Situatedness in Personality, Attitude & Rationality Research

– From Case Studies towards Criteria of Situated Models in Cognitive Psychology –

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Abstract

Situated cognition, the idea that cognition depends on the environment engaged in, has been proclaimed and defended by philosophers for almost half a century. Its implementation in cognitive psychology has remained largely unspecified by the philosophical debate, yet more and more empirical research is done under the label of situated cognition. Thus, in order to find criteria to guide situated modelling in cognitive psychology, I compare three empirical models that extensively reference situational features in explaining their respective research subjects. Specifically, I investigate the *Cognitive-Affective Personality System* (CAPS) in personality research, the *Associative-Propositional Evaluation* (APE) model in attitude research, and the *adaptive toolbox* in decision-making research. Two possible hands-on criteria to model situated cognition are extracted and reviewed: a *functional-cognitive distinction* and *if-then rules of situation-behaviour relations*. Finally, the possible gain in interdisciplinary exchange that situated models in cognitive psychology enable is discussed.

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To some philosophers it appears matter of surprise, that all mankind, possessing the same nature, and being endowed with the same faculties, should yet differ so widely in their pursuits and inclinations, and that one should utterly condemn what is fondly sought after by another. To some it appears matter of still more surprise, that a man should differ so widely from himself at different times; and, after possession, reject with disdain what before was the object of all his vows and wishes.

David Hume, *The Platonist*, 1758

Introduction

Cognition is comprehensible only with respect to one's body and the environment one is engaged in—i.e., according to philosophers arguing in favour of *situated cognition* (Clark, 1997; Gallagher, 2006; Wilson, 2002). Empirical researchers, however, traditionally model cognition in isolation. They take an *individualistic* stance on the mind (Burge, 1986; Wilson, 1997). If cognitive researchers want to take up situatedness, a different, more context-sensitive approach may be required. The intriguing and important philosophical debate on situated cognition, however, does not offer guidelines of how to implement situatedness in empirical models for at least two reasons. First, this is not the task of philosophy. Second, situatedness is an umbrella term that comprises concepts, which are possibly too diverse to give advice beyond the general idea of increased contextualization (Clancy, 2009). Yet, cognitive scientists have already proposed a variety of situated models (Robbins & Aydede, 2009a, p. 183ff.). If the philosophical debate lacks concrete guidelines for the empirical scientist, it may be worth to look into empirical models that are presumably situated.

Thus, I will focus on situated cognition research after a short overview of the philosophical debate on situatedness and the different schools of thought on situated cognition. I will consider empirical research that stands in contrast to traditional cognitive theorizing in that it regards situational factors as crucial determinants in modelling cognition. I will compare three such models exemplarily to investigate whether they share theoretical structures key to their situated modelling. Next, I will identify two criteria and discuss and evaluate their importance for situated modelling in cognitive science according to their positive impact on interdisciplinary exchange. In particular, I proceed as follows:

In *Chapter 1: Situatedness in Theory*, I give a short overview of the philosophical debate on situatedness and its core concepts and motivations. Specifically, I contrast the situated against the individualistic approach, introduce core concepts of situated cognition, the four E's, and put more flesh on why we should consider empirical research instead.

In *Chapter 2: Situatedness in Practice*, I offer three exemplary case studies. Firstly, I introduce traditional approaches to personality, attitude, and decision-making and the challenges they face because they do not account for the impact of the situation on cognition. Secondly, I sketch the situated models that overcome these challenges. The case studies include the *Cognitive-Affective Personality System* (Mischel & Shoda, 1995), the *Associative-Propositional Evaluation model* (Gawronski & Bodenhausen 2006), and the *adaptive toolbox* (Gigerenzer & Selten, 2002).

In *Chapter 3: Criteria of Situatedness*, I focus on how the three models conceive, conceptualize and account for situatedness. I discuss the two methodological criteria of situatedness that turn out to be more or less prominent in all three models, i.e., the *functional-cognitive distinction* and *stable if-then rules of situation-behaviour relations*.

In the last *Chapter 4: Situatedness Unites*, I evaluate the usefulness of situated models that fulfil the suggested criteria. I show that the exemplar models' situatedness offers interesting ways of relating their research subjects and leads to new research questions.

Chapter 1: Situatedness in Theory

What about *situated cognition* sets it apart from traditional approaches subsumed under the notion of the individualist conception of mind (Burge, 1986; Wilson, 1997)? Situatedness is the idea that a research subject interdepends on or varies with contextual, circumstantial, or environmental factors. The individualist conception refers to schools of thought such as cognitivism and representationalism. Broadly speaking, these approaches argue that cognition is based on algorithmic manipulation of symbols, a language of thought (Fodor, 1975). Accordingly, these *individualistic* conceptions suggest that our behaviour-generating cognitive system can be modelled as a symbol manipulator functioning quite independently of the non-symbolic input posed by the surrounding world.

The motivation for such a context-independent approach to cognition and behaviour is multi-faceted: First, in the Christian-occidental tradition we grant human agents the highest levels of autonomy (Gigerenzer & Brighon, 2009). Second, to conceptualise human agents within their own bodily boundaries and to read their intentions, comes naturally to us from infancy on (Baldwin & Baird, 2001; Blake & Shiffrar, 2007; Kanwisher et al., 1997). Third, the metaphor with which we describe the condition of the human mind and brain is crucially linked to technical developments (Daugman, 1993). Undeniably, in the 20th century the most prominent one has been the invention of computers, whose func-

tioning solely depends on their program (Turing, 1937). Furthermore, as Mischel (2004) notes, the empirically considered models are those for which data collection and analysis are currently feasible. The individualistic approach suggests that it is enough to consider what is happening in the brain to understand cognition. In contrast, testing situated models may require controlling and manipulating many external variables because of the assumed interdependency of cognition and the situation. This is more effortful and time-consuming and possibly requires collection and analyses of Big Data (Bollier & Firestone, 2010; Kitchin, 2014). Thus, taken together, these ideas make the individualistic approach appear fairly practically motivated but they also illuminate the conceptual motivation of why it ignores dynamic interactions between the environment and the individual.

Crucially, traditional cognitive models that explain how behaviour comes about often fall short explaining the behavioural variability (see *Chapter 2*). That is possibly because the variance in behaviour is motivated by the circumstances and not by the cognisers themselves. Situated approaches start out from a circumstantial perspective, suggesting that we are in a dynamic and interactive relation with our surroundings. This dynamic is central to how cognition evolved, develops, and continues to adapt. Situatedness can refer amongst many other things to our biographical, cultural, economic, or spatio-temporal involvement with our environment. Thus, the situated approach can be found in many disciplines of science.

With respect to cognition, the idea of situatedness can be traced back at least to Dewey's (1896) early criticism of the stimulus-response model of behaviour. But only in the last five decades, after system theory and complex system (Ashby 1961, von Bertalanffy, 1968) entered many related disciplines, it became a popular school of thought in philosophy of mind (Gallagher, 2009) and cognitive psychology (Clancy, 2009). Today it is a real alternative to the individualistic approach.

However, even only with respect to cognition, philosophers take situatedness to be “a many-splendored enterprise” (Robbins & Aydede, 2009b, p. 9), “a loose-knit family of approaches” (Wilson & Clark, 2009, p. 55), and a neither well-defined nor homogenous research program (Lyre & Walter, 2013). According to the understanding of these authors, situated cognition is an umbrella term encompassing many ideas and concepts, most importantly the four E's: embodiment, embeddedness, externalism, and enactivism. However, they also note that the usage and relation of these terms varies greatly across other literature. Sticking to their systematisation, the gist of the four E's is the following:

1. The *embodiment thesis* binds cognition to the bodily condition of the individual. Meaning is attributed to representations and behaviour with respect to the sensing and acting capabilities of an individual's body.
2. The *embedding thesis* states that humans actively rely on structures and features of their environment to improve their cognitive performance. Cognition exploits environmental structures and cognitive load is minimised by using the environment as its own model instead of having a representation of the environment in one's head.
3. The *extension thesis* builds on 1. and 2., stating that cognition is distributed across the individual and its environment. Cognition goes beyond the individual because it is about substance-neutral functional organisation of systems and processes.
4. The *enactivism thesis* argues that cognition emerges from the interaction of an autonomous system with its environment, and that many cognitive capabilities can be explained regardless of presence or absence of mental representations.

Much of the philosophical debate regarding the four E's is concerned with whether body and environment are only causally relevant or indeed constitutive for cognition (Robbins and Aydede, 2009b). However, while it is important to keep in mind the theoretical framework and its multiple facets, here, these philosophical concerns are of minimal interest.

More important are common ideas that apply to any version of situatedness. One such idea is that situatedness is adaptive (Dall et al., 2004; Gigerenzer & Todd, 1999; Smith & Semin, 2004; 2007). Roughly speaking, if the cognitive system evolved as a response to environmental pressures, it had to be sensitive to the environment in the first place and there is no obvious reason why it should have stopped being sensitive to differences in the environment. Our mental capacities have evolved and still adapt dynamically to take on the social and non-social challenges of survival and everyday life different environments pose. Moreover, we also alter the environments that impact us; we carve out (cognitive) niches that lead to further even more specified adaptation (Odling-Smee et al., 2003; Pinker, 2010). For each of the many challenging environments, evolution found fitting solutions. Because these solutions evolved with respect to specific problems, there is no incentive to assume that these solutions should be generally applicable solutions (Gigerenzer & Todd, 1999). Accordingly, our minds limitations become particularly obvious when we rely on the wrong solutions under the wrong circumstances. Unsatisfying results then emerge quickly, laying bare the biases of our cognitive system (compare Subchapter 2.5.). However, this context-specificity is no weakness; instead it supports the idea that being adaptive is being

situated.

Further common ideas of the different situated approaches are (Lyre & Walter, 2013): (1) the perception-action cycle—in an embodied and embedded agent perception and action have continuous and reciprocal effects on each other. (2) Solutions to cognitive problems should account for real-life interactions, i.e., they are ecological. The required effort should be appropriate in its temporal, energetic, and computational dimensions. (3) The body is not only a tool but also a resource that feeds cognitive processes. (4) Similarly, the environment is not only the source of problems, but it can also aid their solution.

However, it has also been voiced that grouping situated approaches like the four E's together overlooks their potentially quite different premises and implications, and that depending on one's understanding, they may even be incompatible (Menary, 2010). Thus, it is not surprising that Shapiro (2007, p. 338) writes that “saying more beyond ... vague claim[s] is difficult” and Wilson and Clark (2009, p. 55) call the search for an essence of situated cognition a “misplaced goal” of philosophising. Indeed, the search for a conceptual essence may be fruitless, but here I am concerned with the search for essential theoretical methods for modelling cognition in a situated fashion in empirical research.

Practical criteria for situated cognitive models possibly foster the empirical implementation of the well-developed and well-grounded situatedness movement in philosophy. They may also give a structure to the empirical models, which makes it easier to critically examine and evaluate them. In turn, this improves the cross-talk between philosophers and scientists, and their potential gains from the respective other side of research on situated cognition. Unfortunately, Clancy (2009, p. 16) suggests that with situated cognition “something new and conceptually difficult to assimilate was being introduced” which makes him continue that (2009, p. 28, my emphasis) “[f]rom an investigative standpoint, *the one essential* theoretical move is contextualisation.” Accordingly, the philosophical debate does not provide empirical researchers with a more concrete recipe for how to design a situated model.

Luckily, despite the current lack of criteria for what makes a good situated cognitive model, much empirical work has already been done under the many labels of situatedness. The research spans from perception and sensation, over memory and learning, decision-making, language, and consciousness to emotions and social interactions (Robbins & Aydede, 2009a, p. 183ff.). If the philosophical debate does not provide the criteria, then maybe it pays off to compare the commonalities of the empirical models, which are already considered situated. Such a comparison may provide common denominators—theoretical

features of situated modelling—that, despite their different research subjects and objectives, can serve as reference points in developing and evaluating situated models of cognition.

Chapter 2: Situatedness in Practice

The previous chapter provided a philosophical perspective on situated cognition. The philosophical debate offers good reason why we should consider the situated approach, but it does not provide any practical criteria for developing situated models. Hence, it may be worthwhile to consider the empirical research instead. The chapter at hand introduces research that is already considered situated, and attempts to derive the needed criteria from it.

This chapter investigates the *Cognitive-Affective Personality System* (Mischel & Shoda, 1995; 1998) in personality research, the *Associative-Propositional Evaluation model* (Gawronski & Bodenhausen 2006; 2007, 2011) in attitude research, and the *Adaptive Toolbox* (Gigerenzer & Todd, 1999; Gigerenzer & Selten, 2002) in decision-making research. I chose these models for different reasons: First, directly originating from work in the late 60's and early 70's (Mischel, 1968; 1973), the Cognitive-Affective Personality System is one of the first situated models of cognitive science. By conceptualizing personality the way it does, it moves personality psychology into the scope of cognitive research in the first place, allowing for a more comprehensive understanding of personality in the light of its cognitive basis (compare Subchapter 2.1 and 2.2). Second, the Associative-Propositional Evaluation model points out how an already fairly context-sensitive research program can still gain from expanding its situatedness in a minor but important step from a dual-system to a dual-process account. Third, the Adaptive Toolbox is probably one of the most prominent and widely applied exemplars of empirical research on situated cognition.

To highlight the value of these situated models, it is worthwhile to present them in relation to their individualistic predecessors whose problems they overcome. Accordingly, before introducing each model I will sketch the respective traditional approaches in personality, attitude and personality research and the challenges they face because of their tendency to disregard situational factors. Personality research faces the *personality paradox*, the observation that personality is stable, yet our characteristic behaviour is not (Ross & Nisbett, 1991). Attitude research is challenged by *acquisition confusion*, the observation that attitudes are sometimes flexible, sometimes rigid, while they are conceptualized as either of them (Gawronski & Bodenhausen, 2006). Finally, decision-making research is troubled by

the *rationality dilemma* according to which either, our standards of rationality are inadequate, or, human agents are irrational because they usually do not meet these standards (Arkes et al., 2015). Each challenge is quite different, yet all of them have three things in common: They arise from the explanatory limitations of the individualistic conception regarding behavioural variability, and they can be explained away from a situated perspective. Note that in the following subchapters I introduce the context and sketch the models quite generally. Their evaluation with respect to the criteria of situatedness I leave to the third chapter, so that those subchapters the reader is already acquainted with can be skipped without losses.

2.1. Traditional Personality Research and its Troubles

Personality is the collection of qualities that describe an individual's characteristic tendencies to think, feel and behave. Psychology of personality investigates the defining characteristics and their variation across the population. Personality assessment has been and still is most prominently based on one or the other version of the Five Factor Model (Digman, 1990). Today most in use is the NEO-PI-R (Costa & McCrae, 1992) which suggests five independent personality traits, known as the Big Five or OCEAN: (1) *Openness to experience* which contrasts one's creativity and curiosity against one's consistency and cautiousness; (2) *Conscientiousness* which contrasts efficiency and organisational skill against one's tendency to be easy-going and careless; (3) *Extraversion* which contrasts one's sociability against one's tendency to remain solitary and reserved; (4) *Agreeableness*, which contrast one's cooperativeness against one's competitiveness; and (5) *Neuroticism*, which contrasts one's sensitivity and nervousness against one's confidence. Individual differences along the Big Five are assessed by means of between-person comparisons, which have been shown to remain fairly stable within important stages of life (Roberts & Mroczek, 2008).

Personality assessments like the Big Five abstract from contextual differences. They assess general behavioural tendencies, i.e., are based on the frequency with which characteristic behaviour occurs. Contextual variations become noise that is averaged out by means of an assessment that focuses on the differences between individuals, not contexts. Furthermore, the NEO-PI-R states that each trait can have many different cognitive origins, which is known as *equifinality* (Costa & McCrae, 1992). Accordingly, there is no one-to-one mapping between the cognitive structures that are at the basis of an individual's personality and that person's rating on the Big Five personality test (Cervone, 2005).

Because of the Big Five's equifinality and their non-contextual assessment, they must

leave behavioural variance at the level of the individual unexplained (Cervone, 2005). With respect to extraversion, for example, it has been observed already in the early days of personality research that different individuals express their extraversion differently in different situations, despite their similar scoring on the between-person rating scales (Newcomb, 1929). On another note, introverts have been regularly found to be very able to behave extraverted (Little, 1996; 2008). Personality psychologists may be very aware that with traditional assessments based on between-person comparison, valuable information about the individual is lost, yet they often discard this fact (Dale & Vernon, 1964; Epstein, 1979; Woodhams et al., 2008). Eventually, one's Big Five rating is a bad predictor of one's behaviour (Cervone, 2005). That it is possible to measure low variance regarding an individual's personality and high variance regarding their behaviour appears to be an incongruent observation known as the *personality paradox* (Ross & Nisbett, 1991). In other words, a stable personality and diverse behaviour do not appear to match up; how can stability result in variability? After all, our personality is assumed to affect our behaviour in characteristic ways.

Luckily, the paradox can be dissolved by elaborating on Kurt Lewin's Field Theory (1951), which states that behaviour is a function of not only personality but also the environment. It has been argued that the paradox of behavioural diversity despite stable personality traits arises only from a cross-contextual perspective, as it is taken relying on between-person comparisons (Mischel & Shoda, 1995). In a given context, individuals indeed show stable patterns of behaviour. In other words, *intercontextual* behavioural variability—better known as the *intraindividual* variability—accounts for the behavioural diversity, while *intracontextual* behavioural stability accounts for a stable personality. Thus, the personality paradox does not arise in a conceptualisation of personality that is based on intracontextual stability. Mischel and Shoda's (1995; 1998) Cognitive-Affective Personality System does exactly that. In doing so, the otherwise paradoxical behaviour becomes the very signature of personality, and personality research itself becomes a part of cognitive science.¹

¹ Interestingly, investigations of the relation of personality and cognition has only recently begun (Griffin et al., 2015). Although this new field of research emerged after the rise of situated cognition, situatedness has yet been widely neglected. A review by Soubelet and Salthouse (2011) analysed studies correlating the Big Five and cognitive abilities like intelligence, memory and perceptual speed. However, only openness and intelligence correlate strongly. The lack of other straight forward correlations is not surprising given the equifinality and non-contextual assessment of the Big Five.

2.2. Situated Personality Research: The Cognitive-Affective Personality System

The Cognitive-Affective Personality System (CAPS; Mischel & Shoda's, 1995; 1998) suggests that personality is grounded in a network of mediating units encompassing affective and cognitive processes whose interactions manifest in *stable if... then... situation-behaviour relations*. The processing structures and dynamics at the heart of characteristic dispositions are defined as follows (Mischel & Shoda, 1995, p. 257; italics in the original):

The *processing structure* of the disposition consists of a characteristic set of cognitions, affects, and behavioural strategies in an organization of interrelations that guides and constrains their activation. The *processing dynamics* of the disposition refer to the patterns and sequences of activation among the mediating units that are generated when these individuals encounter or construct situations with relevant features.

The authors suggest a network linking mental and behavioural capabilities in a response system which forms the processing structure. The processing dynamic to the activation of the structure according to the way the nodes of the network are connected, e.g. strongly or weakly, excitatory or inhibitory. The theory assumes that the nodes are highly interconnected, but only a few of these connections are *functionally important*, as established by social learning and reinforced by feedback activation. The activation of a specific pattern bringing about a specific behaviour depends on the interconnection of the network nodes and on the initial activation of the network given the perceived or imagined psychological features of given situation.

The construal of the situation is key. It depends itself on the individual's learning history and on it depends which situational features actually have a psychological effect on the individual and their behaviour. Objective contextual differences like whether the individual is in a leisure or work context are less important than individuals' subjective construal like whether they interact with a peer or an authority, or whether they are praised or blamed (Wright & Mischel, 1988). Situations with a similar set of features functionally important to the individual activate its cognitive-affective structure similarly, resulting in similar behaviour, while the opposite is true for situations with different situational features. Regularly occurring pairs of situational features and behavioural patterns can be said to form *stable if... then... situation-behaviour relations* on which CAPS definition of personality is based.

The mediating units of the cognitive-affective system incorporate (a) *encodings*, the categories and constructs by which an individual represents the world; (b) *expectancies and beliefs* an individual holds about themselves, their surrounding and the future; (c) *affects*, the

affective responses, feelings, and emotions; (d) *goal and values*, the motives, passions, and affective states regarding desired and unwanted outcomes; and (e) *competencies and self-regulatory plans*, i.e. scripts, plans, strategies for action. Behaviour and personality can only be correlated with respect to these features of the individual's personality system and their specific interplay in a given situation. The specifics of the processing structure and dynamics lead to characteristic behaviours in response to the situational features that affect the network. In other words, how a person behaves, depends on how they perceive the world, what they are striving for and expect to happen, as well as on their current emotional and motivational state and on their habituated behavioural responses. In this interactive relation of the individual and the situation lies the essence of personality, according to CAPS.

To the degree to which the individual's cognitive and affective state and the relevant situational features are known, individual-specific if... then... situation-behaviour relations can be formulated. The behavioural consistency as expected to result from a stable personality is present only in as far as there is state- and feature-dependent regularity to an individual's behavioural variability. Only then can these stable relations be used to generalize across individuals or situation. Accordingly, on the one hand, individuals can be grouped together with respect to the situation-behaviour relations applying to them. On the other hand, given a new situation that possesses the relevant situational features, the behaviour of these individuals can be predicted much more accurately than from their Big Five profiles. For example, Downey and Feldman (1996) have shown that males classified as *rejection-sensitive* behave particularly caring or extremely controlling in their relationship depending on whether or not they experience rejection. Such men may all score high on the Big Five neuroticism scale but this has no predictive power regarding their next encounter with their partner. Furthermore, it groups them together with individuals who may be similarly neurotic (on an abstract level) but may be so for different reasons, in different ways, in different situations.

Interestingly, laymen's personality judgments have also been shown to depend on situation-behaviour relations in two ways. First, it has been shown that subjects' judgments of someone's personality change as changes in that person's behavioural patterns occur (Shoda et al., 1989; Kammrath et al., 2005). Second, subjects have also been shown to judge their own trait consistency in accordance with the stability of the relevant situation-behaviour relations, but not in accordance with their overall cross-situational behavioural consistency, or rather inconsistency (Mischel & Peake, 1982; Mischel & Shoda,

1995). Thus, defining personality in terms of situation-behaviour relations does not only lead to better predictions of individual behaviour; it also appears to be the way people naturally judge as personality—at least, insofar as they gather more and more contextual information regarding a person.

In summary, CAPS is a process model of personality that does not consider the variability of behaviour as noise but—given the variability is composed of context-specific invariance—as the very signature of personality. As a framework theory, the details regarding CAPS’ processing structures and dynamics are supposed to be provided by other fields of cognitive science. By conceptualizing personality in terms of stable if...then...situation-behaviour relations and decomposing situations into the features meaningful to the individual, CAPS offers a toehold for the fields that investigate encodings, expectancy, affect, goal pursuit, habituation and the like. As I will show later (*Chapter 4*), the Associative-Propositional Evaluation model and the Adaptive Toolbox, both may be such filler models to CAPS.

2.3. Traditional Attitude Research and its Troubles

Attitude is one of the oldest concepts of psychology. After reviewing the literature of his time, Allport (1935, p. 810) defines an attitude as: “a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual’s response to all objects and situations with which it is related.” This definition of attitude sounds already quite situated, in fact, much more so than today’s working definition of attitude as a “valenced evaluation of something” (Wood & Fabrigar, 2015), whereby “something” is the attitude object which can be a person, object, concept, event, action and the like. The “valenced evaluation” refers to the attractiveness or aversiveness, the liking or disliking, of the attitude object. A common way of categorizing attitudes relies on a two-system account whereby attitudes can either possess features of the first or the second system, i.e., they are either conscious, controlled, and flexible, or they are unconscious, automatic, and rigid (Greewald & Banaji, 1995; Wilson et al., 2000). Explicit attitudes often refer to the first kind and implicit attitudes to the second, although this distinction arises from differences in attitude assessment. Explicit attitude assessment is based on questionnaires, while implicit attitude assessment is based on performance measures, e.g. response time in tasks like the implicit association test or the sequential priming task (for an overview see Gawronski, 2009).

Two questions are central to attitude research: First, how attitudes are acquired? Second, how do attitudes influence behaviour? While it is fairly uncontroversial that implicit and explicit attitudes can have diverging behavioural outcomes (Fazio & Olson, 2003; Strack & Deutsch, 2004), the mechanisms underlying attitude acquisition, i.e., their formation and change, are highly disputed because of ambiguous evidence. On the one hand, implicit attitudes are assumed to result from primary socialization processes which should make them particularly rigid and difficult to change later on, while explicit attitudes remain flexible and under deliberative control throughout life (Petty, 2006; Rudman, 2004, Wilson et al., 2000). On the other hand, measures of implicit attitudes regarding one and the same attitude object turned out to vary greatly with context (Gawronski et al., 2010). Indeed, attitude research has led to a vast amount of studies with contradictory observations regarding the stability (Rudman, 2004; Wilson et al., 2000), context-dependency (Barden et al., 2004; Wittenbrink et al., 2001), and robustness (Gawronski & Strack, 2004; Gibson, 2008; Gregg et al. 2006; Olson & Fazio, 2006) of implicit and explicit attitudes. For example, Dasgupta and Greenwald (2001) showed that negative implicit but not explicit attitudes towards African Americans decreased after presentation of disliked Caucasians and admired Africans. The same dynamic occurred with respect to attitudes towards the elderly after presentation of disliked young and admired old individuals. Here, the presumably rigid implicit attitudes appear to be quite flexible, while the presumably flexible explicit attitudes remained unchanged. The conflicting evidence regarding the flexibility and rigidity of attitudes of either kind I call the *acquisition confusion*.

What is required is to spell out whether, how and when circumstances affect implicit and explicit attitudes, and how implicit and explicit attitudes affect each other. To do so Gawronski and Bodenhausen (2006; 2007) proposed the Associative-Propositional Evaluation model that explains the ambiguous differences in implicit and explicit attitude acquisition by means of a dual-process instead of a dual-system model. The two processes can be flexible or rigid, depending on the circumstances that affect them. By structuring attitudes not according to the features of two systems, but according to two ways of processing, whether the processes are conscious or unconscious, automatic or controlled, rigid or flexible, becomes secondary. What is more important is which kind of process a situation allows for, e.g., by the temporal constraints the situation sets on responding.

2.4. Situated Attitude Research: The Associative-Propositional Evaluation model

The Associative-Propositional Evaluation (APE) model (Gawronski & Bodenhausen, 2006, 2007, 2011) is set in a functional-cognitive framework (De Houwer et al., 2013). Within this framework, behaviour is not understood as a proxy of attitudes as it is in today's working definition with attitudes as evaluations (Wood & Fabrigar, 2015). Instead, the framework suggests that a strict terminological and conceptual distinction between attitudes on the cognitive level of analysis and evaluative behaviour on the functional level is necessary. On the functional level, there is only the observation of evaluative behaviour and its causal explanation with respect to the situation in which it occurs. The evaluative behaviour can either be an *affective response* or an *evaluative judgment*. On the cognitive level, the attitudinal processes, the cognitive-affective mechanisms by which the causal relation of evaluative behaviour and situation is established, can be inferred from and adjusted to the observations on the functional level. Thus, the cognitive and functional levels of analysis support each other if, by drawing on observations on the functional level, a model of attitudes on the cognitive level can be established that allows for predictions about the evaluations on the functional level.

According to the APE model, there are two attitudinal processes, an associative and a propositional one. Mostly evaluative conditioning forms associations. Evaluative conditioning is the pairing of a neutral stimulus with an affective one, whereby the affect is also associated with the previously neutral stimulus. The collection of affective associations forms an associative network. Activation of this associative network causes an affective response, which is determined by the pattern of activation depending on the network structure, dynamics, and on the network-effective situational features—just like in CAPS. For example, one and the same individual, here Michael Jordan, is evaluated differently depending on whether the evaluation context suggests categorizing him by race or occupation (Mitchell et al., 2003).

But different from CAPS, in the APE model more details regarding the features of its suggested network, as well as its other structures and processes, can be given. The most important feature of the association network is that its associations are accuracy-neutral and don't require the individual to consider them right or true. In other words, for an association to elicit an affective response it neither matters whether the individual agrees with the direction the affect takes, nor that the encounter with the attitude object actually has the positive or negative effect that would justify the positive or negative affective response.

The propositional process hijacks the associative process. Due to a yet unspecified process, so far only described as “gut feeling” (Gawronski & Bodenhausen, 2011, p. 62) the association-based affective response can be put into propositional form on which evaluative judgments are based. The content of the proposition is about the attractiveness or aversiveness, the liking or disliking of the attitude object, and initially matches the direction of the affective response. The proposition can enter a more thorough evaluation process regarding its accuracy in a given situation. The APE model suggest that a propositions accuracy is assessed by a consistency check based on syllogistic reasoning comparing the attitudinal proposition with other propositions which encompass other evaluations as well as beliefs and expectations.

Importantly, this consistency check is highly dependent on the circumstances; only propositions relevant to the situation are usually considered. The less time for evaluation there is, the higher the chances the propositional judgment only reflects the current underlying association of the attitude object. More time allows for a more thorough consistency check, i.e. more propositions relevant to the situation can be considered. However, such effort is usually only made in cases of cognitive dissonance, i.e. when the propositions considered so far turn out to be inconsistent. Consistency is achieved by taking more propositions into consideration. Doing so either makes the situation an exception that allows the individual to hold on to contradicting propositions, or one of the propositions is eventually rejected, in which case the evaluative judgment will deviate from the affective response.

Interestingly, the model assumes that consideration of further propositions lead to the activation of further associations whereby new associative links may be established that change the associative network. Indeed, the effect the associative and propositional evaluation processes have on each other can be unidirectional, as well as reciprocal, depending on the situation (for a detailed discussion see Gawronski and Bodenhausen, 2006; 2011). One feature of associations in this respect is that they have been shown to be quite resistant to extinction (Baeyens et al., 1988; Gawronski et al., 2015). However, associations can be reshaped by forming new, additional associations which will change the affective response in a given situation towards a given attitude object. The theory suggests that the first association towards an attitude object is usually represented independently of context, while subsequent deviating evaluations are associated with the context in which the deviation occurs (Gawronski et al., 2010). Furthermore, it has been shown that contexts that are conceptually or perceptually similar to such association-effective contexts will activate the same asso-

ciations and lead to similar affective responses (Gawronski et al., 2014). This indifference regarding conceptual and perceptual difference is one reason why associations are accuracy-neutral.

In summary, the APE model grounds attitudes in two evaluative processes, which evaluate an attitude object with respect to the context in which it is encountered. Previous encounters shape the processing structures and dynamics, and the current situation determines the activity of these processes and thus the behavioural outcome. Propositional evaluations, i.e. evaluative judgments, are indeed conscious, but whether they can be deliberately changed depends much on how well they fit into the current belief system. The better their fit, the less likely it is that they are deliberately changed. Associative evaluations, i.e., affective responses, in contrast, are indeed automatic, but may or may not be conscious. They are rigid insofar as the associations cannot be dissipated, but also flexible insofar as the new context-specific associations for the same associative object can be formed. Thus, the APE model solves the acquisition confusion by disentangling the evaluative behaviour and the attitudinal process, and by specifying under which conditions attitudinal processes form, function and change.

2.5. Traditional Decision-Making Research and its Troubles

Rationality is commonly defined as the quality of being based on or in accordance with reason or logic. Rationality is also commonly assumed to be the defining feature of humans—*homo sapiens*—because our actions are particularly logical and reasonable. Thus, traditional models of decision-making in psychology and economy assume that behaviour is rational when it mirrors an optimization process constrained by the rules of logic and the laws of probability (Bell & Raiffa, 1988). In other words, logical or statistical *coherence* and *consistency* are typical standards of rational behaviour. If these standards are violated, the behaviour and thus the agent is considered ‘irrational’ or ‘biased’ (Tversky & Kahnemann, 1985).

An exemplary list of studies that considered decision-making coherent given it satisfies a single syntactical rule like *modus tollens*, statistical independence or transitivity, is offered by Arkes and colleagues (2015). Other, more complex models relate rationality to Bayes’ rule or expected value and expected utility maximization like *homo economicus* (Berger, 2013). Within the framework of these traditional models of decision-making, it is commonly argued that failing to meet the respective criteria of rationality is disadvantageous (Yates, 1990). Take, for example, transitivity as the single semantic rule of rationality,

which postulates that a preference for A over B and B over C implies a preference of A over C. Someone who violates this rule preferring C over A is not only considered incoherent, they could also be taken advantage of by being turned into a ‘money pump’ (Echennique et al., 2011). If an optimizing agent has such circular preferences it should be possible, in principle, to sell them one option and to continuously sell them the respective better option of the intransitive triple in subsequent sales without the buyer ever actually being better off.

In all experiments listed by Arkes and colleagues (2015), participants failed to make decisions according to any of the proposed rules of rationality and the different researchers suggested a variety of cognitive fallacies and biases responsible for the respective failures (comp. *ibid.*, table 1, p. 21). For example, subjects have been shown to be indeed intransitive. However, in none of the 107 experiments on transitivity reviewed, no subject has actually been turned into a money pump, because these subjects learned about their initially intransitive preferences and corrected their preferences on the spot. But if humans barely ever meet any of these so-called standards of rationality, by which right do we call ourselves rational? This is the *rationality dilemma*: either our standards are inadequate or we are not rational.

To illustrate the case, studies have shown that (1) depressed individuals are more realistic, i.e. less optimistic, about the future than healthy controls (Korn et al., 2014), (2) autistic individuals are more logically consistent than healthy controls by not falling for framing effects, i.e. they are less biased by how information is presented (De Martino et al. 2008), (3) patients suffering from a damaged amygdala are less loss averse, i.e. they weight gains and losses more equally (De Martino et al., 2010), and (4) individuals with a tendency for psychopathy behave more economically advantageous by accepting even unfair offers in an ultimatum game (Osumi & Ohira, 2010). If it is those individuals deviating from the norm, sufferers of one or the other condition, who are more rational than the average person, then we should either stop consider us rational beings or rethink our standards of rationality.

Research done by Gigerenzer and colleagues (Arkes et al., 2015; Gigerenzer & Brighton, 2009; Gigerenzer & Selten, 2002; Gigerenzer & Todd, 1999) argues in favour of a new standard of rationality, i.e. bounded or *ecological rationality* (Simon, 1956). According to ecological rationality, we do not make optimal decisions but satisficing ones. That does not necessarily mean that we are worse off, but that instead of looking for the optimal or logi-

cally consistent solution, we search through the available options until an acceptable one is found. Such decisions are assumed to be rational, because they respect the situational constraints and they are most efficient given the circumstances. Thus, they take a situated stance on what our cognitive system is capable of and what rationality is about. In what follows, I will present this alternative standard of rationality in more detail and discuss how humans equipped with an *adaptive toolbox* of decision making rules are able to meet this alternative standard of rationality (Gigerenzer & Todd, 1999; Gigerenzer & Selten, 2002).

2.6. Situated Decision-Making Research: The Adaptive Toolbox

Ecological rationality is the overarching theory framework in which the adaptive toolbox (AT) is anchored. As conceptualized by Gigerenzer and colleagues (1999; 2002; 2004; 2009; 2015), it is concerned with the match between the structure of information in the world and its representation in our cognitive system. In as far as both fit together—with respect to efficiency, not accuracy—, *heuristics*, mental shortcuts and rules of thumb, can be very rational solutions despite being biased and ignorant of available information. Their multiplicity owed to their context-specific applicability forms the AT.

Two subfields of ecological rationality research are *bounded* and *social* rationality. Bounded rationality focuses on decision-making given scarce resources and uncertainty, including, amongst others, limited time, computational powers, and information about alternatives, risks and consequences. Social rationality is particularly concerned with the match of the structure and representation of information between the social environment and the mind. In contrast to bounded rationality, which focuses on cognitive heuristics, here the focus lies on heuristics that rely on and exploit affect and social norms (Hertwig & Herzog, 2009).

The assembly of the specialized cognitive and affective mechanisms forms the AT in which biases and heuristics are merely regarded as the most prominent tools of inference and reasoning (Gigerenzer & Todd, 1999; Gigerenzer & Selten, 2002). In other words, the AT is a set of efficient rules of thumbs, of which we use whichever rule fits a given situation best to make a rational decision. Each heuristic of the AT can be defined as an *if-then decision rule*. Take, for example, the recognition heuristic (Goldstein & Gigerenzer, 2002) which relies on absolute recognition, and the fluency heuristic (Jacoby & Dallas, 1981) which relies on relative recognition, i.e. retrieval speed. Both belong to the class of one-reason, take-the-best heuristics, which make use of simple features of our memory system.

The recognition heuristic says: “If one of two alternatives is recognized, infer that the recognized alternative has the higher value on the criterion.” The fluency heuristic says: “If both alternatives are recognized but one is recognized faster, infer that the one recognized faster has the higher value on the criterion.” These and every other heuristic can be decomposed into three (if-then) sub-rules—a search rule, a stopping rule and a decision rule. The combination of these sub-rules that make a heuristic is modular, and depends on the demands of the decision situation and the restrictions set by it and the cognitive system. Compared to the linear or polynomial models of optimization and maximization, such heuristics are fast and frugal due to the computational simplicity of these rules. A single cue that happens to correlate with the criterion in question can be enough to bring about a decision.

However, this is only possible because the efficiency of heuristics is bound to the situation. In that, heuristics stand in glaring contrast to traditional models of decision-making, which usually propose that our cognitive system offers generally applicable computational solutions. Beside the assumptions that the world is uncertain and the agent does not know about all options, outcomes, and their probabilities, AT assumes additionally that ignorance of information can be rational, which just adds to its contrast to traditional decision-making theories. In accordance with the dictate of the *accuracy-effort trade-off*, which states that the more effort is put into a decision, the more accurate it will be, traditional theories assume that all the available information must be taken into account to make the best decision. In contrast, ecological rationality suggests that sometimes *less is more*, because sometimes more information and effort can be detrimental beyond the mere increase of cost with effort.

The reason has to do with the *bias-variance dilemma*, which the AT solves differently than the traditional decision-making theories (Gigerenzer & Brighton, 2009). The prediction error of any model on which decisions can be based can be decomposed into bias, variance, and noise. Ideally a model would minimize both bias and variance, because a biased model may not be sensitive enough to the structural patterns of the environment, i.e. underfitting, while high variance may make the model too sensitive, confusing important patterns and noise, i.e. overfitting. However, the trade-off between bias and variance implies that a decrease in variance comes with an increase in bias and vice versa. Traditional models of decision-making minimize bias and accept higher variance because it makes their solution more flexible and thus more generally applicable to different decision situations.

But high variance makes these models also weak predictors because of their oversensitivity to noise.

Heuristics, on the other hand, minimize variance in trade for a higher bias. Less prone to noise, they make robust predictions, which is important for decision-making in an uncertain world. However, they acquire this robustness for the price of inflexibility, which is why heuristics only work if they are applied in the right circumstances, i.e. when the simple perceptual or cognitive cues they rely on actually correlate with the decision criteria in question. For example, for a tennis novice, recognition of tennis players depends on the players' presence in the media the novice is acquainted with. If a player's success in tennis tournaments and the player's media presence are correlated (*ecological correlation*), then the novice can make a fairly accurate guess of who will win the next tournament just by recognizing one player but not the other from the news (*surrogate correlation*, Scheibehenne & Bröder, 2007). However, the recognition heuristic the novice relied on in this example will fail, if the media the novice is acquainted with is not representative of the players' success but concerned with hearsay of the player's private life, because the novice will recognize the players for the wrong reasons.

This dependency on cue-environment correlations and the computational simplification that biased decision-making allows for enables heuristics to defy the accuracy-effort trade-off. It says that a good decision is bound to costly and time-consuming information gathering and computation, which is why heuristics can only be either fast or accurate, not both. But consider, for example, evidence that reduced input improves language acquisition (Elman, 1993), time pressure improves expert's handball play (Johnson & Raab, 2003) and expert golfer's putting (Beilock et al., 2002; 2004), and that forgetting about alternatives improves guesswork (Schooler & Hertwig, 2005). These studies are at odds with the common assumption of the accuracy-effort trade-off. Accordingly, Gigerenzer and Brighton (2009) argue for a *less-is-more effect*, stating that under certain circumstances more information and more computing is not only more costly and effortful, it can also decrease accuracy because of the noise-sensitivity of high-variance-low-bias solutions. But a heuristic low-variance-high-bias solution can be faster and more accurate, if utilized under the right circumstances.

In summary, the AT suggests that being biased is not necessarily bad. Relying on context-specific heuristics and biases, instead of solving all kinds of complex problems with one ingenious computation algorithm is advantageous and reasonable. In this light, human

are rational because they utilize the appropriate cognitive tools in a given situation and the task at hand, not because they are equipped with an all-purpose instrument.

Chapter 3: Criteria of Situatedness

After contrasting traditional and situated approaches in personality, attitude, and decision-making research along the difficulties of the former, I will turn to situatedness more generally. In this chapter I want to discuss first the respective understanding situatedness amounts to in each of the presented fields of research, and second whether we can derive helpful hands-on criteria from them. To this end I will turn back to each of the three situated models and focus exclusively on their core features that enable them to grasp situatedness conceptually. Afterwards I will discuss the two criteria I find most crucial for situatedness in these models: first, the *functional-cognitive distinction* which has been made particularly explicit in reference to the APE model; second, the *if... then... situation-behaviour relations* which is particularly prominent in CAPS, but also in AT. Because the if-then rules can be understood as a specification of the functional level of the functional-cognitive distinction. I will start with the discussion of situatedness in the APE model.

3.1. Situatedness in the Associative-Propositional Evaluation model

As a dual process theory, the APE model tries to grasp how different behavioural responses to the same attitude object depend on the circumstances of evaluation and on mediating attitudinal processes. The first process is associative and leads to quick, affective responses. The second propositional process allows for evaluative judgments that can be contrasted against other beliefs. Furthermore, the APE model focuses on attitude formation and change (Gawronski & Bodenhausen, 2006, 2007, 2011).

According to the APE model an attitude is either of the two processes. Which process, and thus which behavioural response is relied on, depends on the situation. In this case situation is understood as the context of evaluation, the background in front of which, or the frame within which, an attitude object is evaluated. Because the evaluation process is active, and the direction it takes is so dependent on the situation, the evaluative response cannot be taken as a straightforward behavioural proxy of the attitude towards the attitude object (De Houwer et al., 2013). Instead, it only reflects the attitude towards the attitude object in this or that evaluative situation. Which response an attitude object elicits, is moderated by the current situation and the learning history of the individual. Thus, besides the

individual, the situation is a core determinant of behaviour in the APE model.

Finding patterns of how the situation mediates evaluative responses of individuals enables making inferences regarding the formation, characteristics, and change of the cognitive processes at work. To do so, the distinction between the functional and the cognitive level of analysis has been highlighted not only with respect to the APE model (De Houwer et al., 2013). The functional level is concerned with *when* evaluations are *moderated*, and the cognitive level with *how* evaluations are *mediated*. The functional level explains under which conditions which features of an evaluation situation lead to what kind of evaluation. An important assumption here is that there is the right causal relation between the situation and the evaluative behaviour that form a functional unit of interpretation². For example, a person's laughter after a joke is the effect of its funny punchline, and not a response aimed at humiliating the joker after a bad punchline. The cognitive level explains how the situation-behaviour relation on the functional level is realised on the cognitive level, i.e., which cognitive-affective processes are at work in the formation of evaluative behaviour.

A clear terminological distinction between the mental construct and the behaviour it relates to is important for the functional-cognitive distinction. In case of the APE model those are attitude and evaluation. Again, this relation should not be understood as a linear one, which would make evaluation a proxy of attitude. Yet, the two levels of analysis have to support each other: The functional level should offer the empirical basis in which cognitive theorizing is grounded. On the cognitive level, the elements of the functional level should be organised and related with reference to the cognitive-affective processes. Then formulating and testing predictions on the functional level that result from the assumed mechanism on the cognitive level can be used to refine the model on the cognitive level.

Doing so has, for example, led to the refinement of the stimulus-context relation and its effect on the evaluative responses in the APE model. Not only has it been shown that the outcomes of implicit and explicit measures can differ (Fazio & Olson, 2003; Strack & Deutsch, 2004) but also that the outcomes of implicit (Gawronski et al., 2010) and explicit (Rydell et al., 2007, Wilson et al. 2000) assessments of attitude can diverge due to contextual factors. Implicit attitudes of the same attitude object, for example, can differ across context in the following way (Gawronski et al., 2010): The formation of a positive

² Note that neither the APE model nor its functional-cognitive framework explicitly mention that the situation-behaviour relation on the functional level can be structured in if-then situation-behaviour relations, as is done especially by CAPS (see next subchapter). However, CAPS in turn does not explicitly mention the functional-cognitive distinction.

association toward an attitude object O is common and will result in positive affective responses towards O not only in context A, but also in context B, C, D, and so forth. However, in context K, I may have learned to evaluate O negatively. This negative association is context-dependent, but not restricted to context K either, as it will also be active in other contexts that are conceptually or perceptually similar to K. Explicit evaluations of O may differ across yet other conceptual and perceptual dimensions and contexts. The clear distinction between the functional and the cognitive level of analysis enables to give such a differentiated view on attitude acquisition and expression, only because it gives room to the situation as a moderator.

3.2. Situatedness in the Cognitive-Affective Personality System

Designed as a framework theory that allows to integrate different fields of social cognition (Mischel, 2004), CAPS remains a coarsely formulated metatheory. It merely lays out the general dynamics and important parts of the cognitive-affective structure that lies at the heart of personality. The specifics are left to be filled in by other fields of cognitive sciences. Yet, CAPS offers enough to give a situated view on personality in which contextualized behaviour is broken down into its essential features and grouped according to stable if... then... situation-behaviour relations. These relations are the defining characteristic of the model as well as of its object, personality.

CAPS tackles situatedness by decomposing the situation into its psychological features and putting them into relation with an individual's behaviour whereby both steps require each other. The if... then... situation-behaviour relation is the observable pattern whose situational 'if' is coupled to its behavioural 'then' by cognitive-affective processes integrating situational features and the individual's goals and motivations. From this view, meaningful categories of situational features cannot be established without reference to the behaviour they prompt. Also no meaningful categories of behaviour can be established without reference to the situational features that bring them about. The if...then... situation-behaviour relation forms a functional unit.

Consider *rejection-sensitive* men introduced earlier (see subchapter 2.2): Rejection can lead to a vast variety of behaviours: A rejected individual could respond discouraged, angry, or indifferent, and control behaviour can have many different reasons, such as the fear of losing control, the urge to dominate, or the fixation on a pursued outcome. But enforcing excessive control after the experience of rejection, as rejection-sensitive men do, forms a

functional unit of a stable pattern relating a certain situation and a certain behaviour: *If* rejection by the partner is experienced, *then* excessive control over the partner is enforced. This pattern often occurs because these men have experienced some sort of physical maltreatment or emotional neglect during childhood (Downey & Feldman, 1996). Its ongoing occurrence is explained in cognitive terms by these men becoming consistently more upset, feeling betrayed and anxious when experiencing rejection, which undermines their self-esteem, for which then they blame and punish their partner with their control behaviour (Goldner et al., 1990). Neither of these insights could have come from considering the situation or the behaviour alone, let alone these men's neuroticism scoring.

Informative inferences require the functional units of situation and behaviour, as they are crucial to the functional level of analysis (compare previous subchapter). At first, the task is to figure out who behaves repeatedly in what way in which situations, making the individual, their behaviour, and the situation crucial components of the theory. However, providing these specific units goes beyond the scope of the framework of CAPS. The patterns found allow for making inferences regarding the underlying mental processes, which is analysis on the cognitive level (compare previous subchapter). First, the psychological features that are shared by the situations in which a certain behaviour occurs, have to be determined. Then, inferences regarding the individuals who behave in a certain way can be made. Which inner states, beliefs, goals, motives, affects, scripts, and the like are likely to cause such behaviour? Finally, experiments can be made to test whether this cognitive explanation of the functional relation holds. Regarding the initial investigation of the psychologically effective features of the situation Mischel emphasises (2004, p. 15): "The importance of finding these features and elaborating their meaning for the individual has long been recognized (e.g., Kelly 1955). The encouraging development is that new methods are becoming available to facilitate analyses of active ingredients of situations".

Furthermore, Mischel (2004, p. 15) points out that, in close social relationships "one person's behavioural output becomes the other person's situational input, and vice versa, forming a dyadic system." If their interaction results in stable if... then... situation-behaviour relations as well, it allows for the modelling of the interpersonal systems in a way similar to that of a single individual. Personality, as well as relationships and possibly other agential systems, can be characterized by its behavioural signatures and the essential features of the situations in which these systems are involved. Indeed, if... then... situation-behaviour relations appear to be generally useful to structure any agential system's func-

tional level description. The overall idea remains the same: situations that regularly lead to the same behaviour of the system form *functional equivalence classes*. If a feature can be found that all these situations, but not others, share, it possibly bears meaning to the system, allowing researchers to investigate the underlying mechanism. Since these inferences are made based on patterns of interactions, the most likely (cognitive-affective) model will certainly be a process model.

3.3. Situatedness in the Adaptive Toolbox

The AT postulates an assembly of cognitive-affective biases and heuristics by which means human agents make robust decisions and perform well, if they use them in the environmental conditions for which they are tailored. In contrast to the APE model and CAPS, AT conceptualizes the situation not only with respects to its effective, perceptual, and conceptual features; instead the relevant situational features are the cues that give away informative relations between different environmental structures (ecological correlations) and between environmental structures and cognitive structures (surrogate correlations).

Especially the latter establishes a tight individual-situation interrelation that could be portrayed as the opposite of the extended mind thesis: Instead of cognition being distributed across an individual and its environment, the situation includes environmental and cognitive features. Consider the example of the tennis novice again. The novice's success in guessing a tennis tournament outcome does not only depend on the participating tennis players' media presence in relation to their success in matches. It crucially depends on the novice's recognition of the players' names from the media, if the guess is based on the recognition heuristic (Scheibehenne & Bröder, 2007). The involvement of the novice's memory system is crucial for the recognition heuristic to work. In terms of the if-then rules by which heuristics can be described, the exploited cognitive structures and dynamics become part of the if-condition. In comparison, the if... then... situation-behaviour relations crucial for CAPS only encompass the situational features of the external environment in which the behaviour occurs.

Although AT's heuristics make use of cognitive structures and dynamics, the explanation of decision-making based on heuristics is not a cognitive explanation. Heuristics are behavioural rules that are bound to certain conditions. Human agents make decisions *as if* the underlying cognitive mechanism is the application of a heuristic rule, but AT provides no detail regarding the cognitive level, the cognitive realisation of heuristic choice making.

Recently Marewski and Schooler (2011) have proposed an *ecological strategy selection theory*. It is a computational model of affordances (Gibson, 1977) with respect to heuristics which gives a different dynamic to original idea of bounded rationality and AT: Not the success of a heuristic alone, but whether a heuristic can be applied in a given situation, depends on the features of the environment and the cognitive-system. The available heuristic strategy space is passively narrowed down by these circumstantial factors. However, the qualitative specifics of the cognitive processes involved remains unclear yet again. Instead, the proposal emphasizes the importance of situational and cognitive determinants over the actual cognitive process in explaining cognition.

3.4. Summary: Situatedness in Cognition—Two Criteria of Situated Modelling

I set out asking whether we can derive conceptual criteria for situated cognitive modelling from already existing models in cognitive psychology that are considered situated. The question was whether it is possible to be more specific about the “one essential ... move” (Clancy, 2009, p. 28) innate to all the concepts subsumed under situatedness, i.e. the contextualization of cognition. My investigation resulted in two candidate criteria: the *functional-cognitive distinction* and *if... then... situation-behaviour relation*.

Exemplarily, I looked into different fields of cognitive research. I started out with a brief introduction of traditional research programs which cannot be considered situated (see subchapters 2.1., 2.3., and 2.5.) because they take the environment and contextual influences to be either (a) noise in the data, as in the case of traditional personality research, (b) irrelevant for modelling cognition, as in the case of traditional attitude research, or (c) something that can be approached most generally, as in the case of traditional decision-making research. Traditional personality research focuses on interpersonal differences, while it neglects the importance of context-dependent differences in behaviour. Traditional attitude research conceptualised attitudes based on features of the agent’s cognitive system as whether the agent is conscious and in control of them or not; what kind of evaluative responses is possible in a given situation and how this response is affected by contextual changes is not taken into consideration. Traditional rationality research judges the rationality of a decision by how well it complies with rules of logic and optimization algorithms that are supposed to be generally applicable due to their high-variance-low-bias solutions; the context-specific alternative that is based on high bias is usually discarded due to negative connotation of bias.

Each of the traditional approaches faces a problem of its own that can be overcome by a situated approach (subchapter 2.2., 2.4., and 2.6.) which either takes the environment to be (a) an important independent variable of analysis as in the case of CAPS (Mischel & Shoda, 1995; 1998), (b) crucial for conceptualizing the workings of the cognitive system as in the case of the APE model (Gawronski & Bodenhausen, 2006, 2007), or (c) a set of challenges to which a variety of solutions can be found as in the case of AT (Gigerenzer & Todd, 1999; Gigerenzer & Selten, 2002). Situated personality research defines personality based on an individual's behavioural signature, the stable if... then... situation-behaviour relations. Situated attitude research infers the qualities of attitudinal processes from how contextual differences affect evaluative responses. Situated rationality research judges rationality by how well an individual applies heuristics that exploit different informational structures of the environment and the cognitive system.

Despite the differences in why and how these models take situation into consideration, they also have some commonalities. For once, their explanatory focus is less on behaviour *per se* and more on behavioural variability. Herein lies the problem of the traditional, individualistic approaches, which have trouble explaining why the same individual not only behaves differently in different situations, but can behave differently in seemingly similar situation. In the three considered fields of research behavioural variability is the troublemaker for the traditional approaches, but it is also the observational starting point of the situated approaches that followed them. To disentangle the determinants of the various behaviours, the individual as well as the situation had to be considered as determining factors. Thus, contextualization of behaviour became a key move of situated cognition (Clancy, 2009).

The individual is the system in which the cognitive structures and processes in question are implemented. The situation poses most of the problems and offers some of the solutions the agents have evolved to deal with. Their variable behaviour is the effective implementation of the situation-appropriate solution. With the behavioural variability, the individual, and the situation, as shared variables of all situated approaches to cognition, four opportunities emerge.

First, besides testing how well cognitive models predict various behaviours, the investigation of cognitive processes can be guided and structured by the patterns of behavioural variability that apply to the different situations and individuals. These patterns can help to find the behaviour driving cognitive forces that apply to an individual in a given

situation or not. In the case of CAPS, for example, that led to the insight that it is not societal concepts like work and leisure by which situation can be clustered, but social relations like whether one interacts with an authority or with peers. The patterns can also help to sort which kind of cognitive process is affected by which kind of contextual differences. The ambiguous ways in which evaluative responses are affected by contextual differences suggests, for example, that attitude formation is not a uniform process but rather two, as in the case of the associative and propositional evaluation processes suggested by the APE model. However, starting scientific theorizing from observational data is the general scientific method and does not distinguish situated approaches from traditional ones. The strong focus on the coupling of situation and behaviour emphasized here gains its importance only with respect to the other three opportunities.

Second, the search for a cognitive explanation of why and how certain situations lead an individual to behave in a certain way requires to strictly distinguish between the *explanans*, the cognitive process, and the *explanandum*, the observable behavioural patterns. Accordingly, a stringent terminological and theoretical *functional-cognitive distinction* has been proposed regarding the APE model (subchapter 3.1.; De Houwer, et al., 2013). However, this distinction is made implicitly also in CAPS and AT, and will be discussed as a possible criterion of situated modelling in the next section of this chapter.

Third, the patterning which is part of the functional level of analysis of the functional-cognitive distinction can be put into the logical form of *if... then... situation-behaviour relations*. Such relations are suggested as signature of personality in CAPS, as well as the structure of heuristic rules in AT (subchapter 3.2. and 3.3.). It is also applicable to the APE model and discussed second as a criterion that further specifies the first criterion.

Fourth, given situated models of cognition have a common starting point in patterns of situation-behaviour relations, this might ease cross-talk between the different fields of research. Moreover, it may allow for an integration and interrelation of the situated models of cognition. CAPS, for example, has been introduced as a framework theory that can possibly integrate the APE model and AT. Furthermore, insights of AT and the APE model can possibly refine each other respectively. In any case, it may allow for relating the different research subjects to one another beyond mere correlation, as it is often done with respect to traditional personality research and cognitive abilities, for example (Roberts et al., 2007; Curtis et al., 2015; Judge et al., 1999; Rammstedt et al., 2016; Soubelet & Salt-house, 2011). Examples of the fourth opportunity are discussed in *Chapter 4*.

What remains to do for the rest of this chapter, is to discuss the second and third opportunity: Can the *functional-cognitive distinction* and the *if... then... situation-behaviour relations* be put to use as criteria of situated modelling that specify how to contextualize cognition strategically? First consider the functional-cognitive distinction as it has been presented regarding the APE model (subchapter 2.4. and 3.1.). The general idea is that *explanans* and *explanandum* have to be terminologically and conceptually separated between the cognitive level of analysis and a functional level of analysis. The strict separation of the behaviour that has to be explained and the cognitive processes that explain it, secures that the provided explanation will not be circular. On the functional level the behaviour is put into perspective by relating it to the situation in which it occurs. A certain behavioural output is linked to a certain situational input, assuming a causal relation between them. On the cognitive level a cognitive model has to explain why and how patterns of situation-behaviour relations occur on the functional level. A good cognitive model accounts for the patterns found on the functional level and makes robust predictions about an individual's behaviour in a new situation. Thus, observations on the functional level of how certain individuals behave in certain situation can inform the cognitive level modelling, while the model on the cognitive level can explain why and how certain individuals behave the way they do in certain circumstances.

This has been explicitly spelled out by De Houwer and colleagues (2013) with respect to the APE model, but an implicit functional-cognitive distinction can also be found in CAPS and the AT. Regarding CAPS, the *if... then... situation-behaviour relations* as signatures of personality are the *explanandum* on the functional level of analysis. The *cognitive-affective* personality system, the network of mediating units that incorporate, amongst others, beliefs, affects, goals, and self-regulatory plans, is the *explanans* on the cognitive level. The *if... then... situation-behaviour relations* are characteristic for an individual as a whole, not for any of the cognitive processes, but the various cognitive processes involved have to account for the relation; thus, the occurrence of circular explanations is highly unlikely.

Regarding AT, the functional level explanation consists of the heuristic if-then rules that describe under which situational and cognitive conditions a heuristic is successful. According to ecological strategy selection (Marewski, Schooler, 2011) they also describe under which conditions they can be applied in the first place. However, besides the quantitative computational models of heuristics, AT does not offer a qualitative model on the cognitive

level of analysis that explains how and why human agents behave *as if* they follow heuristic rules. AT's explanations do reference cognitive structures like the memory system, but, as argued in subchapter 3.3., in these cases only those cognitive processes are mentioned whose characteristics are exploited, not the cognitive processes that exploit them. All that AT provides is a set of behavioural rules that appear to be fast, frugal, and effective under certain conditions, all of which is part of the functional level of analysis. Nevertheless, in doing so, the ecological rationality and AT research program still respect the functional-cognitive distinction. They just do not cover qualitative cognitive models, possibly because the leading researchers do not consider it relevant (Kruglanski & Gigerenzer, 2011).

This may question whether the distinction is a good criterion of situatedness? If the functional-cognitive distinction is coarsely understood as an explanans-explanandum distinction, then the most prominent situated model should lack an explanatory part. Yet it explains so much of human decision-making and rational choice. Remember that the functional level is not purely descriptive. It considers situation-behaviour relations to be functional units, which do not merely correlate situations and behaviours, but put them in a causal relation. Indeed, heuristic rules describe our choice behaviour, but they also provide a causal explanation why it is best to behave in one situation according to one heuristic and in another situation according to another heuristic. Herein lies all the valuable explanation AT provides. Whether this is enough or not, does not concern the current discussion. All that matters for now is that in neglecting the cognitive level of analysis and focusing on the functional level, AT still makes an implicit distinction between the two.

Although the cognitive level explanation is of great interest, AT's purely functional account illustrates how much situatedness can advance research already on this level only. Crucially, the functional level provides an account of how to relate behaviour-generating cognitive processes to the situation. By making the functional-cognitive distinction a criterion of situated modelling in cognitive science, the tripartite relation of individual, situation and behaviour is established.

The second criteria in question are the *if... then... situation-behaviour relations* that further specify how cognition can be contextualized by specifying the structure of the functional level description. Consider CAPS first: I have just argued that the *if... then... situation-behaviour relations* are the explanandum on the functional level that is explained by the cognitive-affective personality system allocated on the cognitive level. The *if... then...* relation is a conditional statement that, unlike a material conditionals ($p \rightarrow q$), states a caus-

al relationship as is required for the functional level. In fact, the antecedence of the situation-behaviour relation is probably best understood as an INUS condition (Mackie, 1974), i.e. it is insufficient but a non-redundant part of a condition which is itself unnecessary but sufficient for the occurrence of the effect in the consequent. That means that in establishing such a relation one does not imply that no other situation could have led to the same behaviour nor that one claims to fully grasp every aspect of the situation that contributed to the causation of the behaviour. It allows for the abstraction from contributory causes and for general statements regarding situation and behaviour. For example, rejection-sensitive males can be said to show control behaviour in response to rejection by their partner, without having to specify how the rejection or the control behaviour have to look like in detail. In short, it allows for abstract descriptions of behavioural patterns.

Whatever the cognitive-level-explanation might be for a specific situation-behaviour relation, describing it in terms of an if... then... relation has the following interpretative advantages: Situations can be analysed according to their similarities and differences given they produce the same or different behaviour, respectively. On the one hand, the level of abstraction of which perceptual or conceptual situational features can be said to be affective is constrained by the situation. It cannot be defined completely arbitrarily by the researcher. Whether or not some feature actually makes a difference can be tested experimentally. The major pitfall the researchers have to be sensitive about is equifinality (or multiple realisability): fundamentally different situations that produce the same behaviour. Occurrences of such cases can possibly be resolved by either a more fine-grained distinction of what kind of behaviours are considered similar or—if this is not successful—the researcher may argue in favour of equifinality. If there is no sensible similarity between the situations that can account for the similarity in behaviour, two behavioural patterns with the same behavioural outcome should be established.

On the other hand, if the behaviour that is evoked by a situation changes, i.e., if the situation-behaviour relation changes, the researcher can assume that the cognitive processing of the essential, situational features has changed. This offers the opportunity to explore experimentally which events affect the cognitive processes and which do not. Stable situation-behaviour relations speak in favour of the adaptiveness of a behaviour or the rigidity of the cognitive process. The investigation of which situational features have what kind of effect on an individual's behaviour and how this effect can be changed is what allows for inferences regarding the characteristics of the underlying cognitive structures and

processes.

Note that the if... then... situation behaviour relation in CAPS is seemingly binary only if one neglects the cognitive level that establishes the causal relation. In fact, the if...then situation-behaviour relation can be understood as a tripartite relation between the situation, the cognitive process, and the behaviour. The individual whose cognitive process establishes the relation obviously encompasses the third reference point. However, the individual goes beyond the cognitive process and extends into the first two reference points as well, the situation and the behaviour. On the one hand, it is the individual that behaves and whose physical condition constrains the behaviour. On the other hand, the individual is part of the situation. Not only does the presence of the individual in the situation impact whether and how others behave in the situation, it is also the interplay of the circumstances and the individual that create the situation to which the individual has to respond in the first place. A fitting functional account of personality has been proposed (Perugini et al., 2016) which refers to personality as the impact of the individual on the situation-behaviour relations.

The heuristics of AT are regularly described in terms of if-then rules. However, these are rules that suggest how to behave best, they do not describe causal relations. Only if they are considered in the ecological strategy selection framework, they take the form of situation-behaviour relations. For example, the recognition heuristic (Goldstein & Gigerenzer, 2002) can be defined as “If one of two alternatives is recognized, infer that it has the higher value on the criterion.” But from the cognitive niche perspective (Marewski & Shooler, 2011), behaving according to the heuristic requires the right situation: “If (and this case only if) one of two alternatives is recognized, then one can infer (or—if read more strongly—infers) that the recognized alternative has the higher value on the criterion.” Because heuristic rules are only applicable in very specific circumstances, the conditionals of these if... then... situation-behaviour relations may not be an INUS conditionals, but possibly necessary and sufficient ones. Whether this holds depends on the heuristic in question, on whether other heuristics can be applied under the same circumstances, and on how strongly the ecological strategy selection theory is read.

Last but not least, regarding the APE model no if... then... structure of the functional level has been explicitly suggested. However, establishing such is in principle possible. If it had been done, it could have helped working out that associative evaluation processes usually form in a context-independent fashion, while deviating associative evalua-

tions of the same attitude object form in a context dependent (Gawronski et al., 2010): In the general case, the relation could be described as: “If an attitude object is encountered in any new situation, *then* the affective response matches the original evaluation with one exception.” The exceptional case would have been: “If an attitude object is encountered in a situation that shares perceptual or conceptual features of a situation for which a deviating, affective response has been learned, *then* the affective response will match this deviating response.”

On another note, Kruglanski and Gigerenzer (2011) have argued against the qualitative distinction of judgments postulated by dual process accounts. Instead they argued for a common principle of intuitive and deliberative judgments, which can be roughly equated with associative and propositional evaluations. The common principle the authors suggest are the heuristic if-then rules of AT.³ However, their disagreement concerns foremost the value of cognitive level explanations and is of no further concern here. More importantly, it shows that the second proposed criteria of situatedness can also be applied in this field of research.

The latter example suggests that the criteria are general enough to allow for the continuation of scientific dispute, while they lay common ground that specifies contextualisation for situated models of cognition. In its core, it offers a structure for behavioural patterns that can be used efficiently to make inferences regarding the characteristics of the cognitive processes that realise the pattern’s functional unity. Even if one abstains from a cognitive level explanation, as in the case of the original AT research program, finding these patterns and deriving from them potentially advantageous rules, offers explanatory value in and of itself.

In summary, I have argued that the *functional-cognitive distinction* and *if... then... situation-behaviour relations* are two practical criteria that specify contextualisation concerning empirical models of cognition. Contextualisation is the essential step towards situated models of cognition. Because situated cognition encompasses diverse ideas and concepts, without commitment to any of the four E’s in particular, these two criteria may be all that needs to be utilised to guide situated modelling in empirical cognitive psychology. Their only pur-

³ A weak point of their argument is that they do not differentiate dual-system and dual-process theories properly (Kruglanski & Gigerenzer, 2011, footnote 1). Gawronski and Bodenhausen (2006, p. 714) argue the “rule-based” critique does not apply to their activation vs. validation account of attitudes.

pose can be to structure behavioural data and ease the process of developing cognitive models based on inferences from the observations structured accordingly. In short, the two criteria can be spelled out as guidelines in the following way:

Functional-cognitive distinction (FCD) criterion: Distinguish conceptually and terminologically between the functional and the cognitive level of analysis. The functional level encompasses causal explanations of which behaviour occurs in what kind of situations. The cognitive level provides a cognitive mechanism that explains the situation-behaviour relation on the functional level.

If... then... situation-behaviour relation (SBR) criterion: Find and describe patterns of situation-behaviour relations in terms of if (situation) then (behaviour). Base your inferences regarding the underlying cognitive processes on them. Besides situational features the if-clause situation can encompass cognitive preconditions that have to be satisfied as well. However, be aware that such inclusions do not undermine the integrity of functional-cognitive distinction.

Chapter 4: Situatedness Unites

In the previous chapter I have argued in favour of two practical criteria that specify contextualisation concerning empirical models of cognition. Furthermore, I have argued that both criteria are either explicitly or implicitly satisfied by each of the three models. In satisfying them, these models find common ground in the situation-behaviour relation that is conceptually independent of the aspect of cognition they are concerned with. Individualistic approaches do not necessarily share this common ground, even if they are driven by behavioural data as in the case of the Big Five, where the context-independent behavioural frequency but not the context-dependent behavioural variety lays the basis of interpretation. Given the common ground, opportunities for cross-talk between the fields of cognitive research might increase. Moreover, it may allow for an interrelation and integration of the situated models of cognition. CAPS, for example, has been introduced as a framework theory that can possibly integrate the APE model or AT. Additionally, insights in AT and in the APE model can possibly refine the respective other model. In what follows I want to give a glimpse of how each of the three situated models considered here can facilitate research in the respective other fields of research. First, I will shortly compare the models' similarities and differences. Second, I will give some exemplary research questions relating the models based on their respective situation-behaviour relations. In that, the two criteria of situatedness facilitate interdisciplinary research.

Consider first some similarities and differences: CAPS and the APE model both

suggest a network structure responsive to environmental features (Gawronski & Bodenhausen, 2006; Mischel & Shoda, 1995). However, the APE model suggests this network is associative, while CAPS only states that the mediating units are inhibitory or excitatory related. The APE model and AT, although in disagreement regarding the need for consistency criteria in decision making, both agree upon the boundedness of the cognitive processes (Gawronski & Bodenhausen, 2006; Gigerenzer & Selten, 2002). For example, the evaluation of evaluative judgements is constrained by which propositions are relevant to the situation, but it evaluates them according to their consistency. On another note, the network suggested by CAPS encompasses competencies defined as scripts, plans, and strategies, which very well could refer to the heuristics of AT (Gigerenzer & Selten, 2002; Mischel & Shoda, 1995).

What could CAPS possibly contribute to the APE model or AT? As a framework theory, CAPS can, indeed, offer only an overarching theory in which both can be embedded and related to an individual's personality. Other than that, CAPS is too coarse and vague to inspire new research questions for either of them. In contrast, the other two models can possibly be used to elaborate on the cognitive-affective processes underlying CAPS. Furthermore, I propose that the APE model and AT can learn from each other. The following list of speculative research questions is supposed to illustrate and possibly stimulate new research as it results from the models from which I derived the criteria of situatedness:

Do the dynamics of attitude acquisition also apply to intraindividual variability in CAPS? According to the APE model, the initial formation of implicit attitudes is usually context-independent while subsequent, deviating evaluations of the same attitude object are represented in a context-dependent fashion (Gawronski et al., 2010). Context-dependent deviating evaluations also have been shown to activate in response to contexts that are conceptually or perceptually similar to the context in which the deviating evaluation was obtained (Gawronski et al., 2014). This feature in particular characterises them as associative and accuracy-neutral.

Does a similar dynamic hold for characterising situation-behaviour relations in CAPS? Consider, for example, the assessment of children's aggressiveness in response to blame by peers or adults (Shoda et al., 1994). The distinction between peers and adults is a conceptual one. Whether the response behaviour is mediated by perceptual features has, to my knowledge, not yet been tested. Are there differences in how a child reacts to peers or adults that look familiar in contrast to those who do not? Which effect does the familiarity

have, if the perceptual similarity crosses the conceptual distinction, i.e. e.g. when a peer looks like an adult or vice versa? What influence does the social context have on the response, i.e., the presence or absence of other peers or adults? Studying such effects could possibly refine personality profiles. For example, it may be possible to differentiate between those groups of individuals that are more affected by conceptual and those that are more affected by perceptual features; the latter group could be said to be of an associative type. In the current purely conceptually driven analysis of situations, however, such differences appear only as noise in the data.

Can the situation-behaviour relation of personality be explained by the same ecological strategy selection theory that has been suggested for AT? Moreover, could the stability of personality be reduced to the habituation of strategies with respect to the regularly encountered environments? According to ecological strategy selection theory, the number of situations in which a heuristic can be applied is constrained by the circumstances of the situational and cognitive environment (Marewski & Schooler, 2011). Such strategy determination is not necessarily limited to heuristics. If a trait or trait expression is understood as a strategy that an individual adapts, this strategy could also be determined by the circumstances of the situational and cognitive environment. On a similar strain, it has already been proposed that personality is an adaptive response to other personalities in one's social environment (Dall et al., 2004). Furthermore, behaving in a certain way opens or limits goal pursuit in social interaction which is why Little (1996; 2008) suggested "free traits" (as opposed to "fixed traits") that individuals can express strategically to their advantage.

The effect of the environment on personality can also be observed in environmental changes that cause personality changes (Specht et al., 2011). Major life events like marriage or divorce, the first child or death of a spouse, but also a new job or unemployment have been shown to induce changes in personality. These life events usually mark drastic changes of the social environment the individual is regularly engaged in, and thus these events mark time points when it may be necessary to adapt new behavioural strategies. These strategies are then the new characteristic behaviour that maps "on to the impressions formed by observers about what they are like" (Mischel, 2004, p. 8). If a strategy is selected for at least as long as the individual is engaged in the new environment, it can be interpreted as a change in personality—independent of whether personality is understood in terms of CAPS or the Big Five. From this perspective, it is questionable whether the stability of personality over time is due to the biology of the agent or due to the agent continuously

being engaged in the same environment. As long as the environment does not change, there is no need to change the working strategy. And sometimes it may not even be feasible to change the strategy, as it has been suggested for heuristics (Marewski & Schooler, 2011).

Can heuristics explain the clearing of cognitive dissonance caused by conflicting evaluative judgments better than the consistency check suggested by the APE model? The APE model suggests that the accuracy of explicit attitudes is achieved by syllogistic reasoning. If the evaluative judgment in question is consistent with other propositions currently considered, no further effort is put into the evaluation. If a conflict occurs, usually more propositions are taken into consideration until consistency is reached again (Gawronski & Bodenhausen, 2006). The solution offered by the APE model appears to be a hybrid solution: On the one hand, it is ecologically rational because only context-relevant propositions are considered; on the other hand, it follows the traditional rationality approach in that it takes logical consistency as the way to resolve cognitive dissonance. But if the ecological rationality account is right, cognitive dissonance may be resolved by heuristics rather than syllogistic reasoning. Take, for example, the take-the-best heuristic (Gigerenzer & Goldstein, 1996) or the tallying heuristic (Dawes, 1979). The former says that to infer which of two alternatives—in this case propositions—is preferable, search for a single cue that discriminates between the alternatives, stop your search immediately and choose the alternative favoured by the cue. The latter says that to estimate a criterion, do not estimate weights but simply count the number of positive cues to decide between alternatives. Depending on the circumstances either of the heuristics might be fit to decide which of two contradicting propositions to keep and which to reject. With them, AT offers at least two testable alternative solution to resolve cognitive dissonance due to conflicting evaluative judgments that do not depend on the traditional single rule consistency criteria, whose problems have been discussed by Arkes and colleagues (2015).

Can the quality of heuristics be expanded by considerations regarding the features of APE processes? An essential feature of APE's associative evaluation network is its accuracy-ignorant, associative structure whose activation is often accompanied by affective “gut reaction” (Gawronski, 2011, p. 62). The affect heuristic exploits such gut reactions to evaluate risks and benefits of an event instead of relying on more complex reasoning processes (Finucane et al., 2000, Slovic et al., 2007). If affects arise from the activation of an associative network, as the APE model suggests, characteristic features of the associative process may affect the

quality of affect-based decisions in predictable ways. Consider one more time that perceptual and conceptual similarities affect the activation of some associative evaluations equally (Gawronski et al., 2014). The quality of affective reasoning based on affects brought about by such associations may be crucially undermined by choice-irrelevant perceptual features.

Conclusion

In the last four chapters I have argued that situated cognition is a fruitful endeavour. Situatedness is advanced by many philosophers in many variations. Accordingly, situated cognition has become an umbrella term that subsumes a diverse range of theories. Because situated cognition is a potpourri of philosophical theories, its implementation in empirical research has no methodological code of practice. The only advice so far has been to contextualise cognition, i.e. the advice to take more contextual variables as determinants of cognitive processes into consideration. The present thesis has aimed at this advice more concrete. In effect, two criteria of how to theoretically approach and structure contextualization for empirical cognitive models have been derived from the comparison of three different cognitive models. By presenting situated models of personality, attitude, and decision-making in the light of their individualistic predecessors and their respective shortcomings, I provided evidence for the explanatory power of situated, cognitive models in general. Furthermore, it allowed me to introduce the three situated models in enough depth to inform my analysis of how the respective models cover the situatedness of their research subject. From this analysis, I derived the *functional-cognitive distinction* and *if... then... situation-behaviour relations* as either implicitly or explicitly mentioned common denominators of these three models. I discussed the respective purposes that each of the two criteria serves in structuring contextualization of cognition. At last, I argued in favour of situated models of cognition that implicitly or explicitly satisfy the two criteria by exemplarily pointing out possibilities of interdisciplinary exchange.

In summary, I suggest satisfying the two proposed criteria of situatedness facilitates the empirical implementation of the philosophical concept in cognitive research. However, these admittedly coarse criteria may seem somewhat unsatisfying to some philosophers, as they may be based on metaphysical assumptions that are not shared by all theories subsumed under situated cognition. While embodiment and embeddedness theorists might find the criteria rather acceptable, enactivists possibly disagree with the functional perspective on situatedness the criteria provide. It may only be fitting for an approach towards

situatedness to not be generally applicable. At least, this criticism is one reason why I do not claim the two criteria are minimal criteria of situatedness. The theories subsumed under situated cognition are too diverse to allow for such. The two criteria already come with interpretative assumptions that are made by one, but not the other philosophical theory. However, my target audience is not the philosophers but the empirical scientists that want to do philosophically informed research on cognition, but do not yet commit to one or the other interpretation of what situatedness specifically boils down to. Indisputably, satisfying these criteria will affect the design and the interpretation of the experimental results according to the suggested relationship of the situation, the individual, and their behaviour. Thus, the proposed criteria should be seen as no more than methodological starting points for situated modelling in cognitive science.

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