the explicit motivational system can operate in tandem or independently depends on the degree of *referential processing* between the systems (see Fig. 1; see also Weinberger & McClelland, 1990). Referential processing is a descriptive term for the translation of nonverbal representations into verbal ones through verbal labeling ("naming") and verbal representations into nonverbal ones through mental imagery ("imagining"). It was introduced by Paivio (1986), who argued that referential processing allows information exchange between verbal and nonverbal processing systems, but that it always requires additional processing time and effort relative to processing within verbal and nonverbal systems in which the representational format remains constant. For instance, reading a word only requires its perception and its transformation into a motor speech pattern, whereas naming an object requires its perception, the retrieval of an appropriate verbal label and then the transformation of the label into speech (see Figure 2 and Bucci & Freedman, 1978, for related arguments). The retrieval of the proper label represents the extra step necessary for referential processing from the nonverbal to the verbal system (or RP_{naming}). In the reverse case -- $RP_{imagining}$ --, the retrieval of a nonverbal representation in response to a word (e.g., "flower") also requires an additional processing step, namely, the formation of the appropriate mental image for the word. Research by Paivio and others (reviewed in Paivio, 1986, 2007) consistently shows that tasks that require processing only within the nonverbal system or within the verbal system are more efficiently accomplished than tasks that require referential processing between systems. In our view, the fact that the brain processes information in separate, parallel systems with different representational formats and that between-systems exchange entails a cost provides the key to understanding why motivational systems are not necessarily and automatically marching in lockstep. If this view is correct, then strategic use of and stable individual differences in referential processing should be associated with variations in the congruence between implicit (i.e., nonverbal) and explicit (i.e., verbally mediated) motivational systems.

To address the question of whether strategic use of referential processing increases motivational congruence, Schultheiss and Brunstein (1999, 2002; see Schultheiss, 2001, for a more extensive portrayal and discussion of these and related studies) conducted three experimental studies in which they had one half of participants vividly imagine the pursuit and attainment of an experimenter-assigned verbal goal ($RP_{imagining}$) and attend to their affective response to the experience ($RP_{naming)}$, whereas the other half was engaged in control tasks that did not require translation of the same goal into mental imagery. Across all studies, goal-imagery participants' commitment to the assigned goal and their behavioral efforts aimed at attaining it were significantly predicted by their implicit motives. In other words, they chose and behaved in a motivationally congruent manner. In contrast, among control-group participants, goal commitment and implementation were not predicted by their implicit motives, reflecting a higher risk for motivational incongruence. These findings, which have recently been replicated by Job and Brandstätter (2009), suggest that situationally induced referential processing can transiently increase between-systems congruence and tie the commitment to and execution of explicit goals to implicit motives. We speculate that individuals who have learned to employ referential processing strategically (e.g., who frequently and deliberately engage in mental simulations of future goal-related activities and pursuits) will also show higher levels of motivational congruence in their everyday lives. However, this conjecture still needs to be validated in future studies.

Note that in our view, referential processing does not allow individuals to gain direct access to the nonconscious processes involved in implicit motivation or those that aid the formation and maintenance of explicit self-views and goal hierarchies. Rather, referential processing aids motivational congruence by making the experiential reality of verbally encapsulated goals and values (= output of the explicit system) available to implicit motives ($RP_{imagining}$) and by labeling and representing in a person's verbal consciousness her or his motive-dependent affective response (= output of the implicit system) to the simulated experience (RP_{naming}). And it is precisely the process of binding in one's mind one's "gut feelings" and their valid trigger stimuli that often goes awry because people may not pay attention to their affective responses or misattribute them to the wrong triggers (see Schwarz & Clore's, 2007, distinction between incidental and integral feelings).

3. Individual differences in referential processing: The case for referential competence

But what if referential processing is not strategically employed or induced by an experimenter as in the Schultheiss and Brunstein (1999, 2002) studies? Can people still choose goals and endorse values that fit their implicit motives? As the low positive correlations between implicit and explicit measures of motivation observed in meta-analyses (Spangler, 1992) suggest, some people are able to achieve motivational congruence to some extent, but almost as many others fail to a similar extent. In our recent research, we have explored the possibility that individual differences in automatic engagement of referential processing -- that is, *referential competence* (RC) -- are responsible for the degree to which individuals' implicit motives and explicit values and goals are well-matched or mismatched in the absence of strategically employed referential processing.

In the following, we will first provide a brief history of the RC concept and its measurement. We will then describe recent work that suggests that high RC is associated with motivational congruence and report additional validation data for various measures of RC.

3.1 Brief history of the RC concept

3.1.1. Naming things takes longer than reading words

The observation that it takes longer to name things than to read their word referents is an old one in psychology. For instance, Ligon (1932) reported that the longer latency for naming things over reading words emerges as soon as children learn to read, well before they are practiced readers. A well-known example for the phenomenon is the Stroop test in which participants either have to read color names or name a series of colored areas corresponding to the color names. In the classic study (Stroop, 1935), participants took 41 s to read 100 color names printed in black (Card A), but 63 s to name the colors of 100 rectangular patches (Card B) - a difference of 22 s. Longer reaction times for reading versus naming is not specific to the color domain but has also been found for other stimuli including objects, drawings, and geometric forms (Fraisse, 1969).

But the substantial sample-level difference between naming things and reading words is just one half of the story here, albeit one that is very consistent with Paivio's (1986) proposition of a referential process that needs to be engaged for translating back and forth between verbal and nonverbal codes. The other half is in the substantial speed variations *between individuals* on each task (i.e., naming or reading). Probably the first researcher to make use of this variation as an individual difference variable was Broverman (1960a, b). Broverman used cards A and B from the Stroop task to measure participants' reading and naming abilities, respectively, and then created adjusted difference scores (regression residuals) to classify individuals as conceptually dominant (better reading than naming) or perceptual-motor dominant (better naming than reading). Broverman used these scores to predict participants' performance on other cognitive tasks. Consistent with Paivio's (1986) dual-coding theory, conceptually dominant individuals performed particularly well on a task that required finding the appropriate word meaning (verbal-system processing), whereas individuals with perceptual-motor dominance performed particularly well on a task requiring spatial-figural comparisons and transformations (nonverbal-system processing). However, because dual-coding theory was not around at the time, Broverman made no attempt to relate the adjusted difference scores from the Stroop task to indicators of referential between-systems processing.

The first study to explicitly explore the concept of RC was conducted by Bucci and Freedman (1978). Like Broverman, they used cards A and B from Stroop's task to assess word reading and color naming times, respectively, and then created a naming-reading difference score based on regression residuals. Participants were split into a high-RC group (color naming faster than predicted by word reading) and a low-RC group (color naming slower than predicted by word reading). The difference between the groups was solely due to differences in color-naming latencies, as groups did not significantly differ in their word-reading times. Unlike Broverman, however, Bucci and Freedman were not as much interested in how these groups differed in traditional cognitive tasks (verbal intelligence tests were included, too, but scores were not substantially related to RC) than in how well they were able to tell stories in response to the instruction to talk about a dramatic or interesting personal experience. High-RC individuals used specific, concrete language in their narrations, even if they talked about something as mundane as traveling to another city. They also used direct quotes and third-person singular pronouns frequently, but first-person pronouns relatively sparsely. In contrast, low-RC individuals used unspecific, abstract language, avoided quotes, and frequently used first-person pronouns ("I"). In other words, the high-RC group used language in a similar way as an author of fiction would, whereas the low-RC group did not.

In a replication study, Bucci (1984) again used the color-naming task to divide a sample of participants into low- and high-RC individuals and to study how these groups differ when describing different color shades and providing short narratives of everyday experiences. Compared to the low-RC group, the high-RC group produced more metaphorical color terms (e.g., maroon, mauve, sienna, "like dried mud") and used more specific, concrete, and focused language in their narratives. They also made less use of the first person pronoun. Together with the earlier study by Bucci and Freedman (1978), these findings suggest that individuals who are high in RC (i.e., who are quick at naming things), relative to those low in this ability, are habitually better at moving back and forth between verbal and nonverbal representations and at capturing nonverbal experience efficiently and accurately with words.

3.1.2 Content analysis of text: Ratings versus word counts

From these studies, Bucci and her collaborators advanced research on RC by developing two new measures of referential processing. One was the derivation of scales for rating the quality of narrative language based on the findings for high-RC individuals in the Bucci (1984) and Bucci and Freedman (1978) studies. The referential activity (RA) scales assess the degree to which a speaker or writer is able to translate experience into words in a way that will evoke corresponding experiences for the listener or reader (Bucci & Kabasakalian-McKay, 1992). In other words, they measure how well narrators are able to capture and communicate nonverbal experience, including emotions and other "inner" events, in language that easily evokes vivid images in the reader's mind.

The four RA scales are Concreteness, Specificity, Clarity, and Imagery. The Concreteness and Imagery scales measure the sensory characteristics of language; the Specificity and Clarity scales reflect its degree of articulation, focus, and communicative quality. Moreover, Concreteness and Specificity indicate how *frequently* these dimensions are expressed in speech or writing; Clarity and Imagery are indicators of the *effectiveness* of the expressions. All dimensions are coded on a 10-point scale, ranging from 1 (low level) to 10 (high level). Because the four scales are substantially intercorrelated, an overall RA mean score can also be computed. The RA measure can be applied to different types of materials such as psychotherapy session protocols and PSE stories and has been validated in studies on therapeutic progress (Bucci, 1995).

In our own research, we have found higher scores on the overall RA measure to be related to better RC, as reflected in smaller differences on the Stroop color-naming/word-reading task. In one unpublished study with 75 US student participants, the correlation between RA, as assessed in six PSE stories and partialled for word count, and RC was $r = -.24$, $p < .05$. In another study, we obtained a similar, although slightly smaller correlation (see Table 1; note that the correlation is negative because higher RA ratings are associated with *smaller* differences between color-naming and word-reading latencies, signifying higher RC). While this result should not be surprising, given the history of the development of the RA scales, it is, in our opinion, still remarkable that response latencies on a simple naming task consistently converge with judgments of the vividness and literary quality of imaginative stories. Our results also support the notion that a basic process of information exchange between nonverbal and verbal systems as assessed through the color-naming task determines to what extent nonverbal experience is accurately represented in narrative language and thus available for conscious reflection.

The other advance resulting from the color-naming task studies by Bucci and Freedman (1978) and Bucci (1984) was the development of a computerized RA (CRA) measure by Mergenthaler and Bucci (1999). The development of the system had its roots in the observed differences in word use between high-RC and low-RC individuals (e.g., use of first-person and third-person pronouns). Mergenthaler and Bucci's (1999) CRA measure consists of two dictionaries: One is a word list of 63 words identified as characteristic for high RA (e.g., third-person singular pronouns, all articles, references to speaking). The other is a word list of 118 entries representing low RA (e.g., non-specific quantifiers such as "any", "more"; non-specific actions in the present tense such as "make", "try"; words representing negation and uncertainty). Bucci and Mergenthaler (1999) reported a correlation between the CRA measure and the RA scales of around $r = .50$. Moreover, the high and low RA words cover about 50% of a text. A caveat provided by the authors is that the CRA measures may miss out on descriptions of bodily, sensory, and emotional states that are better captured by the RA scales. The CRA measure has not been validated with the color-naming task originally devised for the assessment of RC.

The RA scales and the CRA measure can be used to assess situation- or stimulus-specific RP by examining individuals' RA fluctuations in response, for instance, to a therapist's suggestions (e.g., Bucci & Maskit, 2007) or one's child (e.g., Christian et al., 2010) but also to assess stable individual differences in RC, as suggested by the overall consistency of a person's RA level from one situation to the next. For instance, we found in one study (N = 83) in which we used the RA rating scales to assess RC from PSE protocols that individuals' RA levels were highly stable from one story to the next, as indicated by an internal consistency coefficient of .86. In another study, CRA analyses of individuals' personal-goal descriptions showed internal consistencies of .80 (high CRA lexicon) and .87 (low CRA lexicon).

3.2 Exploring the reliability and validity of RC: Schultheiss, Patalakh, Rawolle, Liening, and MacInnes (2011)

To test the hypothesis that RC is a predictor of the degree to which the implicit and the explicit motivational systems are in congruence with each other, Schultheiss and colleagues (2011) conducted a series of studies in which they examined the reliability and validity of Bucci's (1984) color-naming measure of RC. Across four studies, they assessed RC with a computer task requiring participants to name color patches (red, green, blue, and yellow) or read color words ("red", "green", "blue", and "yellow") presented in random order on the screen (see Fig. 4, Panel A, for a schematic overview). Responses were recorded via voice-key activation. Stimulus presentations were organized into 8 blocks with 12 color-naming and 12 word-reading trials each. To obtain a pure measure of color-naming ability, net of effects of general mental speed or speech generation effects, Schultheiss et al. subtracted average word-naming latencies from average color-naming latencies and divided the difference by the average of both latencies. On average and across studies, participants were about 100 ms slower at naming colors than they were at reading words. Participants' difference scores were moderately to highly consistent across blocks, with coefficients alpha ranging from .74 to .90 across studies. Moreover, overall RC scores showed high retest stability over a two-week interval, $r = .80$. These findings suggest that the color-naming task captures stable and consistent individual differences in RC.

In three studies, Schultheiss et al. then examined to what extent the RC measure was associated with, or predicted, the degree to which individuals' explicit goal commitments and motivational values were aligned with their implicit motives in the domains of power, achievement, and affiliation at the between-subjects (Studies 2 through 4) and within-subjects level (Study 3). Motivational congruence was assessed (a) at the between-subjects level as the absolute difference between standardized implicit motives scores assessed per PSE and standardized explicit goal commitment (motive-goal congruence) or value (motive-value congruence) scores assessed per questionnaire and (b) at the within-subjects level as the degree to which the profile of story-writing responses to PSE pictures correlated with questionnaire-item responses to the same pictures (as assessed with the PSE questionnaire; Schultheiss, Yankova, Dirlikov, & Schad, 2009). The results can be summarized as follows:

First, higher RC was associated with higher motive-goal congruence, that is, better alignment between individuals' implicit motives and their explicit goal commitments, across all three studies in which the effect was tested. This was true both of studies with cross-sectional design (Studies 2 and 3) and of a study in which participants could indicate their preferences on a goal-choice task (Study 4). Across studies, Schultheiss et al report an average *r* of .275 for the association between the RC color-naming task and motive-goal congruence.

Second, RC was associated only marginally with motive-value congruence, that is, better alignment between individuals' implicit motives and the value they explicitly placed on specific types of motivation (power, achievement, affiliation), assessed at the between-subjects level in Study 2 and not significantly in Study 3. Schultheiss et al explained this with the more enduring and passive nature of self-attributed motivational values relative to personal goals, which are more frequently formed and actively pursued and thus open more opportunities for RC to influence their selection in a motive-congruent way.

Third, RC was also associated with better motivational congruence at the within-subjects level (Study 3). The faster participants named colors, the stronger and more positive the correlations between the motive profiles of their PSE story writing responses and the profiles of their questionnaire responses to the same PSE picture cues. Within-subjects motivational congruence had no significant variance overlap with between-subjects motivational congruence, which indicates that whether individuals accurately judge their motivational needs vis-a-vis others is not directly linked to how much insight they have into variations of their motivational responses to different situational cues. It is therefore particularly impressive that RC predicts both types of motivational congruence in similar ways.

Fourth and finally, gender emerged as a moderator of the association between RC and motivational congruence. In Study 2, the association between RC and motive-goal congruence was stronger in women ($r = .48$) than in men ($r = .10$); and the above-mentioned association between RC and within-subjects congruence in Study 3 emerged only in women ($r = .38$) but not in men ($r = -.08$). Given the absence of direct gender differences in RC or motivational congruence measures, these findings are intriguing and merit further research.

In summary, Schultheiss et al's (2011) studies provide replicable evidence that RC, as assessed with a simple color-naming task, is a stable individual difference variable that taps into individual's ability to efficiently translate between verbal and nonverbal representations and that predicts, as hypothesized by Schultheiss's (2008) information processing model of motivation, the degree to which implicit and explicit motivational systems are in alignment.

3.3 Broadening the measurement basis of RC: Shape naming, valence judgments, and imaging to words

In two studies, one conducted in the US, the other in Germany (unpublished data from Schultheiss et al's, 2011, Studies 2 and 3), we have also explored to what extent other naming tasks converge with the color-naming task we have used as our cardinal measure of RC. Specifically, we have devised tasks that required participants to (a) name simple shapes and read their names (square, circle, triangle; *shape-naming task*), (b) judge happy ("good") and angry faces ("bad") as well as read the words *good* and *bad* (*face-judgment task*), and (c) judge complex scenes from the International Affective Picture Set (Lang, Bradley, & Cuthbert, 2008) preselected for having strong positive valence (e.g., bunnies, ice cream; "good") or negative valence (e.g., plane crash, attacking dog; "bad") and read the words *good* and *bad* (*scene-judgment task*). See Figure 3 for an overview of these tasks.

The structure of the three new tasks was similar to the color-naming task; that is, there was an equal number of randomly presented naming and reading trials in each block, responses were assessed per voice key, and response latency differences for naming and reading trials were aggregated across several blocks. Like color-naming, the shape-naming task was assumed to tap a cognitive component of RC, but had the advantage of circumventing problems with color vision, which are present in a small percentage of the population. In contrast, the face-judgment and scene-judgment tasks were assumed to tap into a more affective component of RC, because they required participants to retrieve the proper label for the affect generated by a hedonically charged nonverbal cue.

Table 2 shows that all four tasks had substantial convergent validity, although the two cognitive RC tasks tended to correlate more strongly with each other than with the two affective RC tasks and vice versa. Moreover, on the two cognitive tasks, object naming required about 100 ms more time than word reading. In contrast, valence judgments of faces and scenes on the two affective RC tasks required substantially more processing time, with a difference of about 180 ms relative to word reading. Somewhat counterintuitively, the cognitive RC tasks turned out to be better predictors of motivational congruence (both for the motive-goal and the motive-value indices) in US and German samples than the affective RC tasks. When we combined the color-naming and shape-naming measures into a measure of cognitive RC, it was significantly correlated with motive-goal congruence ($r = .23$) and total congruence (i.e., the average of motive-goal, motive-value, and value-goal congruence; $r = .22$) in the US sample, ps < .05, whereas a combined measure of the two affective RC tasks was not (motive-goal congruence, $r = .05$; total congruence, $r = .12$, ps > .10). Similarly, in the German sample cognitive RC was associated with motive-goal congruence ($r = .18$, $p < .10$) and total congruence ($r = .16$, $p = .12$) but affective RC was not (motive-goal congruence, $r = -.05$; total congruence, $r = -.11$, ps > .20). The correlation between cognitive and affective RC was .48 in the US sample and .41 in the German sample. Future studies need to address the question whether the difference in the association between cognitive and affective RC on the one hand and motivational congruence measures on the other is robust and, if it is, why cognitive RC is a better predictor of motivational congruence than affective RC.

While all of these studies have used measures that assess RC_{naming} through a variety of labeling tasks, we have also explored $RC_{imagining}$, that is, the ease with which people can translate verbal experience into a nonverbal format (unpublished data from Schultheiss et al's, 2008, Study 1). We based our research on earlier work by Paivio (1978), who assessed $RP_{imagining}$ by measuring how long participants took to figure out for which of two digital clock times (= symbolic information) the arms of a corresponding analog clock were closer together. To provide the correct answer, the digital clock information first needs to be translated into mental imagery of analog clock faces (= referential processing). Then, the clocks can be compared in the mind's eye and a decision can be made about the proximity of the two arms on each clock (see Figure 4 for an illustration). Our $RC_{imagining}$ measure consisted of 20 such comparisons, presented in two blocks of 10 trials. Participants' key-press response latencies were the dependent variable. To control for performance aspects that are inherent in the clock task but do not reflect referential translations per se (see Paivio, 1978, Experiment 3), we also measured participants' performance on 20 trials in which they had to judge which of two analog clock faces the hands were closer together (nonverbal comparison) and another 20 trials on which they had to judge on which of two digital times represented the later time (verbal-symbolic comparison).

Although all three performance measures were positively and significantly correlated with each other, regression analysis indicated that only the nonverbal-comparison control task was a significant unique predictor of variance in the $RC_{imagining}$ task, but not the verbal-symbolic comparison task. We therefore subtracted response latencies of the nonverbal-comparison task from latencies on the $RC_{imagining}$ task to obtain a net estimate of participants' ability for imaging to words. This yielded a normally distributed, corrected $RC_{imagining}$ measure with a mean of 3.16 s (SD = 1.57). Thus, on average participants took about 3 s to create a mental image in response to verbal-symbolic information, above and beyond the time they needed to make a comparison based on nonverbal information.

Does the clock task measure valid individual differences in RC? To provide an answer to this question, we used a two-pronged approach. First, we examined its convergent validity with the color-naming measure of RC as well as with Bucci and Kabasakalian-McKay's (1992) text-coding measure of RA. To obtain a measure of the latter, we had a coder, who had achieved an 86% agreement overall with practice excerpts scored by experts in the instruction manual, code six PSE stories collected from each participant and used in our analyses the average RA sum score per participant, residualized for protocol length to control for differences in verbal fluency (longer stories tended to have higher RA ratings). Second, we tested the clock task's criterion validity by examining how well it predicted the speed with which participants could make judgments about their mood on a standard hedonic-tone scale, as assessed via PC and key-press responses. Based on research on alexithymia (e.g., Sifneos, 1975) and dual attitudes (for a review, see Wilson, Lindsey, & Schooler, 2000), we reasoned that people who make mood judgments quickly are better at reading out nonverbal gut feelings and are also less likely to construct them through indirect, inferential means than people who take a long time to make such judgments.

Table 1 shows that RC as assessed by the clock task converged with the color-naming and the RA-coding measures of RC in the predicted manner: longer net response times on the clock task were associated with longer net color-naming times and with less vivid and imagery-laden language in PSE stories. Of the three RC measures tested, the clock-task was also the one most strongly associated with how quickly participants judged their mood. Those who took a long time translating digital clock information into an analog representation also took longer indicating how happy, satisfied, sad, or depressed they were. Notably, higher RA as rated in PSE stories was also associated with faster responses on the hedonic-tone rating task. Note that the association between the color-naming task and the clock task does not simply reflect differences in overall response speed (an effect that may account for the comparatively large overlap of $r = .71$ between $RC_{imagining}$ and RC_{naming} measures reported by Paivio, Clark, Digdon, & Bons, 1989, p. 172), as this effect has been removed from the clock-task RC measure by subtracting the effect of analog-clock comparisons and from the color-naming RC measure by subtracting the effect of word-reading times. None of the RC measures was associated with mood per se, suggesting that individual differences in RC are not influenced by mood.

Overall, our explorations into the measurement of RC suggest that stable individual differences in referential processing can be obtained through a variety of measures that show meaningful patterns of variance overlap with each other, that predict valid criteria, and that provide a rich arsenal for further exploration of RC's role in personality and motivational congruence.

3.4 Further explorations into the convergent and discriminant validity of RC

So far we have focused on relationships between RC measures and their ability to predict congruence between motivational systems and other criteria. Over the course of several studies in which we have included the color-naming task as our RC measure, we have also examined its relationships with other measures which (a) assess phenomena that tap into similar cognitive abilities as RC (e.g., verbal fluency and verbal intelligence), or (b) assess constructs that are also related to the translation of affective-emotional information into a verbal format (i.e., alexithymia) or (c) have been shown to predict motivational congruence specifically. Here is what we found.

RC and verbal ability. Schultheiss et al (2011) examined the overlap between the RC color-naming task and various measures of verbal fluency and verbal intelligence. Shorter color-naming latency differences were related to higher verbal fluency as assessed by the total word count on the PSE in one study (Study 2: $r = -.22$) but not in another (Study 3: $r = .06$). We explored this issue further by examining the overlap between color-naming RC and PSE word count in other, unpublished data sets, but without much evidence for a consistent association between RC and verbal fluency. Schultheiss et al (2011) also examined correlations between RC and two measures of verbal intelligence. One test required participants to generate words with an assigned prefix or suffix, the other to assign words to the most appropriate of four pictures (e.g., the word "frenetic" to the picture of a soccer game). RC was not reliably associated with participants' performance on either task (generating words: $r = -.02$; assigning the proper word: $r = -.17$). Replicating earlier findings by Bucci and Freedman (1978) who also failed to observe convergence between the color-naming RC task and verbal intelligence tests, these observations suggest that the color-naming RC task measures an ability that is not captured by traditional tests of verbal fluency or intelligence. They also suggest that traditional intelligence tests, which typically measure verbal and nonverbal abilities separately, but usually not their interplay, may miss out on a fundamental domain of human cognitive ability (see Paivio, 2007, for a thorough analysis and discussion of this issue).

RC and alexithymia. The construct of alexithymia -- literally the inability to read and verbalize one's emotions -- has been used in clinical studies to explain why some patients have problems benefitting from psychotherapy and are restricted in their emotional life (e.g., Sifneos, 1975; Taylor & Bagby, 2004). Schultheiss et al (2011) used a standard measure of alexithymia, the Toronto Alexithymia Scale (TAS; Bagby, Parker, & Taylor, 1994), in two of their studies to examine the overlap of this measure with RC (findings involving the TAS in Study 3 are reported here only and were not included in the original paper by Schultheiss et al, 2011). Color-naming RC scores were not significantly associated with TAS scores (Study 2: $r = .04$; Study 3: $r = -.15$, *p*s > .10). Neither was there any evidence that higher TAS scores were associated with less motivational congruence as indexed by higher motive-goal (Study 2: $r = .01$, *ns*; Study 3: $r = -.22$, $p < .05$) or motive-value difference scores (Study 2: $r = -.08$; Study 3: $r = .02$, *p*s > .10).

These findings stand in marked contrast to Bucci's observation that increases in referential processing are associated with episodes of emotional insight during psychotherapy, that is, with a transient reduction of alexithymia (e.g., Bucci, 1995). However, Bucci's research typically examines alexithymia as a process, not as a trait, and relies on actually measuring emotional insight procedurally rather than asking participants about whether they ascribe emotional insight to themselves. These two factors may account for the differences between Schultheiss et al's (2011) findings, who also measured RC procedurally and assessed the criterion of motivational insight in a sophisticated manner, and typical work on alexithymia, which somewhat paradoxically relies on self-report methods such as the TAS to assess individuals' conscious insight into the limits of their emotional insight and relates the outcome of this assessment to other declarative measures of emotional processing. Schultheiss et al (2011) therefore argued that the *construct* of alexithymia has considerable conceptual overlap with referential processing, because both constructs deal with the verbalization of nonverbal experience, and that lacking overlap of the TAS *measure* of alexithymia with the measure of RC should not be viewed as conclusive evidence against such a link. Corroborating this line of thought, recent research sheds doubt on the validity of the TAS as a valid and specific measure of the alexithymia construct (e.g., Leising, Grande, & Faber, 2009; Parling, Mortazavi, & Ghaderi, 2010).

RC and other correlates of motivational congruence. Recent years have seen rising interest in the predictors and correlates of motivational congruence and a number of moderators of the fit between a person's implicit and explicit motives have been identified. In several studies, we have started to explore the degree to which these moderators show variance overlap with RC.

Action orientation after failure (AOF), the ability to downregulate negative affect and thus to regain self-access (e.g., Kuhl, 2000), has been shown to predict the degree to which individuals choose goals that are congruent with their implicit motives (Baumann et al., 2005; Brunstein, 2001). However, in two studies in which we assessed AOF with a questionnaire measure (Kuhl, 1981), correlation coefficients between AOF and RC measures were low and nonsignificant. In the study in which we had measured RC_{naming} (color-naming), $RC_{imagining}$ (clock task), and RA (ratings of PSE stories), none of the three measures was substantially associated with AOF (*r*s = .09, .00, and .05, respectively; $N = 93$). In another study, RC_{naming} (color-naming) and RA also failed to converge with AOF, *r*s(75) = .12 and -.15, respectively, *p*s > .20.

Another variable that has been implicated in motivational congruence is self-determination, that is, the ability to choose goals in a self-congruent manner and to be aware of one's feelings and preferences (Deci & Ryan, 1985). Thrash and Elliot (2002) found that individuals with high scores on the self-determination scale (SDS), a self-report measure of this ability, were better able to choose goals that were congruent with their implicit achievement motive than individuals with low scores on this scale. However, like in the case of AOF, we found SDS scores to be unrelated to RC (color-naming) and RA (PSE story ratings), *r*s(75) = -.09 and .13, respectively, *p*s > .20.

Other moderators of motivational congruence, such as public and private self-consciousness (Thrash, Elliot, & Schultheiss, 2007) or identity status (Hofer, Busch, Chasiotis, & Kiessling, 2006), remain to be examined for their overlap with measures of RC. However, given the substantial differences between the assessment of these variables (declarative measures) and RC (procedural measures), we expect correlations to be generally low and to reflect a fundamental divide between self-ascribed and process-measured abilities.

4. Beyond motivational congruence: Referential processing and the functional coherence of personality

As the research we have reviewed here so far suggests, referential processing between verbal and nonverbal codes, both through the strategic use of goal imagery and through stable individual differences in RC, is a necessary prerequisite for motivational congruence, as assessed through measures of implicit motives and explicit goal pursuits. But does the congruence-enhancing effect of RP extend to other elements of personality, too?

Our answer to this question can only be speculative at this point, because to our knowledge there is no research that has explored the role of RP in other implicit-explicit dissociations. But we would venture this prediction: RP, either as a state or as a trait (i.e., RC), should play a critical role whenever nonverbally manifested dispositions (e.g., attachment styles, implicit attitudes) need to be represented accurately in language to become consciously available (e.g., as explicit representations of one's attachment style or social attitudes). If RP is high, conscious beliefs about oneself are more likely to represent a direct translation of nonverbal experience; if it is low, they are more likely to be the result of the ever-busy left-hemispheric interpreter's propensity for making inferences about the causes of one's behavior even when it lacks direct insight into the causes of this behavior (Gazzaniga, 1985; Nisbett & Wilson, 1977; Roser & Gazzaniga, 2004; Wilson, 2002). For instance, we would expect individual differences in RC to predict to what extent individuals' enduring self-attributed attachment styles, as assessed per questionnaire or other forms of self-report, converge with their habitual automatic emotional and behavioral responses to an attachment figure (see Crowell, Fraley, & Shaver, 2008). Likewise, we would expect the degree to which nonverbal indicators of transient emotions (such as behavioral and autonomic changes) converge with self-reported emotional states to depend on an individual's current RP, which in turn may depend on dispositional RC (see Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005).

In contrast, we do not expect RP to be involved in within-systems congruence of the verbal system or the nonverbal system, because the ease with which verbal concepts can be related to each other or nonverbal representations can be connected to other nonverbal representations represents processes that are distinct from RP as defined by Paivio (1986). Consistent with this conjecture, we have failed to find evidence for an effect of RC on the congruence between explicit goals and values (see Table 2). Both types of constructs are represented verbally, although at different levels of abstraction, and typically show a substantial degree of convergence in all individuals (e.g., Emmons & McAdams, 1991; King, 1995). For the same reason, we would not expect RP (or RC) to moderate the degree to which explicit attitudes converge with implicit attitudes that represent the strength of automatic associations between verbal concepts, such as Me and Happy (i.e. Implicit Association Test [IAT] and similar measures; e.g., Greenwald & Farnham, 2000). And indeed, a recent meta-analysis suggests that the term "implicit" should be used with caution in this context, because attitudes assessed with the IAT correlate at .24 on average with questionnaire measures of attitudes (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005). The size of this overlap is similar to the overlap between explicit value and goal measures (e.g., King, 1995; Rawolle, Patalakh, & Schultheiss, submitted) and considerably larger than the correlation between implicit and explicit motive measures (see first section of this chapter).

Insight into the role of RP into normal personality coherence can also be gained from studies on clinically relevant phenomena such as anxiety disorders, post-traumatic stress disorder (PTSD), and depression (see also Paivio, 2007, for a discussion of this issue). Borkovec and Inz (1990) have argued that generalized anxiety disorder (GAD) is characterized by an avoidance of mental imagery and a preponderance of verbal processing during worry. This suggests that anxiety predisposes individuals for enhanced processing of information within the verbal system and decreased referential processing between verbal and nonverbal systems. In support of this view, Baumann et al (2005) found that individuals who reported a high rate of threats in their daily lives and who had difficulties regulating negative emotions resulting from perceived threats experienced reduced congruence between implicit and explicit levels of achievement motivation. Although RP was not assessed in this study, we speculate that the anxiety-inducing effects of threat reduced RP in these individuals, which in turn facilitated motive-incongruent goal choices.

A disorder in which the ties between different information-processing systems appear to be severely compromised is PTSD. Individuals suffering from PTSD have typically experienced trauma that later leads to unbidden flashbacks, intrusive memories, hypervigilance, and cognitive avoidance, among other symptoms (DSM-IV-TR, 2000). From a therapeutic perspective, one of the most problematic aspects of PTSD is the unpredictability and dissociation of the symptoms. It is as if the symptoms lead a life of their own, come and go unbidden, and are independent of a person's conscious recall of the trauma. In their dual-representation theory of PTSD, Brewin, Dalgleish, and Joseph (1996) have argued that the dissociative aspects of PTSD are due to the representation of the trauma and its situational context in two different types of memory: verbally accessible memories and situationally accessible memories, that is, memories that are triggered by situational cues and elicit emotional and behavioral responses. Dissociation of symptoms occurs because people suffering from PTSD are characterized by a lack of coherence between these two types of memories. It does not take much to recognize in the two different types of memories instantiations of Paivio's (1986) verbal and nonverbal processing systems or, in the parlance of modern cognitive approaches to learning and memory, declarative and nondeclarative systems (Squire, 2004). Brewin et al's (1996) theory of dissociation in PTSD can therefore indentifies low RP as a core problem in PTSD.

Low RP may be an outcome of trauma and threat, which can hinder the translation of anxiety-laden nonverbal experiences into verbal representations. But there is also evidence that low RP may represent a precursor for the development of PTSD. Gilbertson et al (2006) compared soldiers with combat exposure with their monozygotic twin brothers who had not been exposed to combat. The brothers not exposed to combat thus served as a proxy measurement for pre-combat mental abilities in their exposed twins, as these abilities have a substantial amount of heritability. Soldiers who developed PTSD and their twins were characterized by low verbal ability whereas soldiers who had not developed PTSD and their brothers scored in the normal range on measures of verbal ability. Although Gilbertson et al did not directly assess individual differences in RC, their findings are consistent with the idea that low RC may increase the risk for developing PTSD after trauma. Gilbertson et al endorse a similar conclusion when they state that "[...] verbal mediation and intellectual sophistication may be critical to effective forms of coping with exposure to severely traumatic experiences, and the capacity to place such events into meaningful verbal concepts may reduce negative emotional impact." (p. 493)

Finally, Bucci and Freedman (1981) found lower RC, as assessed through a color- naming task, to be associated with more severe symptoms of depression in a small sample of female inpatients at a clinic. Due to the cross-sectional nature of the study and the small sample size, it is difficult to ascertain whether RP is generally involved in depression and, if so, whether it is a precursor, correlate, or consequence of depression. We venture the speculation, though, that low levels of RP, either as a disposition or as a strategy for achieving congruence, predispose individuals for the development of depression. As we have outlined in the previous section, RP, both as a state and as a trait, is associated with motivationally congruent goal choices, and successful realization of motive-congruent goals is in turn related to heightened emotional well-being (Brunstein et al., 1998; Schultheiss et al., 2008) as well as low levels of depressive symptoms (Pueschel et al., 2011; Schultheiss et al, 2008).

Thus, the view we take here of the potential role of RP in clinical disorders is that RP facilitates between-systems coherence, and that this coherence is essential for effective and adaptive personality functioning. However short and necessarily incomplete our review of RP-related clinical phenomena may be, the perspective we present is consistent with other modern accounts of personality that emphasize the importance of fluid between-systems exchange for personality functioning (e.g., Kuhl, 2000, 2001) and with meta-theoretical approaches to psychotherapy and mental health that assign a pivotal role to self-congruence, that is, the coherence between different functional systems in the person (e.g., Bucci, 1997; Grawe, 2004).

5. Summary and conclusion

According to the approach we have presented in this chapter, valid self-knowledge is preconditioned upon the accurate and efficient exchange of information between functionally separate verbal and nonverbal information-processing systems. Once the contents of the verbal system have been translated into a nonverbal format, systems that operate at the nonverbal level can process this information, and their output (e.g., affective responses) can be translated back into a verbal format to become available for conscious reflection. Integrity of the referential process is thus a necessary requirement for accurate self-knowledge that cuts across different processing systems. Self-knowledge can be strategically enhanced through the deliberate translation of verbal codes into nonverbal ones and vice versa. Research on goal imagery (Schultheiss & Brunstein, 1999, 2002) represents only one example for the strategic use of referential processing to gain self-insight. Expressive writing that aims to capture everyday or special experiences in specific and concrete narrative language may represent another such strategy (see Pennebaker, 1997). Self-knowledge can also be better in some individuals than in others due to differences in RC, that is, the habitual ease and efficiency with which the referential process works, and future studies need to explore the question whether this ability can be increased through training. At this point, we simply hope that the tools for inducing and measuring referential processing that we have presented in this chapter will provide researchers and practitioners with the necessary methods for understanding the origins of personality coherence and helping individuals to increase congruence between implicit and explicit levels of motivation.

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Table 1

Correlations between referential activity as assessed in the PSE, RC as assessed in color-naming and clock tasks, and hedonic-tone judgments and response latencies in 93 US college students (unpublished data from Schultheiss et al., 2008, Study 1)

	1.	2.	3.	4.
1. Referential activity	--			
2. $RC_{Color\ naming}$	-.16	--		
3. $RC_{Clock\ task}$	-.22*	.18†	--	
4. Hedonic tone	-.06	.12	.18†	--
5. Hedonic $tone_{Latency}$	-.22*	.13	.33**	-.04

† $p < .10$; * $p < .05$; ** $p < .005$

Table 2

Descriptive statistics and correlations for four measures of RC (raw difference scores in ms; larger difference = less RC) and four motivational congruence indices (larger index = less congruence) in US (Ns= 86 to 93) and German students (N=99) (unpublished data from Schultheiss et al., 2011, Studies 2 and 3)

		M	*SD*	1.	2.	3.	4.	5.	6.	7.	8.
1. Color naming	US	125	45	--							
	Germany	96	39	--							
2. Shape naming	US	102	46	.50***	--						
	Germany	104	36	.45***	--						
3. Face judgment	US	181	63	.24*	.49***	--					
	Germany	173	41	.32***	.36***	--					
4. Scene judgment	US	193	55	.36***	.36***	.53***	--				
	Germany	175	31	.21*	.26**	.40***	--				
5. Motive-value congruence	US	0.322	0.293	.18†	.06	.14	.02	--			
	Germany	0.309	0.339	.08	.08	-.03	.04	--			
6. Motive-goal congruence	US	0.370	0.309	.34***	.05	-.00	.09	.26*	--		
	Germany	0.341	0.297	.20*	.09	-.03	-.04	.22*	--		
7. Value-goal congruence	US	0.245	0.309	.13	.02	.12	-.00	.08	.10	--	
	Germany	0.337	0.348	-.08	.18†	-.11	-.18†	.13	.16	--	
8. Total congruence	US	0.317	0.205	.30***	.07	.15	.08	.67***	.71***	.61***	--
	Germany	0.329	0.219	.09	.18†	-.09	-.10	.68***	.65***	.67***	--

Note. Motive-value congruence scores represent log-transformed absolute difference scores between PSE motive and PRF scale z-scores, averaged across motivational domains (power, achievement, affiliation). Motive-goal congruence scores represent log-transformed absolute difference scores between PSE motive and idiographic goal commitment z-scores, averaged across motivational domains. Value-goal congruence scores represent log-transformed absolute difference scores between PRF scale and idiographic goal commitment z-scores, averaged across motivational domains. Total congruence scores represent the average of these three congruence scores. Higher values on all scores represent lower congruence.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .005$

Figures

Figure 1. Information-processing model of implicit and explicit motivation (solid lines: significant correlation/influence; dashed lines: no significant correlation/influence). Modified from Schultheiss, O. C. (2008). Implicit motives. In O. P. John, R. W. Robins & L. A. Pervin (Eds.), *Handbook of Personality: Theory and Research* (3 ed., pp. 603-633). New York: Guilford.

Figure 2. Process analysis of word-reading and color-naming tasks (adapted from Bucci & Freedman, 1978). Relative to reading words, naming things requires an additional processing step: retrieval of the proper word referent for a nonverbal entity.

Figure 3. Schematic overview of tasks used to assess nonverbal-to-verbal RC (i.e, "naming").

Figure 4. Schematic overview of clock task used to assess verbal-to-nonverbal RC (i.e., "imagining").

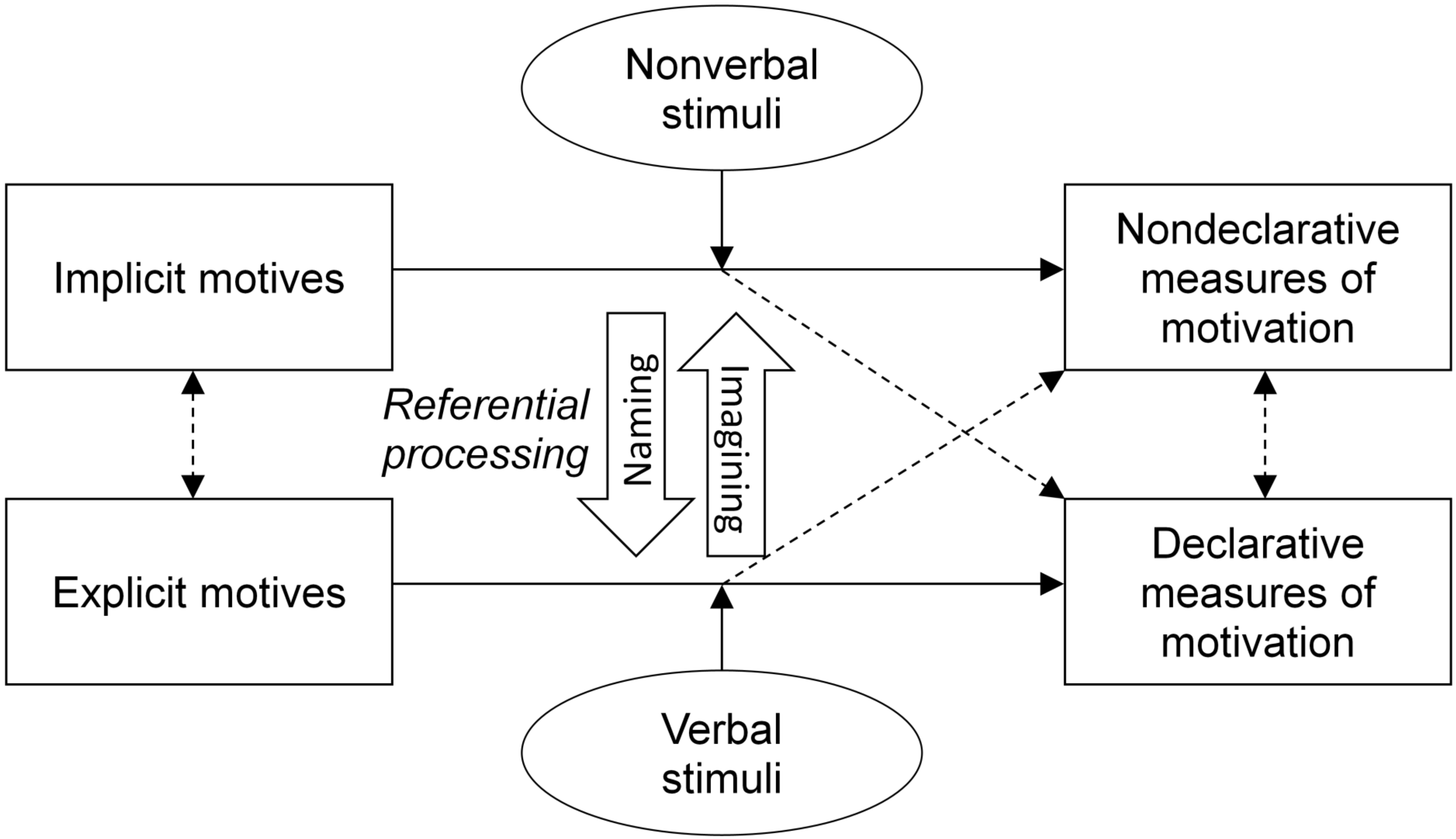
Nonverbal
stimuli
Implicit motives
Nondeclarative
measures of
motivation
Referential
processing
Naming
Imagining
Explicit motives
Declarative
measures of
motivation
Verbal
stimuli

Figure 1.

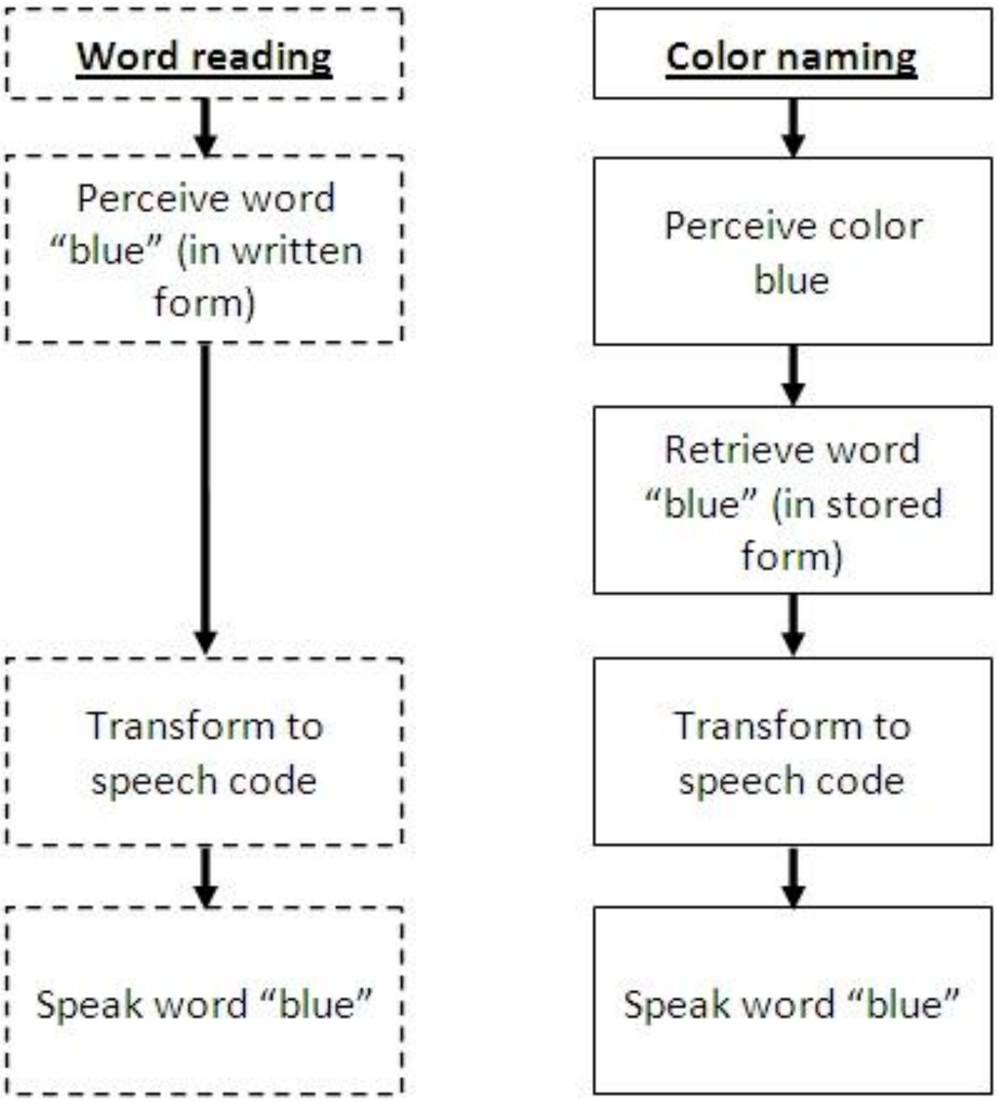
Word reading
Perceive word "blue" (in written form)
Transform to speech code
Speak word "blue"
Color naming
Perceive color blue
Retrieve word "blue" (in stored form)
Transform to speech code
Speak word "blue"

Figure 2.

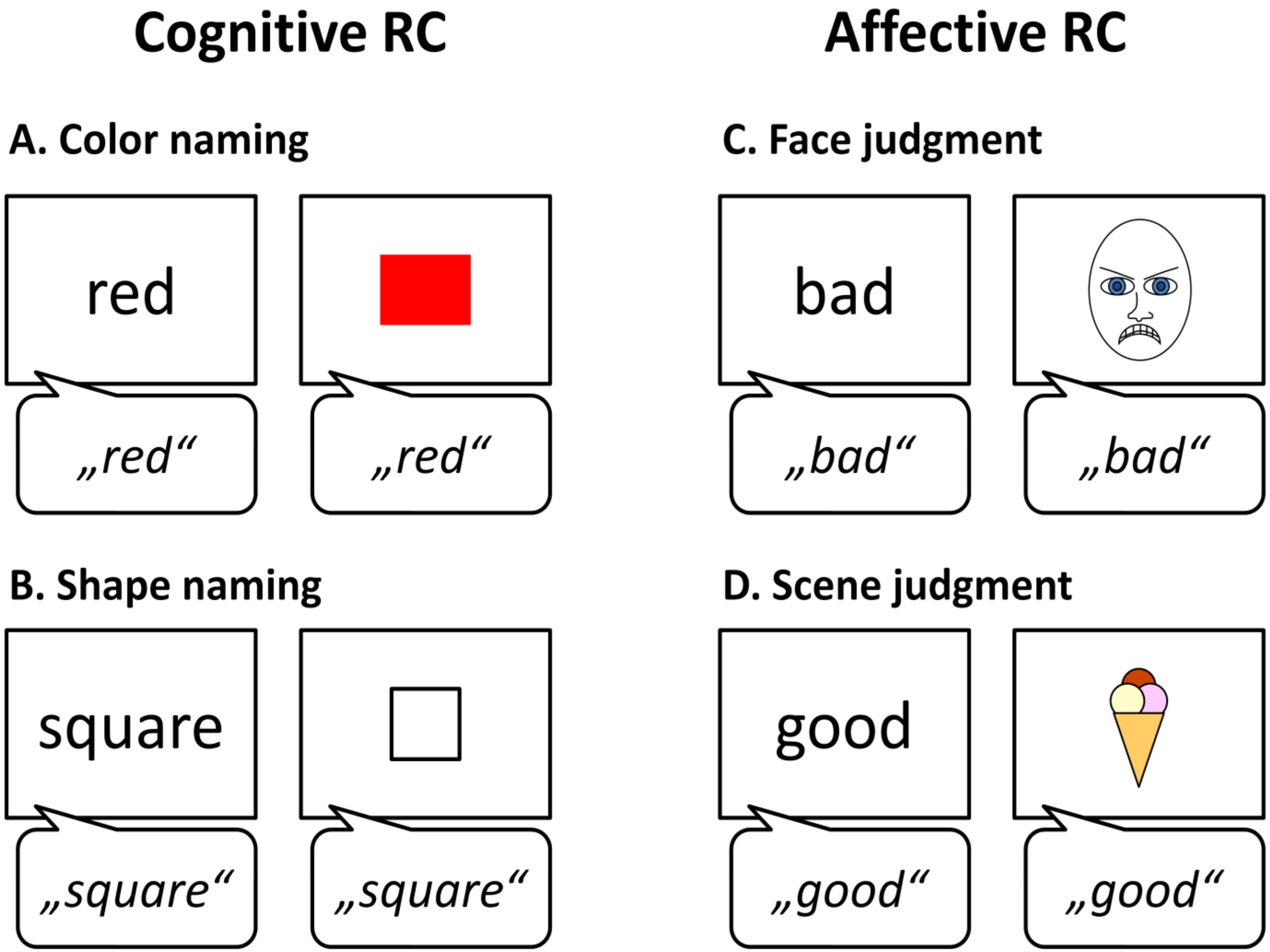
Cognitive RC
Affective RC
A. Color naming
red
„red“
„red“
C. Face judgment
bad
„bad“
„bad“
B. Shape naming
square
„square“
„square“
D. Scene judgment
good
„good“
„good“

Figure 3.

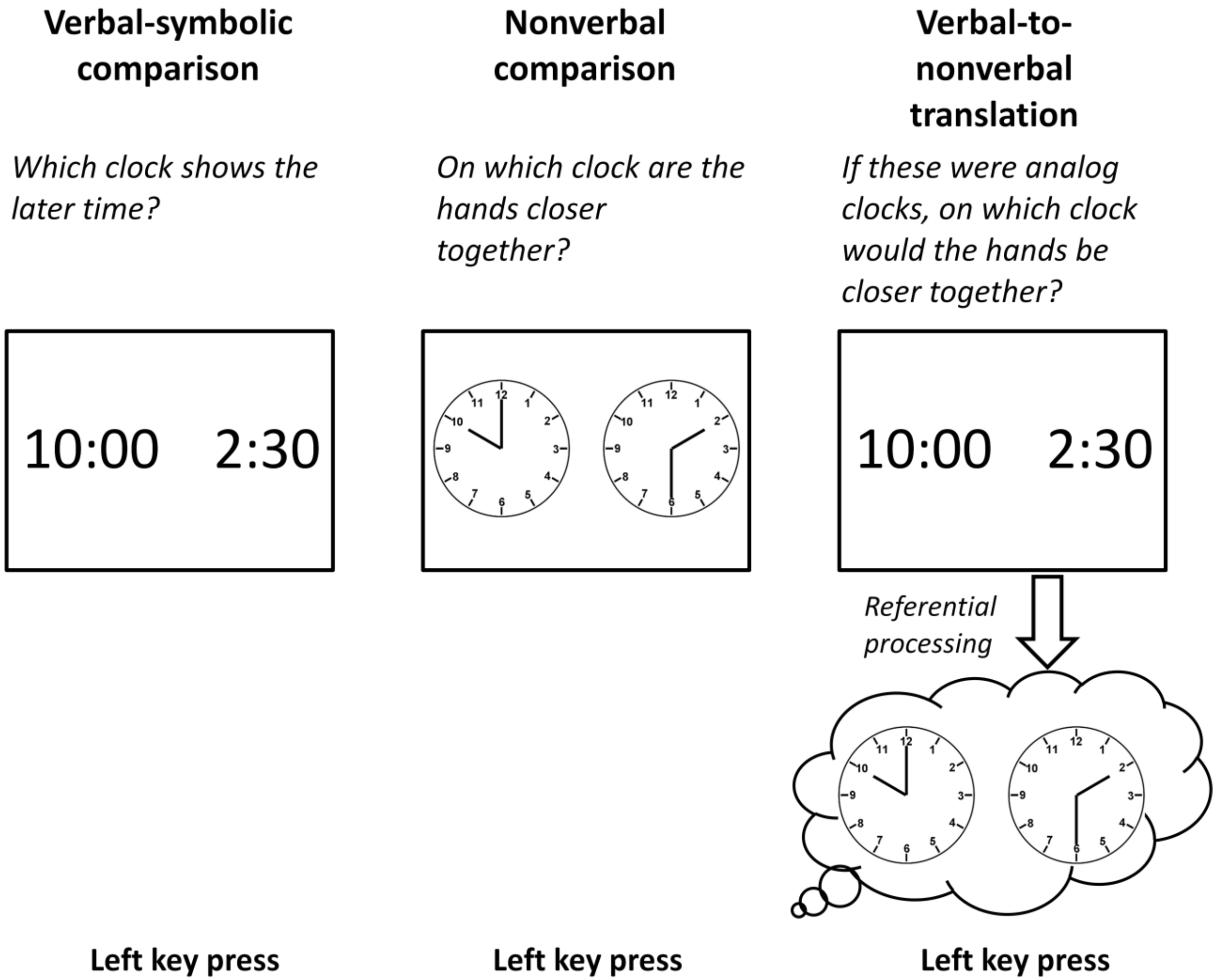
Verbal-symbolic comparison
Nonverbal comparison
Verbal-to-nonverbal translation
Which clock shows the later time?
On which clock are the hands closer together?
If these were analog clocks, on which clock would the hands be closer together?
10:00
2:30
10:00
2:30
Referential processing
Left key press
Left key press
Left key press

Figure 4.