INTUITION VERSUS DELIBERATION:

The Role of Information Processing in Judgment and Decision Making

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INTUITION VERSUS DELIBERATION:
THE ROLE OF INFORMATION PROCESSING
IN JUDGMENT AND DECISION MAKING

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Chapter 1

General Introduction

People are confronted with judgments and decisions on a daily basis. These decisions concern mundane issues such as what to have for dinner, what toothbrush to buy and how to get to work, but also more important issues such as whom to marry or whether to buy a particular apartment or not. Many judgments and decisions are made in a professional context. Consider for example judgments made by judges, doctors, CEO's, and firemen. Some of these decisions are based on habits, some are based on extensive deliberation and consultation and others are made more intuitively.

Traditionally it is thought that the best judgments and decisions are made after extensive deliberation. Normative models of decision-making argue that decisions under risk should be made by first assessing the various possible outcomes, followed by an estimation of the utility and the probability of each of these outcomes. Multiplying the utility of each outcome with the probability that the outcome occurs is the next step. Finally the decision-maker is expected to opt for the decision with the highest (subjective) expected utility (SEU; Edwards, 1954; 1961; Savage, 1954; von Neumann & Morgenstern, 1944). In the same way the best choice would be made by identifying attributes for different options and evaluating the relative importance for each attribute. Next, evaluations for attributes are summed up for each option. The decision-maker is expected to select the option with the highest multi attribute utility (MAU; see for reviews Huber, 1974; MacCrimmon 1973).

However, in reality people do not always possess all relevant information or they lack cognitive capacity and time to execute such analyses (Simon, 1955). Even in the case we have all the needed information, time, and cognitive capacity, we are not that good at applying normative decision rules (Brehmer, 1971; Brehmer & Qvarnstrom, 1976; Hammond & Summers, 1972; Swets, Dawes & Monahan, 2000). Instead, people often rely on mental short-cuts, so called heuristics. That is: They base their judgment or decision on a very limited, but highly informative, number of cues. In this way people are often able to make adequate decisions utilizing a limited amount of cognitive resources (see for an overview Gigerenzer & Gaismayer, 2011). On the other hand, there is growing evidence that people can unconsciously integrate large amounts of information (Glöckner & Betsch, 2008b), and integrate them to come to summary evaluations or feelings (Betsch, Plessner, Schwieren, & Gütig, 2001; Dijksterhuis & Nordgren, 2006; Plessner, Betsch, Schallies, & Schwieren, 2008; see also Betsch & Glöckner, 2010). Intuitions based on these experiences can be remarkable accurate, as demonstrated in the lab (e.g., Albrechtsen, Meissner, &

Susa, 2009; Dijksterhuis & Nordgren, 2006; Halberstadt & Green, 2008; Wilson & Schooler, 1991) as well as in field studies (e.g., Klein, 1993).

The goal of the current dissertation is to improve our understanding of intuition in judgment and decision-making. What are the effects of relying on intuitions in comparison to deliberation? What is the underlying process? How does this relate to expertise? In the current chapter I present a brief overview of relevant theory and empirical evidence relevant to the focal theme of this dissertation. Furthermore, I introduce the main concepts and main independent and dependent variables utilized in this dissertation.

Conceptualizing Decision Modes

Intuition is studied in both philosophy and psychology. Not surprisingly, there are different definitions, and these go back as far as Kant and Jung. Philosophers see intuition as a priori knowledge or experiential belief characterized by its immediacy. Beyond this, the nature of intuition is debated. Roughly speaking, there are two main views. The first view asserts that intuitions are a priori. They are intellectual seemings that something is the case or true. For example, whether the mathematical statement 2x 5 = 10 is true. The second view argues that intuitions are a species of beliefs, and are based on experience (see Bealer, 1998; Parsons, 2000). These intuitions, as a consequence, can differ between individuals, in contrast to the first view.

Psychologists also differ in their definitions of intuition. Abernathy and Hamm (1995) identified as many as twenty different definitions. Generally these definitions are more in line with the second philosophical view on intuition, and agree that intuition is some kind of information acquired without conscious and deliberative reasoning. In this dissertation I opt for a rather general definition presented by Betsch (2008): “Intuition is a process of thinking. The input to this process is mostly provided by knowledge stored in long-term memory that has been primarily acquired via associative learning. The input is processed automatically and without conscious awareness. The output of the process is a feeling that can serve as a basis for judgments and decisions.”(p. 4) Deliberation in contrast, is described as a strategy in which “Information is integrated in a serial manner, processing is cognitively demanding and rather slow, and individuals using these strategies are aware of most of the underlying processes and can even verbalize them.” (p. 6)

Research in social and cognitive psychology often distinguishes between two types of cognitive mechanisms to explain "higher" cognitive phenomenon such as reasoning, thinking and decision-making (e.g., see for a review Evans, 2008). These dual process models have in common that they distinguish between a mode of processing that is more intuitive and a more deliberate mode of processing. The former is fast, automatic, requires low effort, possesses high capacity, and is characterized by parallel processing of information (e.g., Hammond, Hamm, Grassia, & Pearson, 1987; Hogarth, 2001; Seligman & Kahana, 2009). The more deliberate mode of processing is slow, effortful, sequential, and possess low capacity (e.g., Evans, 2010; Horstmann, Ahlgrimm, & Glöckner, 2009; Sloman, 2002). Recently, scholars proposed to differentiate processes *within* both categories of dual processing models (Glöckner & Witteman, 2010; Hogarth, 2010). According to Glöckner and Witteman (2010), intuition is not a homogenous concept, but a label for different cognitive mechanisms. Although I acknowledge that several (perhaps simultaneous or interacting) mechanisms can be active in intuition, I do not distinguish between intuitive mechanisms in this dissertation. In this dissertation I study the effect of relying on intuition as a judgment and decision strategy, and contrast this decision mode to more deliberate reasoning and decision-making. In the following section I briefly introduce different kinds of 'intuition'; i.e., I will briefly outline the differences between intuition and judgment and decision strategies that are often confused with intuition.

Heuristics (as mentioned in the preceding paragraph) are often confused with intuition (Gigerenzer, 1991; 2007; Kahneman, 2003), but do not fit the above definition of intuition. Decisions based on heuristics tend to ignore rather than integrate multiple pieces of information (Betsch, Plessner, Schwieren, & Gütig, 2001), neither are they based on a "feeling". Several studies confirm that analytic thinking is characterized by more heuristic search processes (Cokely & Kelly, 2009), and that deliberated judgments more often rely on heuristics than judgments made intuitively (Haberstroh, 2008; Haberstroh & Betsch, 2002; Halberstadt & Levine, 1999). For instance, people who deliberate are more prone to (consciously or unconsciously) utilize the anchoring (Plessner & Czenna, 2008) and the recognition heuristic (Hilbig, Scholl, & Pohl, 2010), than people who rely on intuition.

Fast judgments and decisions based on habits can also be confused with intuition. Habits are, similar to intuitions, acquired via associative learning and without conscious awareness (Wood & Neal, 2007). However, deciding on the basis of a habit is not a process

of thinking. A habit is triggered by perception of the context with which the habitual response is associated, and is triggered without a mediating goal (Wood & Neal, 2007). Intuition on the other hand, is goal dependent (e.g., Betsch, 2008).

Unconscious-thought theory (UTT; e.g., Dijksterhuis & Nordgren, 2006) is also associated with intuition. Unconscious-thought theory claims that people can make superior decisions after a period of distraction in which they unconsciously address the judgment task. UTT would fit Betsch's (2008) definition; UTT is a process of thinking, occurs without conscious awareness, and the output is a feeling that can serve as a basis for judgments and decisions. The focus of UTT is on integration of information, and not on the role of experience and implicit learning processes. However, UTT is a recently developed framework and some of its assumptions and claims are controversial (Acker, 2008; González-Vallejo, Lassiter, Bellezza, & Lindberg, 2008; González-Vallejo & Phillips, 2010; Smith & Collins, 2009). Although UTT could very well be a process that is related to intuition, it is clear that the precise mechanisms and possible moderating variables yet have to be uncovered. Therefore I focus solely on the contrast between deliberation and intuition in the current dissertation.

Deliberation

In the current section I describe the most important characteristics and effects of deliberation. In a classical experiment demonstrating the effects of deliberation, Wilson and Schooler (1991) asked participants to rate how much they liked different strawberry jams that varied in overall quality. Half of the participants were asked to list their reasons for liking or disliking the jams after tasting. In this way they allegedly could better organize their thoughts before rating the jams. The remaining participants were not given a specific instruction. Results showed that participants who deliberated before making their judgment gave judgments that differed more from expert opinions than participants who relied on their intuition. This phenomenon has been replicated in several domains. Examples are quality judgments of college courses (Tordesillas & Chaiken, 1999; Wilson & Schooler, 1991), Olympic dives (Halberstadt & Green, 2008), predicting basketball games (Halberstadt & Levine, 1999), detecting deception (Albrechtsen, Meissner, & Susa, 2009), and judging the quality of paintings, apartments, and jelly beans (Nordgren & Dijksterhuis, 2009).

The work of Wilson and his colleagues (Wilson & Dunn, 1986; Wilson, Dunn, Bybee, Hyman, & Rotondo, 1984; Wilson, Dunn, Kraft, & Lisle, 1989; Wilson, Hodges, & LaFleur, 1995; Wilson, Kraft, & Dunn, 1989; Wilson, Lisle, Schooler, Hodges, Klaaren, & LaFleur, 1993; Wilson & Schooler, 1991) has been very influential in shaping how we think about deliberating or analyzing reasons before making judgments or decisions. They explain the effects of deliberating as a disruption, and relate this to research showing how automatic behaviors are disrupted when people analyze and decompose them (Baumeister, 1984; Kimble & Perlmuter, 1970; Langer & Imber, 1979). Baumeister (1984) demonstrated this phenomenon in the context of games (*Pac Man* and a *roll-up* game), and his findings can be applied to other domains were behavior relies on learned and automatic responses (e.g., driving a car, hitting a ball in baseball, or playing a musical instrument). In a similar way can judgments be disrupted when people reflect about the underlying reasons (Wilson, Dunn, et al., 1989). People are often unaware of why exactly they feel the way they do. When people verbalize their thoughts and analyze their reasons, they focus on reasons that are accessible in memory, plausible, and reportable (Wilson et al., 1995; Yamada, 2009), possibly ignoring aspects that are more difficult to verbalize.

Wilson et al. (1995) asked participants to rate how much they liked a specific individual and to what extent they thought the individual was suitable as a social worker. Positive or negative information about the individual was made more accessible by presenting this information twice. Judgments of participants who analyzed their reasons were more in line with the relatively accessible information, compared to participants in the control condition. Unfortunately, accessible, plausible, and reportable reasons are not always the main determinants of people's judgments and preferences, and they do not necessarily determine the quality of these judgments (Nisbett & Wilson, 1977).

Along similar lines, Tordesillas and Chaiken (1999) argued that introspection disrupts systematic processing by directing attention in such a way that people are less able to focus on information most relevant to the task at hand. Participants in their study were presented with a description of six psychology courses and were asked to indicate their intention to participate in each of these courses. Afterwards, participants rated how much they were influenced by each separate attribute in the description of each course, how much weight each attribute should be given, and their confidence in their choice. In addition, recall of the attributes was assessed and participants listed their thoughts. Participants in the

control condition listed more thoughts overall and these were also more closely related to important as opposed to unimportant attributes, compared to participants who were asked to deliberate and analyze their reasons.

Intuition

As noted before, relying on intuition can lead to surprisingly good judgments, choices and decisions. Fireman can for example make accurate judgments and decisions by relying on intuition, especially in uncertain situations where a lot of information has to be processed and under time pressure (Klein, 1993). People can also recognize complex grammatical patterns without being able to explain why (e.g., Reber, 1967; Vokey & Brooks, 1992; Wippich, Mecklenbraüker, & Krisch, 2004), or are able to predict outcomes for sport competitions, at least better than after deliberation (Halberstadt & Green, 2008; Halberstadt & Levine, 1999).

Klein (1993; 2003) concluded that expert decision makers are able to draw on repertoires of patterns obtained by experience. This leads them to (unconsciously) recognize patterns that guide judgments and that help them to predict or anticipate outcomes (Recognition-Primed Decision Strategies). Decision makers are unaware of this process and are unaware of the reasons for their judgment, at least at the moment when the decision is made. Others argue that these effects can be explained by the fact that people can process and integrate multiple pieces of information without noticeable cognitive effort and can make complex probabilistic inferences (Glöckner & Betsch, 2008b; Betsch & Glöckner, 2010).

There are also scholars who claim that people can rely on affective reactions or gut feelings that guide their decisions. According to Finucane, Alhakami, Slovic, and Johnson (2000; see also Slovic, Finucane, Peters, & MacGregor, 2002) representations of objects and events in peoples' mind are tagged in varying degrees with affect. When making judgments or decisions, people consult an *effect pool* which contains all positive and negative tags associated with representations of objects and events. Using this overall, readily available affective impression would be far easier and more efficient than weighing pros and cons or retrieving relevant examples from memory.

Similarly, Damasio (1994) argued that people developed a so-called *somatic marker* through learning (Bechara & Damasio, 2005; Damasio 1994). These somatic

markers would increase accuracy and efficiency of the decision-making process by guiding the decision maker. People for instance generate anticipatory skin conductance responses (SCRs) whenever they ponder a risky choice, even before explicitly knowing that it was a risky choice (Bechara, Damasio, Tranel, & Damasio, 1997; Wagar & Dixon, 2006). Wagar and Dixon (2006) demonstrated this effect in a gambling game (Iowa Gambling Task). Participants drew cards from four decks; some cards would generate a gain and some would generate a loss. Two decks were generally profitable while the remaining two decks would result in an overall loss. GSRs of participants were significantly higher when they were about to select from a bad deck, relative to a good deck. These changes took place *before* participants knew what the optimal strategy was. Furthermore, this difference in GSR correlated with preference for the good deck.

Besides affective reactions, processing fluency has also been linked to intuition (Fu, Dienes, & Fu, 2010; Topolinski & Strack, 2009b; Wippich, 1994). Processing fluency can be defined in terms of the experienced ease with which information is processed. People can intuitively recognize objects in fragmented pictures (Wippich, 1994), newly learned grammaticality in letter strings (Kinder, Shanks, Cock, & Tunney, 2003), and whether a number of words share a common associate (Topolinski & Strack, 2009a; 2009c). Research showed that performance on these tasks is related to processing fluency.

Interestingly, most of these mechanisms can be related to individual experiences. For instance, there is ample evidence showing that the valence of the majority of our affective reactions is learned rather than innate (Rozin & Millman, 1987). Further evidence is provided by research on evaluative conditioning (De Houwer, Baeyens, Vansteenwegen, & Eelen, 2000; Razran, 1954; Staats & Staats, 1957; for an overview see De Houwer, Thomas, & Bayens, 2001). Ease of processing can be enhanced by repeated exposure to the stimulus (Bornstein & D'Agostino, 1994; Jacoby, Kelley, & Dywan, 1989), or by the activation of associated concepts (Topolinski, Likowski, Weyers, & Strack, 2009; Topolinski & Strack, 2009a). Research showed that affective reactions and processing fluency contributes additively and independently to performance on more or less intuitive tasks such as coherence judgments and artificial grammar tasks (Topolinski & Strack, 2009b). To sum up, intuition appears to be characterized by processing and integrating multiple pieces of information without noticeable cognitive effort, and is associated with mechanisms that are based on individual experiences.

Processing style

The way we attend to and process information affects what information we process and how shallow or deep we process that information. But it also affects how we make judgments and decisions. Additional insight into the effect of intuition versus deliberation on judgment can therefore be gained by understanding how and in what way judgment mode affects processing style, and vice versa.

Processing style refers to the way people attend to information. People can either attend to the Gestalt of a stimulus or pay more attention to its details. A collection of trees for example can be seen as a forest, but people can also direct their attention to the individual trees (Gasper & Clore, 2002; Navon, 1977; Schooler, 2002). In a classic study Navon (1977) tested his *global precedence* hypothesis. He hypothesized that people by default look at the Gestalt of the stimulus rather than the details, and presented his participants with large letters made of smaller letters. Participants were asked to identify as quickly and accurately as possible if a target letter was presented as either the large or the small letter. He showed that people are generally faster in deciding whether the target letter is the large letter than the small letter.

Derryberry and Tucker (1994; see also Förster, 2009b; Förster, Friedman, Özelsel, & Denzler, 2006) suggested that these attentional mechanisms regulate both perceptual and conceptual processes. The attentional mechanism used to select conceptual nodes within the semantic network is correlated with the attentional selection mechanism utilized on a perceptual level. Friedman, Fishbach, Förster, and Werth (2003) showed that participants were more creative in generating unusual exemplars of a category after the induction of a global processing style, compared to participants who paid attention to the details. They argued that priming visual perception of the Gestalt of stimuli activates abstract concepts in memory and enhances creativity. Moreover, Förster and Dannenberg (2010a) argued that a global processing style is related to the understanding of ambiguous, complex, and abstract stimuli. In a global processing style we make sense of a stimulus by integrating it into superordinate, inclusive knowledge structures. In contrast, a local processing style is related to searching for details. Generally, a global processing style supports creativity and

metaphor understanding, while a local processing style supports analytical thinking and concrete construals.

As a case in point, Macrae and Lewis (2002) showed that people are less able to recognize complex stimuli when in a local processing style; participants in whom a local focus was induced were less able to recognize human faces. Interestingly the same effect occurred when people gave a verbal description of human faces. Macrae and Lewis (2002) concluded that verbalizing induces a local processing style. A local processing style shifts attention to individual elements of information (featural information) in contrast to their spatial relations (configural information). Reliance on featural information makes it harder to recognize faces (Dodson, Johnson, & Schooler, 1997; Westerman & Larsen, 1997). Likewise, analyzing reasons or verbalizing thoughts before making a judgment could induce a local processing style, and this could also make it harder to judge complex stimuli.

Recent research on the brain situated these two processing styles in different locations, namely, global processing in the right hemisphere and local processing in the left hemisphere (Derryberry & Tucker, 1994; Förster & Friedman, 2010; see also Förster & Dannenberg, 2010b). Interestingly, mechanisms associated with intuition (see previous section) are also related to the right hemisphere (eg., Bowden & Jung-Beeman, 2003; Jung-Beeman, et al., 2004; Volz & Von Cramon, 2006), suggesting that global processing style and intuitive processes might be related.

Quality of Decisions

As mentioned, one of the aims of this dissertation is to study the effects of intuition versus deliberation, and to study in what way intuition contributes to better judgments and decisions, as demonstrated by other scholars (e.g., Halberstadt & Levine, 1999; Wilson & Schooler, 1991). But what are adequate and poor decisions? To answer this question we turn to the issue of how to assess quality of decisions.

One option would be to compare the number of positive and negative attributes associated with each option. The option with the most positive in relation to negative attributes would be the best option. For example, when buying an apartment or car, the best choice would be the one with the most favorable and least unfavorable attributes. Obviously people have different opinions about what constitute favorable or unfavorable attributes. Some give more weight to the number of bedrooms and the presence of a double

bathroom; others find the presence of a garden essential. Quality of choice in this example is subjective and no inferences can be made about the absolute quality of the decision; i.e. there is not likely to be an alternative that is seen as the dominant alternative by all interested in buying a new house. Alternatively, one might assess deviations from normative models in which participants evaluate each attribute (MAU; see beginning of this chapter). But, whether an attribute is favorable or unfavorable might also depend on other attributes: A penthouse with a rooftop terrace and view of the skyline might seem nice, but your opinion might change dramatically when there is only one small elevator in the building.

Quality of judgments or decisions can alternatively be assessed by the eventual outcome of the selected alternative. Whether it was smart to buy a particular stock or to bet on your soccer team can be assessed by objective outcomes; stock went up or down, the soccer team won or lost. These are the exceptions rather than the rule. Basically, human decision-making is subjective; the probabilities assigned to certain outcomes as well as the evaluation of these outcomes are subjective. Similarly; the weights assigned to different attributes in MAU-theory also tend to differ between individuals. In sum there is not a single best decision that applies to all of us. For that reason research tends to rely on other indicators of the quality of decisions, such as consistency over time, and the transitivity of preferences (if you prefer a_1 to a_2 and a_2 to a_3, you should also prefer a_1 to a_3)

Alternatively, one can assess whether the process that lead to the decision was correct. Were the rights steps taken and was the decision based on the appropriate information (e.g., requisite decision modeling; Phillips, 1984)? But what if the decision process is based on a less easy to track process, like intuition? In such cases one could focus on subjective aspects such as satisfaction about the decision and more objective characteristics such as consistency over time. Despite the fact that important conclusions can be drawn from these variables, it is not possible to draw conclusion about the objective quality of the decision.

Another way to assess the quality of a judgment or decision is to compare it to expert opinion; as was done in the classical experiment demonstrating the effect of judgment mode by Wilson and Schooler (1991). Similarly, in the current dissertation I assessed quality of judgments, among others, by comparing individual scores to expert judgments. In my experiments I assessed quality judgments of art. It is often argued that

beauty lies in the eyes of the beholders and that there is no accounting for taste. The field of psychological aesthetics studies the experience of beauty and tries to understand what makes a painting or a sculpture beautiful or ugly. Studies have identified a number of criteria that affect the experience of beauty (see for an overview Jacobson, 2006). Given that beauty does not entirely lies in the eyes of the beholder and that there is some objective criteria of high quality art, we used expert opinion as reference point.

Using quality judgments of art enabled me to test the effect of intuition in different types of domains (auditory, visual, and written stimulus material). Another argument to choose art, is it close resemblance to domains in which effects of intuitions versus deliberation are demonstrated before; such as quality of jams (Wilson & Schooler, 1991), judging Olympic dives (Halberstadt & Green, 2008) and judging paintings (Nordgren & Dijksterhuis, 2009). All these domains have in common that it is (for most people) quite difficult to articulate their preferences. It might be that people rely on intuition especially in these domains.

Current dissertation

As mentioned above, judgment and decision-making occur within a wide variety of domains. These different domains often have characteristics that may affect judgment and decision processes. My dissertation builds upon the work of Wilson and colleagues (e.g., Wilson et al., 1995; Wilson et al., 1993; Wilson & Schooler, 1991) on intuitive versus deliberative judgment. As a consequence I rely, in part, upon the type of tasks used in that line of research. In the final chapter I will address the generalizability of the findings obtained in the various studies presented in this dissertation. The focus of the following empirical chapters is on information processing mode as an underlying mechanism of intuition. Another focus will be to explain how and when people come to different judgments when relying on intuition rather than relying on reasons.

In the first empirical chapter (Chapter 2) I address a possible underlying process of intuition, namely global versus local processing style. I argue that deliberation induces a local processing style which narrows conceptual attention and can have detrimental effects on judgment and decision-making. Intuition, in contrast, is related to a focus on the Gestalt and integration of information, and can have beneficial effects on judgment and decision-making. Next (Chapter 3) I return to the relation between processing style and the way we

make decisions. I investigate whether the relation between decision mode and processing style is bidirectional, and test whether processing styles induces a preference for and reliance on intuitive versus deliberative decision strategies. In addition, I test whether decision mode and processing style can exhibit decisional *fit*. That is: whether people experience value when the decision-strategy they are using fits their processing style, and that this is not the case when there is a lack of fit between decision-mode and processing style. In Chapter 4 I focus on the characteristics of intuitive as opposed to more deliberate decisions. I test whether judgments and decisions made in a global, in contrast to a local processing style, are affected by processing fluency and affective reactions. In Chapter 5 I focus on the moderating effects of expertise on the effect of judgment mode on judgment. I propose that the beneficial effects of intuition relative to deliberation depend on the decision makers' experience and knowledge. I argue that especially individuals whose knowledge is 'outperformed' by their experience (intermediate experts) profit from relying on intuition. Finally, in the General Discussion, I will summarize and integrate the empirical findings and discuss limitations and practical implications. [1]

[1] Because Chapters 2-5 were written as separate research articles, they can be read independently. Readers will notice some overlap between the theoretical introductions and method sections.

Chapter 2

Deliberation versus Intuition:

Global versus Local Processing in Judgment and Choice

This chapter is based on Dijkstra, K.A., Van der Pligt, J., Van Kleef, G. A., & Kerstholt, J. H. (2011). Deliberation versus intuition: Global versus local processing in judgment and choice. *Revised manuscript under review.*

Abstract

Decisions and judgments made after deliberation can differ from expert opinion and be more regretted over time than intuitive judgments and decisions. We investigated a possible underlying process of this phenomenon, namely global versus local processing style. We argue that deliberation induces a local processing style. This processing style narrows conceptual attention and can have detrimental effects on judgment and decision-making. Study 2.1 showed that intuitive judgments of quality of modern paintings were more accurate than were more deliberate, reasoned judgments. Study 2.2 showed that local versus global processing style is associated with accuracy of quality judgments of paintings, and Study 2.3 replicated this finding with an experimental manipulation of processing style. Finally, Study 2.4 showed that the effect of intuitive versus deliberative decision mode on quality judgments of poems is mediated by processing style.

Keywords: global versus local processing style, judgment and decision-making, intuition, deliberation.

You invited a group of friends for lunch. You prefer to start lunch with a soup, but have severe doubts about what soup to make. Three recipes turned out to be quite successful in the past; a clam chowder, a mango gazpacho and a zucchini soup. You decide to ask a friend for advice. What should he do? Should he taste all three soups, deliberate and think carefully about what exactly he likes and dislikes about each soup, or should he simply rely on his intuition? Research has shown that judgments and preferences of people who first deliberate are sometimes less in line with expert opinion (Halberstadt & Green, 2008; Tordesillas & Chaiken, 1999; Wilson & Schooler, 1991), are more regretted over time (Wilson, Lisle, Schooler, Hodges, Klaaren & LaFleur, 1993), are less consistent (Nordgren & Dijksterhuis, 2009), and reveal lower correlations with expressed behavior (Wilson & Dunn, 1986; Wilson, Dunn, Bybee, Hyman & Rotondo, 1984) than judgments that are made intuitively. Why do people who deliberate make worse decisions? We argue that deliberation induces a local processing style that narrows conceptual attention and the latter can makes it more difficult to make quality judgments.

Deliberation versus Intuition

In a classical experiment demonstrating the effects of deliberation, Wilson and Schooler (1991) asked participants to rate how much they liked different strawberry jams that varied in overall quality. Half of the participants were asked to list their reasons for liking or disliking the jams after tasting. In this way they allegedly could better organize their thoughts before rating the jams. The remaining participants were not given a specific instruction. Results showed that participants who deliberated before making their judgment gave judgments that differed more from expert opinions than participants who relied on their intuition. This phenomenon has been replicated in several domains. Examples are quality judgments of college courses (Tordesillas & Chaiken, 1999; Wilson & Schooler, 1991), Olympic dives (Halberstadt & Green, 2008), predicting basketball games (Halberstadt & Levine, 1999), detecting deception (Albrechtsen, Meissner & Susa, 2009), and judging the quality of paintings, apartments, and jelly beans (Nordgren & Dijksterhuis, 2009).

The work of Wilson and his colleagues (Wilson & Dunn, 1986; Wilson, Dunn, Bybee, Hyman & Rotondo, 1984; Wilson, Dunn, Kraft & Lisle, 1989; Wilson, Hodges, & LaFleur, 1995; Wilson, Kraft & Dunn, 1989; Wilson, Lisle, Schooler, Hodges, Klaaren &

LaFleur, 1993; Wilson & Schooler, 1991) has been very influential in shaping how we think about deliberating or analyzing reasons before making judgments or decisions. They explain the effects of deliberating as a disruption, and relate this to research showing how automatic behaviors are disrupted when people analyze and decompose them (Baumeister, 1984; Kimble & Perlmuter, 1970; Langer & Imber, 1979). In a similar way can judgments be disrupted when people reflect about the reasons underlying their judgments (Wilson, Dunn, et al., 1989). People are often unaware of why exactly they feel the way they do. When people verbalize their thoughts and analyze their reasons, they focus on reasons that are accessible in memory, plausible, and reportable (Wilson et al., 1995; Yamada, 2009), possibly ignoring aspects that are more difficult to verbalize.

Wilson et al. (1995) asked participants to rate how much they liked a specific individual and to what extent they thought the individual was suitable as a social worker. Positive or negative information about the individual was made more accessible by presenting this information twice. The judgments of the participants who analyzed their reasons were more in line with the accessible information compared to participants in the control condition. Unfortunately, accessible, plausible, and reportable reasons are neither always the main determinants of people's judgments and preferences, nor do they necessarily determine the quality of these judgments (Nisbett & Wilson, 1977).

Along similar lines, Tordesillas and Chaiken (1999) argued that introspection disrupts systematic processing by directing attention in such a way that people are less able to focus on information most relevant to the task at hand. Participants in their study were presented with a description of six psychology courses and were asked to indicate their intention to participate in each of these courses. Afterwards, participants rated how much they were influenced by each separate attribute in the description of each course, how much weight each attribute should be given, and their confidence in their choice. In addition, recall of the attributes was assessed and participants listed their thoughts. Participants in the control condition listed more thoughts overall, and these were also more closely related to important as opposed to unimportant attributes, compared to participants who were asked to deliberate and analyze their reasons.

In the present study we address a possible underlying process of this phenomenon; more specifically we focus on the role of global versus local processing style as a mediating

mechanism. We argue that deliberation, i.e., verbalizing thoughts and analyzing reasons, affects the way in which people attend to, select, and process information.

Processing Style

Processing style refers to the way we attend to information. People can either attend to the Gestalt of a stimulus or pay more attention to its details. A collection of trees for example can be seen as a forest, but people can also direct their attention to the individual trees (Gasper & Clore, 2002; Navon, 1977; Schooler, 2002). In a classic study Navon (1977) tested his *global precedence* hypothesis. He hypothesized that people by default look at the Gestalt of the stimulus rather than the details, and presented his participants with large letters made of smaller letters. Participants were asked to identify as quickly and accurately as possible if a target letter was presented as either the large or the small letter. He showed that people are generally faster in deciding whether the target letter is the large letter than the small letter.

Derryberry and Tucker (1994; see also Förster, 2009b; Förster, Friedman, Özelsel & Denzler, 2006) suggested that these attentional mechanisms regulate both perceptual and conceptual processes. The attentional mechanism used to select conceptual nodes within the semantic network is correlated with the attentional selection mechanism utilized on a perceptual level. Friedman, Fishbach, Förster, and Werth (2003) showed that participants were more creative in generating unusual exemplars of a category after the induction of a global processing style, compared to participants who paid attention to the details. They argued that priming visual perception of the Gestalt of stimuli activates abstract concepts in memory and enhances creativity. Moreover, Förster and Dannenberg (2010a) argued that a global processing style is related to the understanding of ambiguous, complex, and abstract stimuli. In a global processing style we make sense of a stimulus by integrating it into superordinate, inclusive knowledge structures. In contrast, a local processing style is related to searching for details. Generally, a global processing style supports creativity and metaphor understanding, while a local processing style supports analytical thinking and concrete construals.

As a case in point, Macrae and Lewis (2002) showed that people are less able to recognize complex stimuli when in a local processing style. Participants in whom a local focus was induced were less able to recognize human faces. Interestingly the same effect

occurred when people gave a verbal description of human faces. Macrae and Lewis (2002) concluded that verbalizing induces a local processing style. A local processing style shifts attention to individual elements of information (featural information) in contrast to their spatial relations (configural information). Reliance on featural information makes it harder to recognize faces (Dodson, Johnson, & Schooler, 1997; Westerman & Larsen, 1997). Likewise, analyzing reasons or verbalizing thoughts before making a judgment could induce a local processing style, and this could also make it harder to judge complex stimuli.

Overview of the Present Studies

The purpose of the present research is to contribute to the understanding of the underlying mechanisms of the effect of deliberation and analyzing thoughts. More specifically, we investigate whether processing style can explain the differential effect of deliberation versus intuition on judgment and choice. In Study 2.1 we tested our stimulus set and aimed to replicate the usual effects of deliberation versus intuition on accuracy of judgments in a specific stimulus domain, that is, the judgment of modern paintings. Our stimulus set was partly based on Nordgren and Dijksterhuis (2009), who found that people who deliberated before making their judgments were less consistent in their preferences for low- and high-quality art than participants who did not deliberate. Study 2.2 explored the natural co-variation of processing style and accuracy of judgments of low- and high-quality paintings. In Study 2.3, the effect of processing style on judgments of paintings was experimentally tested by inducing either a global or a local processing style. In Study 2.4 we tested whether the effect of judgment mode (intuitive vs. deliberative) on judgments is mediated by processing style.

Study 2.1

As mentioned, Nordgren and Dijksterhuis (2009) observed that participants who deliberated were less consistent in their preferences for low- and high-quality paintings than were participants who did not deliberate. In Study 2.1 we aimed to assess the effect of deliberation on the *accuracy* of quality judgments with the purpose of validating our stimulus materials by replicating the findings of Wilson and Schooler (1991) in the domain of art. In the original experiment of Wilson and Schooler (1991), participants' judgments were compared with ranking scores obtained from experts. We relied on a simple

dichotomy: Low- versus high-quality paintings. As our main dependent variable we calculated a composite score by comparing the ratings of the high-quality paintings with the ratings of the low-quality paintings (see method section). Similar to the experiment of Wilson and Schooler (1991), half of the participants deliberated about what they thought determined the quality of each painting, before giving a quality judgment. The remaining participants were asked to rely on their intuition while judging the paintings. We expected that participants who deliberated before rating the paintings would give poorer quality judgments than participants who made an intuitive judgment.

Method

Participants. Sixty-six first year psychology students from the University of Amsterdam participated in a series of studies, including the present experiment. They participated for partial fulfillment of a course requirement. No information was available about sex and age of the participants.

Materials and procedure. Participants were randomly assigned to the deliberate or intuitive condition. Participants were asked to rate the quality of eight paintings. We selected four high-quality paintings from MoMA (Museum of Modern Art, New York, website: www.moma.org) and four low-quality paintings from MOBA (Museum of Bad Art, Boston, website: www.museumofbadart.org). This division in quality of MoMA and MOBA paintings was confirmed by three experts in modern art (teachers at the Academy of Art; Cohen's Kappa = 1). Paintings were selected and downloaded from the institutions' respective web sites, and presented individually on a computer. Quality ratings were expressed using a 100-point slider, anchored with *very good* and *very bad*.

We computed a composite accuracy score based on the ratings of the eight paintings. Accuracy scores are less sensitive to extreme ratings for individual paintings and provide a single measurement for accuracy of judgments. For each high-quality painting that was rated higher than a low-quality painting participants received a score of +1. Using this method the score could range from 0 (no high-quality painting is rated as higher quality than a low-quality painting) to 16 points (all high-quality paintings are rated as better than all low-quality paintings).

In the intuitive condition participants were asked to rely on their initial intuitive judgment and not to think too much. As was the case in the original experiment of Wilson and Schooler (1991) we asked participants in the deliberation condition to consider separate

aspects of the paintings that determined their quality, before judging each painting. They were asked to do this for one minute for each painting.

Results and Discussion

Composite accuracy score were subjected to an ANOVA. Participants who made intuitive quality judgments showed higher scores (M = 10.94, SD = 2.55) than participants who deliberated before making their judgments (M = 9.41, SD = 3.13, F[1, 64] = 4.80, p = .032, η_p^2 = .07). We conclude that participants who made intuitive judgments were more accurate in their judgments of the paintings, than were participants who deliberated.[2]

Study 2.2

In Study 2.2 we focused on the natural co-variation of processing style and accuracy of judgment of paintings. We expected global processing style to be positively related to the accuracy of quality judgments.

Method

Participants. Forty-seven psychology students from the University of Amsterdam participated in exchange for course credits or a monetary reward (16 male and 31 female). Age ranged from 18 to 39 years (M = 22.17, SD = 3.75).

Materials and procedure. Processing style was assessed by the global – local reaction time measure (Navon, 1977; see also Förster & Higgins, 2005). Participants were presented with a series of 'global' letters made up of smaller 'local' letters. In each trial the participants had to decide if either an L or an H letter was presented by pressing the corresponding letters on the keyboard. In total four different global trials were presented (an H made of Fs, an H made of Ts, an L made of Ts, and an L made of Fs), and four different local trials were presented (an F made of Hs, an F made of Ls, a T made of Hs, and a T made of Ls). On each trial, participants were first presented with a fixation cross in the centre of the screen for 500 ms. Then, one of eight global composite letters was randomly presented. In total 48 global composite letters were presented, preceded by four practice trials. Participants were instructed to react as quickly and accurately as possible.

[2]Analyses of mean ratings provided additional support. The two-way interaction between quality of painting and judgment mode revealed that participants in the intuitive condition were better in differentiating between low- (M = 38.15, SD = 14.73) and high-quality art (M = 49.82, SD = 15.36) than were those in the deliberate condition (low-quality: M = 40.98, SD = 11.78, high-quality: M = 46.29, SD = 11.90, F[1, 64] = 4.04, p = .049, η_p^2 = .06).

After completing the global – local reaction time measure, participants were asked to rate the eight paintings used in Study 2.1 in terms of quality. Quality of the paintings was judged using a 100-point slider, anchored with *very good* and *very bad*.

Results and Discussion

Before analyzing the global – local reaction time task, incorrect responses were excluded from the analyses (Förster & Higgins, 2005). In these responses participants responded with a letter that was not presented on the screen. Median responses were used to deal with skewness (Fazio, 1990; Ratcliff, 1993; Veling & van Knippenberg, 2004). For each individual a processing style score was computed by subtracting the median response latencies for global trials from the median response latencies for local trails; thus a positive score indicates a more global processing style. Processing style scores that deviated more than 2.5 standard deviations from the mean processing style score were considered outliers and excluded from the analyses (two cases).

We computed an accuracy score in the same way as in the previous study. The mean score was 10.78 (SD = 3.50). To test the relation between processing style and the ability to rate the paintings in terms of quality, a regression analysis was conducted with processing style as the predictor. Results revealed a significant association between processing style and the accuracy score ($F[1, 43] = 5.36$, $p = .025$, $\beta = .33$, $\eta_p^2 = .11$). The more global the processing style, the more accurately individuals were able to judge the paintings in terms of quality.

Study 2.3

The previous study demonstrated a relation between natural occurring processing style and how accurate paintings were judged. In Study 2.3 we experimentally tested the effect of processing style on judgments of paintings by inducing a local or global processing style. We expected that participants in the global focus condition would give more accurate quality judgments than participants in the local focus condition.

Method

Participants. Fifty-two first year psychology students from the University of Amsterdam participated in the experiment in exchange for course credits. No information was available about sex and age of the participants.

Materials and procedure. Participants were randomly assigned to either the global or the local processing style condition. Participants completed a variation of the global – local reaction time measure as described in Study 2.2. To induce a global or local processing style, participants were instructed to react to either the global or the local letters (Förster & Higgins, 2005). In this variation of the global – local reaction time measure, the global composite letters were constructed in such a way that the same global composite letters could be used to induce a global as well as a local processing style (an H made of L's, an H made of H's, an L made of L's, and an L made of H's). After completing the global – local reaction time measure, participants were asked to rate eight paintings in terms of quality. The same slider and the same low- and high-quality paintings were used as in the previous studies.

Results and Discussion

One participant was excluded from the analyses because his accuracy score deviated more than 2.5 standard deviations from the mean accuracy score. The same accuracy score was computed as in the previous study. An ANOVA revealed that participants' accuracy scores were higher in the global condition (M = 12.00, SD = 1.98) than in the local condition (M = 10.23, SD = 4.14, F[1, 49] = 3.74, p = .059, η_p^2 = .07).[3]

Study 2.4

The previous study demonstrated a causal relation between processing style and the accuracy of quality judgments of paintings. In the final study we test whether this association between processing style and accuracy of judgments can explain the effect of judgment mode (deliberative vs. intuitive) on quality of judgment. We expected that the effect of judgment mode on accuracy of judgment would be mediated by processing style. To show that the role of processing style in judging art is not limited to paintings, we used low- and high-quality poems in the present study.

Method

[3] Analyses of mean ratings provided additional support. The two-way interaction between quality of painting and processing style showed that participants in the global condition were better in differentiating between low- (M = 37.44, SD = 12.37) and high-quality art (M = 52.96, SD = 12.86) than were those in the local condition (low-quality: M = 37.92, SD = 10.36, high-quality: M = 46.67, SD = 13.03, F[1, 49] = 4.71, p = .035, η_p^2 = .09).

Participants. Seventy-five students (26 male, 49 female) at the University of Amsterdam participated in the study. Age ranged from 18 till 46 years old (M = 21.49, SD = 4.12). Participants were given a monetary reward or course credits for participation.

Materials and procedure.

Participants were randomly assigned to the deliberate or intuitive condition. To control for individual variation, processing style was assessed at the beginning of the experiment and after judging the poems. This was done with the global – local reaction time measure, as described in Study 2.2.

After assessing processing style, participants rated the quality of eight poems using a 100-point slider, anchored with *very good* and *very bad*. Four poems were downloaded from an amateur poem internet site and classified as low-quality. The four high-quality poems had all been published and received awards. Four experts in poetry (graduates in poetry) confirmed the distinction between low- and high-quality poems[4].

In the intuitive condition participants were asked to rely on their initial intuitive judgment and not to think too much. Similar to Study 2.1 and the original experiment of Wilson and Schooler (1991), we asked participants in the deliberate condition to report separate aspects of the poems that determined their quality. They were asked to do this for one minute for each poem, after which they rated the quality of the poem.

Results and Discussion

Two participants were excluded from the analyses because their processing style scores deviated more than 2.5 standard deviations from the overall mean. Accuracy scores were subjected to an ANOVA. Participants who made intuitive quality judgments showed higher accuracy scores (M = 8.19, SD = 3.86) than participants who deliberated before making their judgments (M = 5.19, SD = 3.39, F[1, 71] = 12.51, p = .001, η_p^2 = .15). Thus, participants who made intuitive judgments had more accurate quality judgments of the poems than participants who deliberated. This finding replicates the findings of Wilson and Schooler (1991) and those obtained in Study 2.1.[5]

[4] Cohen's Kappa ranged from κ = .50 (one published poem was taken for an amateur poem and vice versa) to κ = 1 (all judgments were in line with the distinction between published and amateur poems).

[5] Analyses of mean ratings provided additional support. We used a subset of the sample and omitted participants who had recognized poems. The two-way interaction between quality of painting and judgment mode was significant (F[1, 60] = 4.05, p = .049, η_p^2 = .06). Participants in the intuitive condition rated published poems as higher quality (M = 49.87, SD = 12.67) than amateur poems (M = 47.25, SD = 12.83). In contrast, participants in the deliberative condition rated published poems as lower quality than (M = 55.05, SD = 9.73) than amateur poems (M = 58.79, SD = 13.01).

To assess the effect of judgment mode on processing style we controlled for individual differences and subjected both before and after measurements to a 2 (moment of measurement: before or after judging) x 2 (judgment mode: intuitive or deliberative) repeated measures ANOVA. Overall, participants had a more global processing style before judging poems (M = 88.59, SD = 136.20) than after judging poems (M = 39.90, SD = 95.41, F[1,71] = 16.72, p < .001, η_p^2 = .19). The two-way interaction between moment of measurement and judgment was significant (F[1, 71] = 8.52, p = .005, η_p^2 = .11). Simple-effects tests revealed that this effect was due to the deliberate condition. The processing style score for participants in the deliberate condition was lower after judging the poems (M = 26.86, SD = 111.44) than before judging the poems (M = 109.51, SD = 156.21, F[1, 71] = 24.89, p < .001, η_p^2 = .34). No difference was found between processing style scores after (M = 53.28, SD = 74.76) and before judging the poems (M = 67.08, SD = 110.11) for participants in the intuitive condition (F < 1, *ns*). Deliberation thus induced a more local processing style.[6]

A regression analysis was used to test the effect of processing style on the accuracy score. The processing style score derived from the after-judgment measurement was used as predictor, while the processing style score of the before-judgment measurement was kept constant to control for individual differences. Results showed that processing style predicted the accuracy score (F[1, 70] = 8.36, p = .005, η_p^2 = .11, β = .41). A more global processing style was associated with a more accurate judgment of poetry in comparison to a more local processing style.

When the effect of both processing style scores were kept constant while testing the effect of judgment mode on the accuracy score, judgment mode still predicted accuracy of judgments (F[1, 69] = 6.64, p = .012, η_p^2 = .09, β = .29). However, a Sobel test revealed that the influence of judgment mode on accuracy was significantly reduced (z = 1.97, p = .049). This indicates that processing style partially mediated the effect of judgment mode on accuracy of quality judgments of poems, see Figure 2.1.

[6] To check whether processing style scores differed between conditions prior to the manipulation, we conducted an ANOVA. This analysis confirmed that the difference in processing style scores prior to the manipulation was not significant (F[1, 71] = 1.79, p = .19).

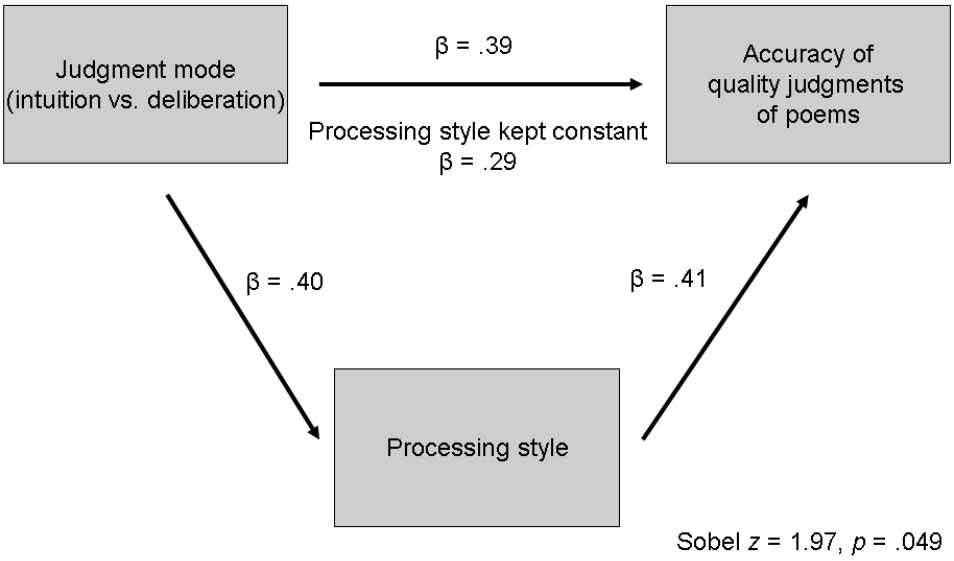

Figure 2.1. Mediation of judgment mode on accuracy of judgments of poems by processing style.

General Discussion

In three studies, we showed that the effect of deliberating or relying on intuition when judging art (paintings, poems) is affected by processing style. First we showed that judging paintings is affected by deliberation; intuitive judgments turned out to be more accurate than judgments based on reasons (Study 2.1). Next we showed that natural occurring processing style affects quality judgments (Study 2.2), and that induced processing style has a similar effect (Study 2.3). Studies 2.2 and 2.3 showed that a more global processing style is related to more accurate judgments of art in terms of quality. In addition we showed that deliberating before judging induces a local processing style; this is not the case when people are asked to rate stimuli intuitively (Study 2.4). The findings of Study 2.4 also revealed that processing style partially mediates the effect of deliberating before judging or judging intuitively on judgment of poems.

Ideally mediation is established by demonstrating correlations between variables that are assessed successively in time (independent variable, mediator, dependent variable),

which is not the case in Study 2.4. Assessing the variables for the mediation analysis in this order, however, would have created a rather artificial situation. Participants would be asked to form a deliberated opinion or to rely on their intuition and then to postpone their actual judgment until after the assessment of processing style. In addition, this procedure entails the risk that the measurement of processing style attenuates judgment. We deemed it more important to conduct an unconfounded test of the effect of judgment mode on judgment than to measure the mediator prior to the dependent variable. The studies presented in the present article can be related to each of the steps that determine whether mediation took place or not, described by Baron and Kenny (1986).

Study 2.1 and 2.4 demonstrated the causal relation between judgment mode and accuracy of judgment (step 1 in establishing mediation; Baron & Kenny, 1986). Study 2.4 demonstrated (among others, see above and below) that judgment mode induces processing style (step 2). Study 2.3 showed that accuracy is affected by processing style (step 3). Finally, Study 2.4 showed that the effect of judgment mode on accuracy is reduced when processing style is included in the equation. These findings thus indicate that the effect of judgment mode on accuracy of judgment is mediated by processing style, and the outcomes of the mediation analysis reported in Study 2.4 provide further support.

In our studies we tested the effect of decision mode and processing style in the domain of art. Further research is needed to test whether processing style also explains the detrimental effects of deliberation in other domains, such as judging the quality of jams or predicting sports matches. The fact that we replicated the effect of processing style on judgments of paintings in a study involving judgments of poems indicates that the effect is not limited to the visual domain, suggesting that similar mechanisms may play a role in other domains.

Overall, our results contribute to the understanding of the effects of deliberating versus relying on intuition in judgments and decisions, and why deliberation might hinder the quality of judgment and choice. As mentioned in the introduction, other authors have shown that deliberating makes people rely more on accessible information, while attention is directed away from other potentially more relevant information (Tordesillas & Chaiken, 1999; Wilson et al., 1995). Processing style as a mediating factor can explain these findings and suggests that the effect of deliberating is more fundamental. Deliberating affects the way in which people attend to, select, and process information in general. However, this

does not mean that processing style is the only underlying mechanism of judgment mode. For example, an important feature of deliberation is extended decision time. It is quite possible that extended decision time has detrimental effects on judgments and decisions apart from the effects of processing style. Future research should clarify this issue.

Construal Level Theory (CLT; see Trope & Liberman, 2010) provides additional possible implications of our research. There are many theoretical similarities between CLT and global versus local processing styles ($GLOMO^{sys}$), and they might in fact refer to the same phenomenon (Förster & Dannenberg 2010a; 2010b). It could be that both global processing style and increased psychological distance improve judgment and decision-making. For example, by imagining that you are making judgments and decisions for future purposes, or for somebody else, would improve decision-making. In addition, the combination of research showing that power increases psychological distance and abstract processing (Smith & Trope, 2006), and research showing that power enables people to make accurate decisions, even after deliberation (Smith, Dijksterhuis & Wigboldus, 2008), suggests that simply increasing psychological distance enables people to make accurate decision irrespective of decision mode.

Another related phenomenon is featural versus configural mindset (Lerouge, 2009). A characteristic of both processing style and mindset is that people either pay attention to details or to the Gestalt. Interestingly, recent research shows that distraction enlarges the effect of mindset (Lerouge, 2009). Individuals in a configural mindset - who are motivated to hold evaluatively coherent representations - become better in differentiating between stimuli, while individuals in a featural mindset - who are motivated to identify specific positive and negative features - are not affected in their evaluation by distraction. This suggests that the beneficial effects of relying on intuition or global processing style are enhanced by distraction. Future research should assess whether this is indeed the case.

Another question for future research concerns the role of expertise. Do experts suffer in the same way from deliberating or adopting a local focus as novices? Or might they be capable of deliberating while maintaining a relatively global focus? Or, alternatively, might they be able to reach accurate decisions in a local focus? Finally, it would be interesting to investigate the effects of decision mode on other domains; such as domains that require decision makers to follow strict rules or on more complex decisions,

like policy making and business. Further research can shed more light on these issues, and help people to make optimal use of intuitive versus reasoned judgment and decision-making.

Chapter 3

It Feels So Good It Must Be Right: Decision Mode, Processing Style, and the Subjective Value of Decisional Fit

This chapter is based on Dijkstra, K.A., Van der Pligt, J., & Van Kleef, G. A. (2011). It feels so good it must be right: Decision mode, processing style, and the subjective value of decisional fit. *Manuscript under review.*

Abstract

Intuition is associated with a global processing style, whereas deliberation is associated with a local processing style. In the present studies we examined this relationship in more detail, focusing on preferences for and use of decision strategies as a function of processing mode, and on the perceived value of the decision outcome. Study 3.1 showed that the relation between processing style and decision mode is bidirectional: A global processing style led to a stronger preference for intuitive decision strategies compared to a local processing style. Study 3.2 focused on the consequences of a (lack of) fit between processing style and decision mode. Participants in a global processing style who decided intuitively and participants in a local processing style who decided deliberatively (decisional fit conditions) estimated a chosen item to be more expensive than did those whose processing style and decision mode were incongruent.

Keywords: global versus local processing style, judgment and decision-making, intuition, deliberation, decisional fit.

Life is packed with decisions, ranging from which gadget to receive for participation in a psychological experiment to which wine to select for an evening with friends and to which new car to buy. There are roughly two different strategies that people can adopt to come to a decision: people can either think carefully about the different options, consider the pros and cons, and make a deliberated choice. Alternatively, people can rely on their *gut feeling* and make an intuitive choice or decision.

Research has shown that the way we make decisions affects the way we attend to, and process information. Deliberation induces a local processing style in which people are focused on details and accessible and easy-to-verbalize information; intuition is related to a global processing style in which people attend to the global picture and take information into account that is difficult to verbalize (Dijkstra, Van der Pligt, Van Kleef, & Kerstholt, 2010; see also Dijkstra, Van der Pligt, & Van Kleef, 2011b).

Research on processing style shows that the relation between higher order cognitive processes and (perceptual) processing style can be bidirectional (Förster, 2009b). In the present article we examine whether the relation between judgment mode and processing style is similarly bidirectional. We test whether processing style induces a preference for intuitive versus deliberate judgment and decision-making, the same way as judgment mode induces processing style. In addition, we examine whether processing style and judgment mode show *fit*-effects. That is, whether processing style and judgment mode affects how people appreciate or value the decision they made.

Decision Mode and Processing Style

As mentioned above, decision strategies are often divided into intuitive strategies, which are fast, parallel and possess high capacity, versus deliberate strategies, which are slow, sequential, and possess low capacity (see for an overview Evans, 2008; 2010). In line with Betsch (2008) we define intuition as follows: "Intuition is a process of thinking. The input to this process is mostly provided by knowledge stored in long-term memory that has been primarily acquired via associative learning. The input is processed automatically and without conscious awareness. The output of the process is a feeling that can serve as a basis for judgments and decisions" (p. 4). Deliberation is described as a strategy in which "Information is integrated in a serial manner, processing is cognitively demanding and rather slow, and individuals using these strategies are aware of most of the underlying

processes and can even verbalize them." (p. 6). Indeed, research has confirmed that intuition is capable of processing and integrating multiple pieces of information without noticeable cognitive effort (Betsch & Glöckner, 2010). As noted before, relying on intuition is related to a global processing style in which people pay attention to the global picture (Dijkstra et al., 2010) and are more sensitive to affective reactions and fluency signals (Dijkstra et al., 2011b). In contrast, deliberation induces a local processing style in which people attend to details and accessible and readily verbalized information (Dijkstra et al., 2011b; Wilson, Hodges, & LaFleur, 1995). Processing style mediates the effect of judgment mode on judgment (Dijkstra et al., 2010).

Processing style refers to the way people attend to information. People can either attend to the Gestalt of a stimulus or pay more attention to its details. A collection of trees, for example, can be seen as a forest, but people can also direct their attention to the individual trees (Gasper & Clore, 2002; Navon, 1977; Schooler, 2002). This attentional selection mechanism operating on a perceptual level is correlated with the attentional mechanism used to select conceptual nodes within the semantic network. Both regulate perceptual and conceptual processes (Derryberry & Tucker, 1994; see also Förster, 2009b; Förster, Friedman, Özelsel, & Denzler, 2006). A local processing style is related to searching for details. In contrast, when in a global processing style people make sense of a stimulus by integrating it into superordinate, inclusive knowledge structures. Generally, a global processing style supports creativity and metaphor understanding, while a local processing style supports analytical thinking and concrete construals (Förster & Dannenberg, 2010a).

Decisional Fit

Research has found that the way people make decisions can affect how they value the decision outcome. People experience *value* of the decision outcome when the strategy they used *fits* their dispositional preference or current orientation. For instance, when people who are generally concerned with the presence or absence of positive outcomes, decided on the basis of possible gains rather than possible losses (Higgins, 2000). Fit effects are commonly demonstrated by revealing a higher estimated price for a chosen item for participants in conditions where dispositional preference or current orientation fits the used choice strategy compared to conditions that do not fit (e.g., Betsch & Kunz, 2008; De

Vries, Holland, & Witteman, 2008; Förster & Higgins, 2005; Higgins, Idson, Freitas, Spiegel, & Molden, 2003). Decisional fit makes people feel right about the used strategy and leads to the experience of value. This experience of value is derived from the strategic manner in which a goal is pursued rather than value from relevance to desired end-states (Higgins et al., 2003).

The majority of studies on fit are in the domain of regulatory focus (e.g., Avent & Higgins, 2003; Higgins, 2000; Higgins et al., 2003). Promotion-oriented individuals - who are generally concerned with the presence or absence of positive outcomes - experience value when focusing on gains. In contrast, prevention-oriented individuals - who are generally focused on the presence or absence of negative outcomes - experience value when avoiding losses. This experience of fit is translated to subjective value. In their experiment Higgins and colleagues (2003) asked participants to choose to receive a pen or a mug. Half of the participants were instructed to think about what they would *gain* by choosing the pen and what they would *gain* by choosing the mug. The other half were instructed to think about what they would *lose* by not choosing the pen or not choosing the mug. Promotion-oriented individuals who focused on gains and prevention-oriented individuals who focused on losses estimated the value of the chosen product to be higher than participants in the non-fit conditions.

A fit effect can also be caused by a match between situationally induced processing styles and decision strategies. A global processing style, for example, fits a decision strategy focusing on gains, while a local processing style fits a strategy focusing on losses (Förster & Higgins, 2005). Other fit effects have been demonstrated for mood (happy vs. sad) and intuitive or deliberative decision strategies (De Vries et al., 2008). Betsch and Kunz (2008) focused on the fit between participants' dispositional preference for decision strategies on a continuum between intuition and deliberation and the decision strategy they used. Their findings showed a fit effect between dispositional preference and decisions strategy.

Overview of the Experiments

As mentioned above, judgment mode induces processing style and processing style mediates the effect of judgment mode on judgment. In the present studies we examine the relation between judgment mode and processing style in further detail. Research on

global versus local processing style shows that the relation between higher order cognitive processes and (perceptual) processing styles can be bidirectional. For instance, instructing people to focus on similarities versus dissimilarities induces a global and local processing style, respectively. However, priming people with a global versus local processing style similarly induces a focus on similarities and dissimilarities, respectively (Förster, 2009b).

In Study 3.1 we test whether the relation between judgment mode and processing style is also bidirectional and whether processing style leads people to prefer intuitive versus deliberative decision strategies in the classic city-size paradigm (Gigerenzer & Goldstein, 1996). In Study 3.2 we test whether congruency between instructed judgment mode and induced processing style fit and affect subjective value of a chosen item. This would mean that decisions strategies not only fit dispositional preference (Betsch & Kunz, 2008) but also current preference and induced processing style.

Study 3.1

As noted before, the way people make decisions (relying on reasons or intuition) induces a specific processing style. In the present experiment we test whether the relation between judgment and decision mode and processing style is bidirectional and whether processing style induces a preference for a particular decision mode (intuition or deliberation). We induced a global or local processing style and asked participants to judge the size of different cities (Gigerenzer & Goldstein, 1996). Given that the relation between higher order cognitive processes and processing style can be bidirectional (Förster, 2009b), and that a local processing style is assumed to be related to deliberate strategies (e.g., focusing on details, analytical thinking and concrete construals), and a global processing style to intuitive strategies (e.g., creativity, metaphor understanding, integrating information into inclusive knowledge structures; Förster & Dannenberg, 2010a), we expect that a global processing style will *induce* a preference for intuition, and a local processing style a preference for deliberation.

In addition to an induced preference for intuition or deliberation, we also expect that participants would rely on a corresponding decision strategy in the city-size task. On the basis of research focusing on the (conscious or unconscious) integration of large amounts of information when deciding intuitively (Betsch & Glöckner, 2010; Glöckner & Betsch, 2008a), and in line with Horstmann, Ahlgrimm, and Glöckner (2009) we expected

that participants in a global processing style would (unconsciously) weigh cues and integrate them in a weighted additive manner (WADD, Payne, Bettman, & Johnson, 1988). Giving the number of cues and the complexity of the task we expected that participants in the local condition would rely on logical rules like the lexicographic strategy (LEX, individuals select the option that is highest on the most valid differentiating cue, see Fishburn, 1974) or the equal weight strategy (EQW, the validity of each cue is ignored and only the number of cues is counted, see Fishburn, 1974). This line of reasoning is supported by research showing that analytic thinking is characterized by more heuristic search processes (Cokely & Kelly, 2009), and that deliberated judgments more often rely on heuristics than judgments made intuitively (Haberstroh, 2008; Haberstroh & Betsch, 2002; Hilbig, Scholl, & Pohl, 2010; Plessner & Czenna, 2008).

However, this line of reasoning is not undisputed. Some argue that intuition is related to effortless, heuristic processing and reliance on logical rules which ignore information. For instance, reliance on the lexicographic strategy or the equal weight strategy. In agreement with this line of reasoning, Gigerezer (2007) argued that simple heuristics based on LEX or EQW schemes might be the core of intuition: "Good intuitions ignore information. Gut feelings spring from rules of thumb that extract only a few pieces of information from a complex environment (. . .) and ignore the rest" (p. 38).

Recently Kruglanski and Gigerenzer (2011) proposed that intuition as well as deliberation is rule-based. They argue that the very same rules can underlie both judgments. The task itself and individual memory constrain the set of applicable rules, whereas individual processing potential and (perceived) ecological rationality of the rule, given the task, guide the final selection from that set. Analyzing the employed strategies, allows us to test whether processing style affects reliance on particular judgment strategies for that specific task.

Method

Participants. Forty-eight students (16 male, 32 female) of the University of Amsterdam participated in the study. Age ranged from 18 till 49 years old (M = 22.48, SD = 5.10). Participants were given a monetary reward or course credits for participation.

Materials and procedure. Participants were randomly assigned to either the global or the local processing style condition. Participants engaged in a variation of the classic city-size task (Gigerenzer & Goldstein, 1996). In the city-size task participants are

asked to judge which of two cities has most inhabitants. Participants could base their decision on the presence or absence of certain cues. This information is presented in a matrix in which cue value information was given in a binary format, "plus" indicating the existence of the cue (e.g., the city has a Zoo) or "minus" denoting the non-existence of the cue (e.g., the city has no Airport). In total the presence or absence of eight cues was given for each city.

Before starting the task, participants were first familiarized with both the task and the various cues. They were informed that the cities presented in the task were allegedly based on real German cities. In addition, they were told that artificial names (e.g., "City-1") were used in order to eliminate the effects of existing knowledge of the cities. Next, global or local processing style was induced by the induction variant of the global – local reaction time measure (Förster & Higgins, 2005). Participants were presented with a series of 'global' letters made up of smaller 'local' letters (an H made of Ls, an H made of Hs, an L made of Ls, and an L made of Hs). Participants in the global condition were instructed to focus on the global letter and to indicate whether the global letter was either an L or an H. In contrast, participants in the local condition were instructed to focus on the smaller local letters and to indicate whether the local letters were an L or an H. This procedure induces a global or a local processing style respectively (Förster & Higgins, 2005).

After the induction of processing style, participants were randomly presented with 16 city-size decision tasks. We used four different types of task, and each type was presented four times. In type 1 participants decided between a city where two of the least valid cues were present versus a city where these two cues were not present but the most valid cue was (as indicated by a pilot study where participants ranked the cues on basis of validity for city-size). In type 2 the only difference between the two cities was the presence of the least and the moderately valid cues versus the most valid cue. For type 3, the two moderately valid cues were contrasted to the most valid cue. And for the last type (type 4), the city with the most valid cue was contrasted to a city with the presence of the two moderately valid cues and the lowest valid cue. To make the task more convincing we included filler cues that were present or absent in both cities, and to make the task more difficult we included a third city that according to the various cues and strategies was always the smallest city, see Appendix A for an illustration.

By creating these different types of decision tasks we were able to test when participants changed strategy. When participants relied on the lexicographic (LEX) strategy (i.e., choosing the city with the most valid cue) for certain types of decision tasks and changed to the equal weight (EQW) strategy for other types of decision tasks (i.e., choosing the city with the largest number of cues present), indicated the use of the weighted additive (WADD) strategy (i.e., the cues are weighted). Of course LEX and EQW are sub-strategies of WADD with specific restricted weights (Bröder & Schiffer, 2003). Therefore the WADD strategy (predicted strategy for participants in the global condition) was identified by change of decision rule. Participants in the local condition were predicted to use either LEX and EQW strategies and not to change decision rule between the different city-size tasks. Only the WADD strategy would predict change since cues can be weighted differently for different tasks. After the city-size task, participants were asked to indicate how much they relied on intuition during the city-size task on a 7-point scale, anchored with *completely* and *not at all*.

Results and Discussion

Before analyzing the data, participants who deviated more than 2.5 standard deviation from the mean response on our dependent variables were excluded from the analysis (one participant). An ANOVA was used to test whether processing style induced a preference for intuitive versus deliberative decision-making. Participants in the global condition indicated that they had relied more heavily on intuition during the city-size task (M = 5.32, SD = .98) than participants in the local condition (M = 4.63, SD = 1.17, F[1,45] = 4.80, p = .034, η_p^2 = .10). This finding corroborates our main hypothesis.

No difference was found in use of strategy across all types of decision tasks between the local and the global condition (F[1,45] = 1.00, *ns*). The number of times that participants judged in accordance with the EQW strategy in the global (M = 10.57, SD = 3.92) and in the local condition (M = 9.26, SD = 5.02, F[1,45] = 1.00, *ns*) did not differ[7]. When examining the effects for each type of decision task separately, we found a marginally significant effect for type 4 decision tasks (city with the most valid cue contrasted to a city with the presence of three less valid cues). Participants in the global condition more often judged in accordance with the EQW strategy (i.e., they selected the

[7] Since in all types of decision tasks the only alternative to EQW was the LEX strategy, analyzing differences in utilization of the LEX strategy would yield equal results

city with the largest number of cues present) more often (M = 3.61, SD = 0.83) than participants in the local condition (M = 2.95, SD = 1.54, F[1,45] = 3.60, p = .064, η_p^2 = .07). No effects were found between conditions in the other three decision tasks (F < 1, *ns*). To test whether participants in the global condition employed the EQW or the WADD strategy (i.e., the cues are weighted) we compared the strategy used in type 3 tasks (two moderately valid cues contrasted to the most valid cue) to type 4 tasks, by conducting a 2 (type of decision task: type 3 vs. type 4) x 2 (processing style: global vs. local) repeated-measures ANOVA. The analysis revealed a main effect of type of task: participants utilized the EQW strategy more often in type 4 tasks (M = 3.34, SD = 1.20) than in type 3 tasks (M = 2.87, SD = 1.26, F[1,45] = 6.29, p = .016, η_p^2 = .12). More importantly, type of decision task by processing style interaction showed that more participants changed their strategy to EQW in the type 4 tasks in the global condition (type 3: M = 2.86, SD = 1.30, type 4: M = 3.61, SD = 0.83) than in the local condition (type 3: M = 2.90, SD = 1.24, type 4: M = 2.95, SD = 1.54, F[1,45] = 4.75, p = .035, η_p^2 = .10) indicating a more frequent use of the WADD strategy and weighing of the cues in the global condition than in the local condition. In sum, a global processing style not only induced an increased preference for intuition than a local processing style, it also affected the employment of specific decision rules.

Study 3.2

The previous experiment demonstrated a causal relationship between processing style and preference for decision mode. As noted, recent studies (Dijkstra et al., 2010) showed that the reverse is also true and that decision mode influences processing style. In Study 3.2 we focus on the fit between decision mode (intuitive vs. deliberative) and processing style (global vs. local) and test whether fit conditions show higher subjective value than non-fit conditions. Given that dispositional preference for intuitive versus deliberative decision-making and utilization of respective decision modes leads to decisional fit (Betsch & Kunz, 2008), we expect that induced preference for intuition or deliberation via processing style (Study 3.1) would, similarly to Betsch and Kunz (2003), fit corresponding decision modes and would lead to an increase in subjective value.

Method

Participants. Eighty-nine students at the University of Amsterdam participated in the study. Due to technical malfunction the demographical information of 16 participants was not registered. Age of the remaining participants ranged from 18 till 50 years old (M = 21.93, SD = 5.32), 26 participants were male and 47 female.

Materials and procedure. We followed a similar procedure to Betsch and Kunz (2008) and De Vries and colleagues (2008). Participants were randomly assigned to conditions in the 2 (Processing style: global vs. local) x 2 (Decision mode: intuitive vs. deliberative) between subjects design. Processing style was induced by the same global – local reaction time measure as described in Study 3.1. Following the processing style induction, participants were informed that they participated in a lottery in which they could win a coffee thermos. They could choose which out of two thermoses they wanted to win. Participants in the intuitive condition were instructed to base their choice on their intuition and not to think too much. In contrast, participants in the deliberative condition were instructed to examine the thermos pots closely and to take ample time to think carefully about the pros and cons of each thermos. After making their choice, participants were asked to indicate the value (in euro's) of the chosen thermos. To include more subjective dependent variables participants were asked to indicate how much they were satisfied and confident with their choice and how easy or difficult they thought the decision was. All three measurements were assessed on a 7-point scale anchored with *not at all* and *very much*. Finally, participants were asked to write down their choice and email address on a lottery ticket and to deposit the ticket in the lottery ticket box.

Results and Discussion

Participants who deviated more than 2.5 standard deviation from the mean response on the main dependant variable were excluded from the analysis (three participants). To test whether the instruction to decide intuitively or after deliberation was successful we compared the time that participants took to make their decision. Decision time was subjected to a 2 (Processing style: global vs. local) x 2 (Decision mode: intuitive vs. deliberative) ANOVA. The ANOVA revealed a main effect of decision mode. Participants who had been instructed to deliberate took more time for their decision (M = 22.92, SD = 11.75) than did those who had been instructed to rely on intuition (M = 10.19, SD = 8.07, $F[1,84] = 33.65$, $p < .001$, $\eta_p^2 = .29$). No other main or interaction effects were found ($F < 1$, *ns*).

Estimated price of the chosen thermos was subjected to a 2 (Processing style: global vs. local) x 2 (Decision mode: intuitive vs. deliberative) ANOVA. No main effect of processing style or decision mode was found ($F < 1$, *ns*). However, as predicted, we found a significant processing style by decision mode interaction ($F[1,82] = 4.12$, $p = .046$, $\eta_p^2 = .05$). Participants estimated the price of the thermos higher in the fit conditions (global-intuitive: $M = 13.58$, $SD = 6.54$; local-deliberative: $M = 12.80$, $SD = 5.51$) than in the non-fit conditions (global-deliberative: $M = 10.92$, $SD = 4.22$; local-intuitive: $M = 10.89$, $SD = 4.07$), see Figure 3.1.

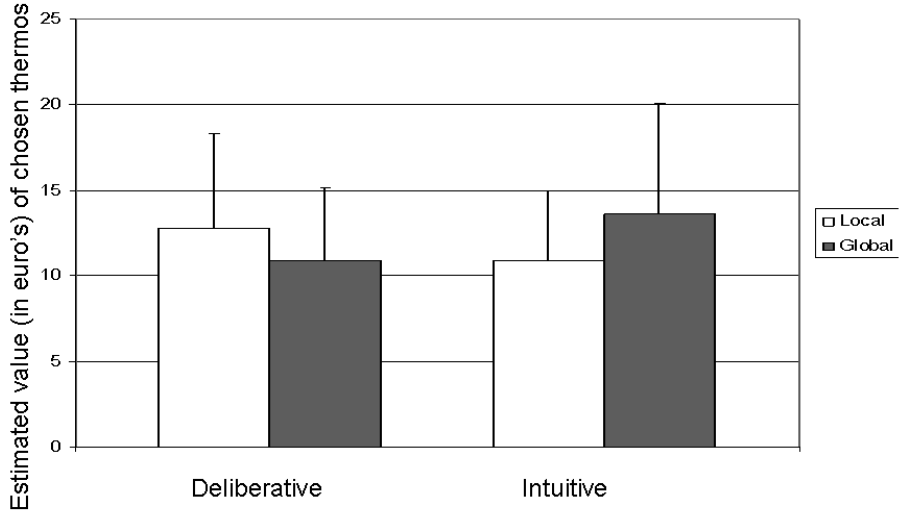

Figure 3.1. Estimated value of chosen thermos as a function of decision mode and processing style.

To explore possible underlying mechanisms we probed the interaction for other effects. Contrast analyses showed that the two fit conditions did not differ from each other ($t < 1$, *ns*), as was also the case for the two non-fit conditions ($t < 1$, *ns*). No fit effects were found for reported satisfaction ($F < 1$, *ns*), reported confidence ($F < 1$, *ns*), and reported ease of the decision ($F[1, 84] = 2.17$, $p = .15$, *ns*).

General Discussion

In two experiments we tested the relation between processing style (global, local) and decision mode (intuitive, deliberative). In Study 3.1 we showed that global versus local processing style induced a preference for intuitive and deliberative decision strategies, respectively. In addition, processing style also affected our participants' reliance on particular decision strategies. Next we showed that global or local processing styles and intuitive or deliberative decision strategies exhibit a decisional fit (Study 3.2). Participants in a global processing style who decided intuitively and participants in a local processing style who decided deliberatively estimated their chosen thermos to be more expensive than did participants in a global and a local processing style who decided deliberatively and intuitively, respectively.

Considering that decision mode influences processing style (Dijkstra et al., 2010), Study 3.1 reveals that the relation between processing style and decision mode is bidirectional. As mentioned, processing style not only induces a preference for a particular decision mode but also induces an actual reliance on particular decision strategies.

The results of Study 3.2 indicate that it is not always wise to rely on intuition. Even when relying on intuition can yield objectively superior judgments and decisions, it may sometimes be more rewarding to make a decision that *feels* right, rather than selecting the objectively best option but being unsatisfied and feeling bad about it. Consider for example choices and decisions where subjective value is most important, such as when buying a painting or a thermos. It would be interesting to investigate in future research whether decisional fit also affects the quality of our decisions, for instance, whether it could lead to objectively superior judgments and decisions.

There are some striking theoretical similarities between Construal Level Theory (CLT; see Trope & Liberman, 2010) and global versus local processing styles (GLOMO^{sys}). They might in fact refer to the same phenomenon (Förster & Dannenberg 2010a; 2010b). This might imply that level of construal and psychological distance should have a similar, or even the same impact on preference for deliberation versus intuition. Moreover, construal level and decision mode should result in similar decisional fit effects. Future research should assess whether this is indeed the case.

In Study 3.1 we assessed preference for intuition or deliberation by participants' self-reports after completing the city-size task. It is possible that self-reports do not reflect

peoples' true preferences, but are nothing but post hoc reflections on the way people reached their decision. Despite the fact that there are no right or wrong answers in the city-size task, more unobtrusive measurements of preference during the judgment task would provide more indisputable evidence for the effect of processing style on preference for judgment mode.According to Higgins and colleagues (2003), decisions fit when people feel right about the strategy they are using. This feeling of fit transfers to the experience of value involved in a subsequent object evaluation. De Vries and colleagues (2008) proposed confidence as possible underlying mechanisms. Fit could increase level of confidence in reactions that decision makers experience toward a decision outcome, regardless of whether those reactions happen to be positive or negative. Fitting decisions would not result in more positive but more extreme subjective value of the chosen item (Idson, Liberman, & Higgins, 2000). However, we could not find support for this explanation. No effects were found for other subjective measurements such as confidence, satisfaction, or the perceived difficulty of the decision task.

Alternatively, fluency could be an underlying mechanism: When situational demands fit dispositional preference or current orientation, people can rely on their ongoing strategy, which feels natural and easy to them. Hence, the decision process is perceived as fluent. The experience of fluency is known to affect perception of truth and rightness (Parks & Toth, 2006; Reber & Schwarz, 1999). Consequently, choices or judgments made under decisional fit might be perceived as more "true" or "right". Support for this line of reasoning is provided by Lee and Aaker (2004). They showed that messages that were framed in a way that matched individuals' regulatory focus were reported to be processed more fluently, were identified more often in a subsequent identification task, and were more convincing than messages with a low fit. Fluency also helps to explain more extreme evaluations for initial negative stimuli as a function of fit-effects (Idson et al., 2000). Future research should clarify this mechanism by assessing fluency and by testing whether fluency mediates fit effects on subjective value. We would expect that the feeling of "feeling right about the strategy" is derived from processing fluency.

To sum up, we showed that the relation between processing style and judgment mode (relying on intuition vs. reasons) is bidirectional and that congruency between processing style and judgment mode result in decisional fit.

Appendix A. Examples of the four different types of city-size tasks.

	Stad 1	Stad 2	Stad 3
Treinstation	+	+	+
Schouwburg	+	-	-
Dierentuin	+	-	-
Kathedraal	-	-	-
Universiteit	+	+	+
Deelstaat hoofdstad	-	-	-
Metro	-	-	-
Vliegveld	-	+	-

Welke stad is het grootst?
Druk 1,2 of 3

Type 1 (the two least valid cues contrasted to the most valid cue)

	Stad 1	Stad 2	Stad 3
Treinstation	+	+	+
Schouwburg	+	+	-
Dierentuin	-	-	-
Kathedraal	-	-	-
Universiteit	+	+	-
Deelstaat hoofdstad	-	+	+
Metro	-	-	-
Vliegveld	-	-	+

Welke stad is het grootst?
Druk 1,2 of 3

Type 2 (the least and moderate valid cues contrasted to the most valid cue)

	Stad 1	Stad 2	Stad 3
Treinstation	+	+	+
Schouwburg	-	-	-
Dierentuin	-	-	-
Kathedraal	-	-	-
Universiteit	+	-	-
Deelstaat hoofdstad	+	-	-
Metro	-	-	-
Vliegveld	-	+	-

Welke stad is het grootst?
Druk 1,2 of 3

Type 3 (the two moderately valid cues contrasted to the most valid cue)

	Stad 1	Stad 2	Stad 3
Treinstation	+	+	+
Schouwburg	-	-	+
Dierentuin	-	-	-
Kathedraal	-	-	-
Universiteit	-	-	+
Deelstaat hoofdstad	-	-	+
Metro	-	-	-
Vliegveld	+	-	-

Welke stad is het grootst?
Druk 1,2 of 3

Type 4 (the most valid cue contrasted to the three less valid cues)

Chapter 4

Where Intuition Resides:

Effects of Processing Style on Affective Reactions and Processing Fluency

This chapter is based on Dijkstra, K.A., Van der Pligt, J., & Van Kleef, G. A. (2011). Where intuition resides: Effects of processing style on affective reactions and processing fluency. *Manuscript under review.*

Abstract

What are the characteristics of intuitive as opposed to more deliberate judgments and decisions? Past research suggests that the experience of intuition depends both on affective reactions and processing fluency (e.g., Topolinski & Strack, 2009b). In the present studies we provide direct evidence for the role of affect and processing fluency in intuitive judgment, and also show that their role is more prominent in intuitive as opposed to more deliberate processes.

We induced global versus local processing styles, which have been shown to instigate intuitive and deliberative judgments, respectively. Study 4.1 and 4.2 showed an increased responsiveness to affective stimuli among participants in a global as opposed to a local processing mode. Study 4.3 showed similar effects for processing fluency; participants in a global processing style showed an increased reliance on fluency. Study 4.4 replicated our findings in a more mundane judgment task, in which participants judged apartments.

Keywords: global versus local processing style, judgment and decision-making, intuition, processing fluency, affective reaction.

We more or less continuously need to make decisions ranging from what to have for dinner and how to get to work, to which job offer to accept, which apartment to buy, and whom to marry. For many decisions people rely on habits, others are made more intuitively, or after carefully analyzing pros and cons for each option before making a deliberated choice. Interestingly, people not only rely on intuition when making simple decisions that do not have serious consequences (Sjöberg, 2001), but also when confronted with more important decisions (Klein, 2004). Some argue that these intuitive decisions are often remarkably accurate (Albrechtsen, Meissner, & Susa, 2009; Dijksterhuis & Nordgren, 2006; Halberstadt & Green, 2008; Klein, 2004; Wilson & Schooler, 1991). On what sources of information are these decisions based? Do intuitive and deliberative judgments rely on different sources of information, and if so, how does that affect the judgments people make?

Wilson, Hodges, and LaFleur (1995) argued that deliberation makes people focus on accessible and readily verbalized information, possibly ignoring other, perhaps more indicative sources of information (see also Tordesillas & Chaiken, 1999). It remains unclear however, what kind of information is ignored and whether intuition does incorporate this information. In the present paper we experimentally test whether affective reactions and feelings of processing fluency are sources of information that are taken into account in a more intuitive mode of processing, but are relatively ignored in a deliberate mode of processing.

In line with Betsch (2008) we define intuition as follows: "Intuition is a process of thinking. The input to this process is mostly provided by knowledge stored in long-term memory that has been primarily acquired via associative learning. The input is processed automatically and without conscious awareness. The output of the process is a feeling that can serve as a basis for judgments and decisions." (p. 4).

There is some evidence that intuition is related to (sometimes implicit) affective reactions (Bechara, Damasio, Tranel, & Damasio, 1997; Wagar & Dixon, 2006; see also Slovic, Finucane, Peters, & MacGregor, 2002) and to processing fluency (Fu, Dienes, & Fu, 2010; Topolinski & Strack, 2009a; Wippich, 1994; Wippich, Mecklenbräuker, & Krisch, 1994). Both affective reactions and processing fluency can be related to experiential learning. For instance, there is ample evidence showing that the valence of the majority of our affective reactions is learned rather than innate (Rozin & Millman, 1987).

Further evidence is provided by research on evaluative conditioning (De Houwer, Baeyens, Vansteenwegen, & Eelen, 2000; Razran, 1954; Staats & Staats, 1957; for an overview see De Houwer, Thomas, & Bayens, 2001). This is in line with the definition provided by Betsch (2008), which claims that the input of intuition is based on knowledge acquired via associative learning.

Processing fluency can be defined in terms of the experienced ease with which information is processed. Ease of processing can for example be enhanced by repeated exposure to the stimulus (Bornstein & D'Agostino, 1994; Jacoby, Kelley, & Dywan, 1989), or by the activation of associated concepts (Topolinski, Likowski, Weyers, & Strack, 2009; Topolinski & Strack, 2009a). Research showed that both affective reactions and processing fluency contributes additively and independently to performance on more or less intuitive tasks such as coherence judgments and artificial grammar tasks (Topolinski & Strack, 2009b). Although intuition might be related to these processes, it has not been experimentally tested whether affective reactions and processing fluency are relatively ignored when individuals deliberate and play a more important role when people rely on intuition.

Dijkstra, Van der Pligt, Van Kleef, and Kerstholt (2010) showed that the effect of relying on intuition or reasons is mediated by processing style (see also Dijkstra, Van der Pligt, & Van Kleef, 2011a). Deliberation induces a local processing style in which people focus on details, and this can make it more difficult to come to an accurate judgment or decision. Processing style refers to the way people attend to information. People can either attend to the Gestalt of a stimulus or pay more attention to its details. A collection of trees, for example, can be seen as a forest, but people can also direct their attention to the individual trees (Gasper & Clore, 2002; Navon, 1977; Schooler, 2002). This attentional selection mechanism operating on a perceptual level is correlated with the attentional mechanism used to select conceptual nodes within the semantic network. Both regulate perceptual and conceptual processes (Derryberry & Tucker, 1994; see also Förster, 2009b; Förster, Friedman, Özelsel, & Denzler, 2006). A local processing style is related to searching for details. In contrast, when in a global processing style people make sense of a stimulus by integrating it into superordinate, inclusive knowledge structures. Generally, a global processing style supports creativity and metaphor understanding, while a local processing style supports analytical thinking and concrete construals (Förster &

Dannenberg, 2010a). Intuition has also been related to processing the 'Gestalt' rather than details (Epstein, 1990; Nisbett, Peng, Choi, & Norenzayan, 2001; Shapiro & Spence, 1997), and to unconsciously integrating large amounts of information (Betsch & Glöckner, 2010; Glöckner & Betsch, 2008).

In the present paper we thus distinguish between *global* and *local* information processing. Inducing these two different processing modes allows us to test the role of affective information and processing fluency in intuitive versus deliberative judgments and decisions. Because of the characteristics of global and local processing (processing the Gestalt vs. searching for details and applying analytical thinking; see above), and the importance of processing fluency and affective reactions in the experience of intuition (e.g., Topolinski & Strack, 2009b), we hypothesized that participants in a global processing mode would be more responsive to affective information and experiences of processing fluency than participants in a local processing mode. In Study 4.1 we test effects of the affective valence of stimuli on affective judgments in a global versus local processing mode. In Study 4.2 we examine the differential effect on affective judgments of evaluatively conditioned stimuli. In Study 4.3 we examine responsiveness to fluency by manipulating implicit learning and test performance on an artificial grammar task (Reber, 1967, 1993; for an overview see Pothos, 2007). Finally, in Study 4.4 we replicate our findings in a more mundane judgment task, in which participants were asked to judge apartments.

Study 4.1

As noted earlier, deliberating leads people to focus on accessible and readily verbalized information while less readily verbalized information is ignored (Wilson et al., 1995; see also Tordesillas & Chaiken, 1999). Because affective reactions contribute to the experience of intuition (Bechara et al., 1997; Topolinski & Strack, 2009b; Wagar & Dixon, 2006), provide guidance in judgment and decision-making (Wagar & Dixon, 2006), and are less readily verbalized, we hypothesize that affective reactions are a source of information that is included in intuitive judgments but relatively ignored in deliberation. We expect people to be more responsive to affective stimuli when they adopt a global rather than a local processing style. This would be in accordance with our expectation that affective

information is more important and receives more weight in intuitive processing than in more deliberate, analytical information processing.

Method

Participants. One-hundred-and-nineteen students from the University of Amsterdam participated in exchange for course credits or a monetary reward (42 male, 77 female). Age ranged from 18 to 50 years (M = 21.92, SD = 4.57).

Materials and procedure. Participants were randomly assigned to either the global or local processing style condition. Processing style was induced by a variation of the global-local reaction time measure (Förster & Higgins, 2005). Participants were presented with a series of 'global' letters made up of smaller 'local' letters (an H made of L's, an H made of H's, an L made of L's, and an L made of H's). On each trial, participants were first presented with a fixation cross in the centre of the screen for 500 ms. Then, one of four global composite letters was randomly presented. We presented a total of 48 global composite letters. In the global condition participants were instructed to indicate as quickly and accurately as possible whether the global letter was an H or an L. In the local condition participants were instructed to respond to the local letter.

After the processing style induction, participants judged 28 pictures selected from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005). We selected (non-erotic) pictures that depicted scenes that differed on the pleasure dimension. Extremely negative pictures (e.g., pictures of mutilations) were discarded. We selected a total of 28 pictures evenly distributed over the pleasure continuum.

Because we were interested in the effects of more intuitive versus deliberative modes of processing on responsiveness to affective reactions, we deviated as little as possible from the original procedure assessing affective reactions to pictures (Lang et al., 2005). We asked participants to indicate the emotions evoked by each picture and instructed them not to dwell on their response. Participants indicated their emotional experiences on three dimensions (pleasure, arousal, dominance) on a nine-point scale. These three dimensions were the same as those presented by Lang and colleagues (2005) and provided the opportunity to test the effect of processing style on affective judgments. The pleasure scale was anchored *very unhappy* vs. *very happy*, the arousal scale *very calm* vs. *very excited*, and the dominance scale was anchored *very submissive* vs. *very dominant.*

To make sure that participants interpreted each dimension in the intended way, we explained the dimensions and anchors, using the instruction by Lang et al. (2005).

Results and Discussion

The standard deviation of the pleasure ratings across all pictures were subjected to an ANOVA. The ANOVA revealed a significant effect of processing style (F[1,117] = 5.64, p = .019, η_p^2 = .05). Participants in the global condition showed a larger standard deviation (M = 2.24, SD = .65) than participants in the local condition (M = 1.97, SD = .60). This is a first indication that participants in the global condition were more responsive to the affective valence of stimuli. As noted, the judged pictures were both negative and positive. Incorporating the affective valence into judgments of stimuli should be associated with more extreme pleasure ratings of the negative and positive pictures, and consequently a larger standard deviation in the global versus local processing style condition. As expected, we did not find any effects on the dominance (F[1,117] = 1.56, p = .21, *ns*) and arousal scales (F[1,117] = 2.29, p = .13, *ns*).

Contrasting pleasure ratings of the eight most positive to the eight most negative pictures revealed that pleasurable pictures were rated as more pleasurable (M = 6.63, SD = 1.01) than negative pictures (M = 2.64, SD = .92, F[1,117] = 856.52, p < .001, η_p^2 = .88). The analysis further revealed a processing style by pleasure rating interaction. Participants in the global condition rated the IAPS pictures more extremely (positive pictures: M = 6.77, SD = 1.08; negative pictures: M = 2.39, SD = .97) than participants in the local condition (positive pictures: M = 6.52, SD = .94; negative pictures: M = 2.82, SD = .84, F[1,117] = 6.03, p = .016, η_p^2 = .05). Simple effects tests revealed that the interaction was mostly driven by ratings of negative pictures (negative pictures: F[1,117] = 6.61, p = .011, η_p^2 = .05; positive pictures: F[1,117] = 1.80, p = .18, *ns*)

To sum up, participants in the global condition, showed larger differences in their pleasure ratings of the pictures and their ratings of the positive and negative pictures were more extreme. This indicates that participants in the global condition were more responsive to the affective valence of stimuli than participants in the local condition.

Study 4.2

In this study we test whether individuals in a global processing style are more responsive to the valence of evaluatively conditioned stimuli than individuals in a local

processing style. We used an evaluative conditioning (EC) paradigm. In this paradigm, the judged conditioned stimulus (CS) remains the same across conditions, and the unconditioned stimuli (US) transfer their affective reaction to the CS. The fact that the same CS is judged across conditions allows us to test whether individuals using a global or local processing style are more or less responsive to these non-deliberated affective reactions.

Method

Participants. Forty-one students from the University of Amsterdam participated in exchange for course credits or a monetary reward (12 male, 29 female). Age ranged from 17 to 25 years (M = 20.12, SD = 1.90).

Materials and procedure. Again, participants were randomly assigned to either the global or local processing style condition. We manipulated the valence of Chinese ideograms in a standard EC paradigm. Four Chinese ideograms (conditioned stimulus) were paired with affect-laden pictures selected from the IAPS database (unconditioned stimulus). Two ideograms were paired twice with four positive US and two ideograms were paired twice with four negative US, in accordance with Lang and colleagues (2005). To avoid main effects of specific ideograms we counterbalanced the CS-US pairings between subjects. In total, each CS was paired eight times, which resulted in 32 trials. Because a forward conditioning paradigm tends to yield larger effects (Hammerl & Grabbitz, 1993; Stuart, Shimp, & Engle, 1987) we first presented the CS for 1000 ms, followed by the US for 1000 ms after an interval of 100 ms. After an inter-trial interval of 3000 ms the next trial commenced.

Next, processing style was induced as in Study 4.1. After the processing style induction, evaluation of the ideograms was assessed on an 11-point scale anchored with *very ugly* and *very beautiful*.

Results and Discussion

Mean evaluations of positively and negatively conditioned ideograms were subjected to a 2 (pairing: positive US vs. negative US) by 2 (processing style: global vs. local) mixed model ANOVA. The analysis revealed the expected main effect of pairing (F[1,39] = 10.67, p = .002, η_p^2 = .22). Chinese ideograms paired with negative IAPS pictures were rated as less beautiful (M = 5.60, SD = 2.08) than ideograms paired with positive IAPS pictures (M = 6.78, SD = 2.38). The main effect of processing style was not

significant (F[1,39] =1.83, p = .18, *ns*). As hypothesized, the processing style by pairing interaction was significant (F[1,39] = 4.03, p = .052, η_p^2 = .09). Participants in the global focus condition differed more in their judgment of the valence of ideograms paired with negative (M = 5.61, SD = 2.09) and positive USs (M = 7.61, SD = 2.02) than participants in the local condition (negative US: M = 5.60, SD = 2.12; positive US: M = 6.07, SD = 2.48). Simple effects tests revealed that the interaction was driven by ratings of positively conditioned ideograms (negative US: F < 1, *ns*; positive US: F[1,39] = 4.64, p = .037, η_p^2 = .11). See Figure 4.1. This indicates that participants in a global processing mode were more susceptible to the (positive) affective valence of stimuli than participants in a local processing mode.

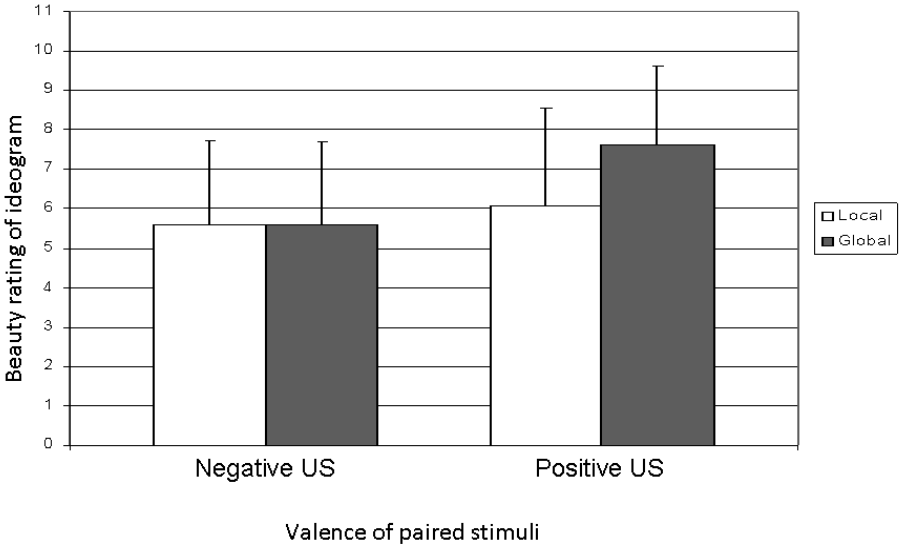

Figure 4.1. Beauty judgments of ideograms paired with negative and positive stimuli for participants in the global and local condition.

Study 4.3

Studies 4.1 and 4.2 showed that individuals in a global processing mode are more responsive, and thus react more extremely to the affective valence of stimuli. This should

also make it more likely that these affective reactions receive more weight in judgments and decisions when people are in a global as opposed to a local processing mode.

In Study 4.3 we focus on another element of information processing that is less readily verbalized: fluency. As noted in the Introduction, fluency can be defined as the experienced ease of processing a stimulus. In Study 4.3 we operationalized fluency by means of an artificial grammar task (e.g., Reber, 1967, 1993; for an overview see Pothos, 2007). In this task participants implicitly learn an artificial grammar. In a subsequent test stage participants are able to distinguish above chance whether presented letter strings followed the learned grammar or not, without being able to explain their judgments (see e.g., Reber, 1967; Vokey & Brooks, 1992). Kinder, Shanks, Cock, and Tunney (2003) showed that processing fluency is the underlying experience that is the basis for participants' judgment in the test stage.

As was the case in the previous studies, we induced a global or local processing style before subjecting our participants to the test stage. We expected that participants in the global condition would be more responsive to processing fluency and consequently perform better on the artificial grammar task than participants in the local condition.

Method

Participants. Seventy-nine students from the University of Amsterdam participated in exchange for course credits or a monetary reward (20 male, 59 female). Age ranged from 18 to 50 years old (M = 22.30, SD = 4.80).

Materials and procedure. Participants were randomly divided between the global and local processing style conditions. In our artificial grammar task we used the same letter strings as Vokey and Brooks (1992) and others (Kinder et al., 2003; Topolinksi & Strack, 2009a). Vokey and Brooks (1992) constructed the letter strings by selecting three to seven letters that followed each other in a grammatical structure. We used the same procedure for learning the *training items* as Topolinksi and Strack (2009a). The 16 strings were presented for 3000 ms and participants were asked to reproduce the letter string using the keyboard. Each letter string was presented again until the letter string was reproduced correctly, and this was followed by another letter string. Next, processing style was induced as in Study 4.1.

After the processing style induction participants were informed that the items they had reproduced and learned previously, followed a hidden grammatical rule. They were

instructed to judge whether the following letter strings conformed to the same hidden rule or not. Participants were presented with 64 new letter strings in a random order. Half of the strings followed the same grammatical structure as the trained strings; the remaining strings did not follow the grammatical structure. These *non-grammatical* strings were created by substituting a single letter of *grammatical* strings in such a way that the string could not be generated by the grammar.

Results and Discussion

Following Topolinksi and Strack (2009a), we excluded slow responses (made after 3000 ms) from the analysis, because these responses could be driven by more deliberate processes and are hence less sensitive to grammaticality and do not qualify as intuition.

Proportions of strings qualified as grammar for grammatical and non-grammatical strings were subjected to a 2 (type of string: grammatical vs. non-grammatical) by 2 (processing style: global vs. local) mixed model ANOVA. Grammatical strings were qualified more often as grammar (M = .50, SD = .24) than non-grammatical strings (M = .41, SD = .20, F[1,77] = 30.97, p < .001, η_p^2 = .29), replicating the standard effect on the artificial grammar task (Pothos, 2007; Reber, 1967, 1993). The ANOVA also revealed the hypothesized interaction. Participants in the global focus condition were better at differentiating between grammatical (M = .51, SD = .24) and non-grammatical (M = .38, SD = .19) strings than participants in the local focus condition (grammatical: M = .50, SD = .25, non-grammatical: M = .44, SD = .21, F[1,77] = 4.76, p = .032, η_p^2 = .06). This indicates that participants in the global focus condition were more responsive to (lack of) fluency and consequently detected the (lack of) hidden grammatical structure more accurately.

Study 4.4

The preceding experiments showed that individuals in a global processing mode are more responsive to less readily verbalized characteristics – such as their own affective reactions to affect-laden stimuli, and processing fluency – than individuals in a local processing mode. The third study showed that increased responsiveness to processing fluency can also enhance people's performance on an implicit learning task. In Study 4.4 we test our hypothesis in a more mundane task. We again induced a global or local processing style and asked participants to judge apartments on the basis of information

provided in pictures and written information in a brief text. Since apartments in the Netherlands are generally advertised by providing information in text and pictures (see e.g., www.funda.nl), we expected participants to be familiar with judging apartments in this way.

We manipulated contrast and brightness of the pictures of the apartments; both are known to increase processing fluency (contrast: Checkosky & Whitlock, 1973; Reber, Winkielman, & Schwarz, 1998; brightness: Whittlesea, Jacoby, & Girard, 1990). These two characteristics are also related to liking (Reber et al., 1998), and are even thought to be a dimension of beauty (Gombrich, 1995; Solso, 1997). Information provided in the text was systematically manipulated in terms of factual elements such as size of the living area and type of insulation.

We expected that information provided in pictures would affect judgment of participants in the global condition more profoundly than that of participants in the local condition. In light of Wilson et al.'s (1995) finding that deliberation increases reliance on accessible information that is also easy to verbalize, we expected that information provided in the text would have a more pronounced effect in the local than in the global condition.

Method

Participants. One-hundred-and-sixty-six first year psychology students from the University of Amsterdam participated in a series of studies, including the present experiment. They participated for partial fulfillment of a course requirement. No information was available about sex and age of the participants.

Materials and procedure. Participants were randomly assigned to conditions in a 2 (Processing style: global vs. local) x 2 (Judgment task: version 1 vs. version 2) between-subjects design. Again, processing style was induced by the same variation of the global-local reaction time measure as used in Study 4.1. After completing the global-local reaction time measure participants were asked to judge two apartments in a random order. Three pictures of each apartment were presented on the left side of the screen, providing "a feel for the atmosphere"; five pieces of textual information were presented on the right side of the screen (viz., type of apartment, size of living area, number of rooms, type of insulation, and some miscellaneous information, such as the absence or presence of a fireplace or information about the kitchen).

To test what type of information was more important – specific attributes or the general atmosphere conveyed by the photographs – we manipulated the positivity of both types of information. For Apartment 1 we manipulated attractiveness of the atmosphere by increasing contrast and brightness of the pictures, creating a desirable and less desirable version of the same apartment. We purposely manipulated the pictures instead of using different pictures in order to keep the elements presented in the pictures constant. For Apartment 2 we manipulated textual information by increasing the size of the living area (75 m^2 instead of 50 m^2), type of insulation (double instead of single glazing) and the absence or presence of certain details (viz., terrace, fireplace, central heating, 10-year-old kitchen). In this way we again created a desirable and less desirable version of the same apartment. Each participant judged one desirable apartment and one less desirable apartment.

For each apartment we asked participants to indicate how desirable they thought the apartment was, how beautiful, and how much they would like to live in the apartment. All three judgments were assessed with a 100-point slider, anchored with *not at all* and *very much*.

Results and Discussion

Four participants were excluded from the analyses because their score on the main dependent variable deviated more than 2.5 standard deviation from the mean response. We combined the three attractiveness ratings to create an overall judgment of desirability for each apartment (Cronbach's α = .91 and .93 for the first and second apartment, respectively).

The desirability ratings for apartment 1 were subjected to a 2 (processing style: global vs. local) by 2 (description of apartment: desirable pictures vs. less desirable pictures) between subjects ANOVA. We did not find a main effect of focus ($F < 1$, *ns*) or version ($F[1,158] = 2.11$, $p = .15$, *ns*). More importantly, we did find an interaction effect ($F[1,158] = 7.91$, $p = .006$, $\eta_p^2 = .05$), see Figure 4.2.

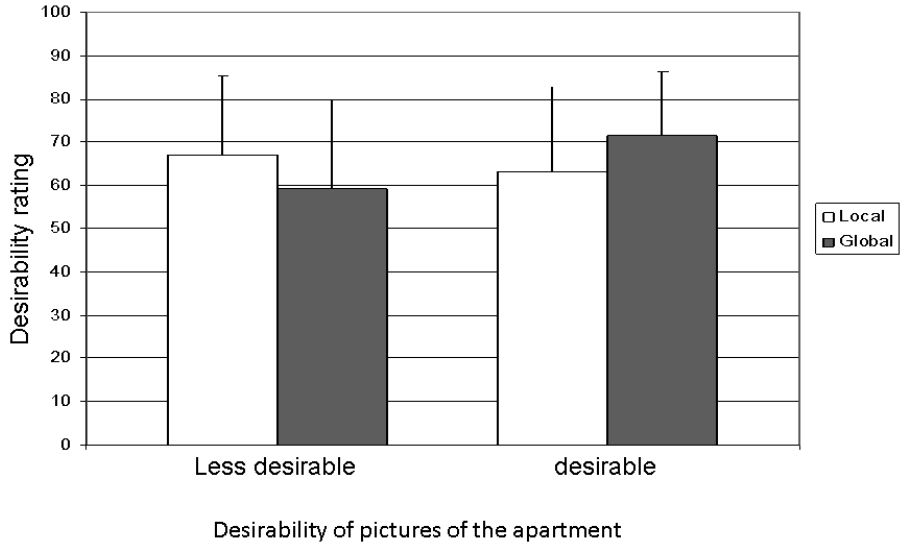

Figure 4.2. Desirability ratings of apartments with less desirable pictures and more desirable pictures for participants in the global and local condition.

Simple effects analyses showed that participants in the global focus condition rated the apartment with desirable pictures as more desirable (M = 71.55, SD = 14.73) than the apartment with less desirable pictures (M = 59.21, SD = 20.66, F[1,158] = 8.98, p = .003, η_p^2 = .11). No significant difference was found between the two versions in the local condition (desirable pictures: M = 63.10, SD = 19.58; less desirable pictures: M = 67.04, SD = 18.13, F < 1, *ns*). To test the effect of textual information, we subjected the desirability ratings for Apartment 2 to a 2 (processing style: global vs. local) by 2 (description of apartment: desirable text vs. less desirable text) between subjects ANOVA. The ANOVA revealed a main effect of version (F[1,158] = 15.46, p < .001, η_p^2 = .09). Not surprisingly, the version with desirable attributes was indicated as more desirable (M = 68.84, SD = 21.32) than the version with less desirable attributes (M = 55.91, SD = 21.16). The analyses revealed no main effect of processing style (F < 1, *ns*). However, the analyses revealed a

version by processing style interaction (F[1,158] = 10.20, p = .002, η_p^2 = .06), see Figure 4.3.

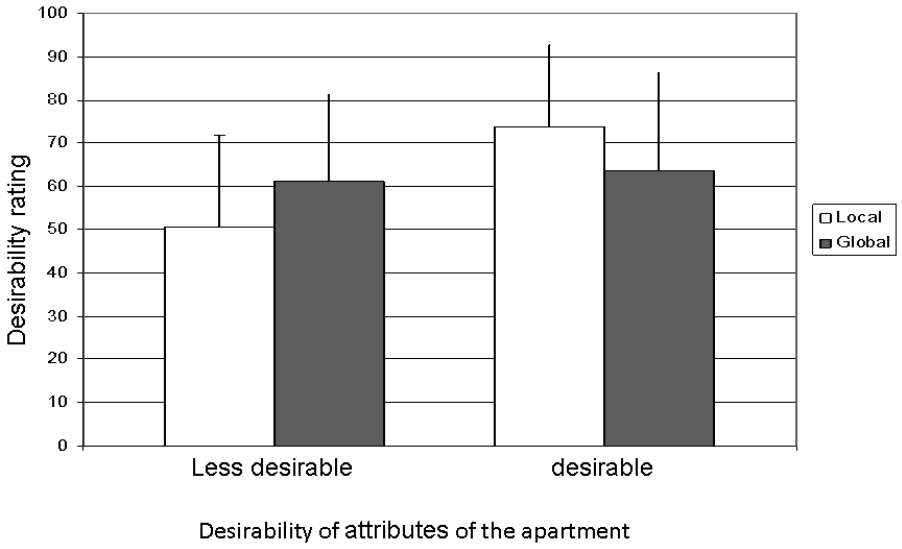

Figure 4.3. Desirability ratings of apartments with less desirable attributes and more desirable attributes for participants in the global and local condition.

Simple effects analysis revealed that participants in the local focus condition indicated the description with more desirable attributes as more desirable (M = 73.85, SD = 18.93) than the version with less desirable attributes (M = 50.65, SD = 21.25, (F[1,158] = 25.70, p < .001, η_p^2 = .25). No difference was found between the version with desirable attributes (M = 63.71, SD = 22.62) and the version with less desirable attributes in the global condition (M = 61.31, SD = 19.92, F < 1, *ns*). We conclude that participants in a global processing style assigned more weight to the global impression or the 'feel' of the apartment, as presented in the pictures, than participants in a local processing style. In contrast, participants in a local processing style appeared to assign more weight to information about specific attributes as described in the text.

General Discussion

In four experiments we examined responsiveness to the affective valence of stimuli and to processing fluency as a function of processing style (global or local). We showed that participants in the global condition were more responsive to affective reactions and gave more extreme ratings to affective pictures (Study 4.1), and more extreme judgments to evaluatively conditioned stimuli (Study 4.2) than those in the local condition. In Study 4.3 we showed that participants in the global condition were more responsive to processing fluency and consequently performed better on an artificial grammar task than participants in the local condition. Finally, we showed that information in pictures had a more profound effect on participants in the global condition than on participants in the local condition. In contrast, information in text affected participants in the local condition more strongly than those in the global condition (Study 4.4).

Given that the effect of judgment mode (intuitive vs. deliberative) on judgment is mediated by processing style (Dijkstra et al., 2010), our studies provide an indication as to what type of information people rely on when they judge intuitively or deliberately. Our findings suggest that individuals who rely on intuition assign more weight to non-verbalized affective information, and less weight to explicit factual information in text than individuals who rely on deliberation (see also Wilson et al., 1995). In addition, we showed that this applies to both affective reactions and processing fluency, both of which are related to intuition (see Topolinski & Strack, 2009b). Individuals who rely on reasons are more affected by verbalized and relatively detailed information, as indicated by our final study on judging apartments.

Fluency and affective reactions are not independent. Previous research showed that fluency reinforces affective reactions (Reber et al., 1998; Reber & Schwarz, 2002). Not surprisingly, it is hard to determine whether it is affective valence or processing fluency or both that causes changes in preference in less artificial judgment tasks, such as the one used in Study 4.4. More insight could be obtained by manipulating fluency and affective reactions independently and preferably with different techniques (e.g., subliminal priming and evaluative conditioning). Our goal in Study 4.4, however, was not to determine which of the two processes affect judgment, but to experimentally test whether judgment mode affects responsiveness to easy (such as information in text) and more difficult to verbalize information.

The fact that we did not find effects of processing style on other dimensions of affective pictures (dominance and arousal) in Study 4.1, suggests that the effect of processing style is limited to valence and does not affect sensitivity to other dimensions of emotions. Our studies thus confirm other findings showing that affective reaction and processing fluency are important mechanisms in intuition (e.g., Bechara et al., 1997; Fu, Dienes, & Fu, 2010; Slovic et al., 2002; Topolinski & Strack, 2009a, 2009b, 2009c; Wippich, W., 1994). In addition, our studies provide new insight into the precise role of these processes and the type of information people tend to rely on when judging intuitively versus more deliberate judgments.

In our experiments we induced processing style instead of decision mode for two main reasons. First, this manipulation is less obtrusive than asking people to deliberate or to follow their intuition. Manipulating processing style is less likely to create demand effects. Second, instructing participants to rely on intuition, and especially instructing participants to deliberate, might be confusing, or even be impossible to comply with, in most of the paradigms we used. Nevertheless, future studies could investigate the role of intuition and deliberation in judgment and decision-making using alternative operationalizations and paradigms.

In addition, future research should help to clarify whether processing style affects responsiveness to one or both poles of the affect continuum. Study 4.1 suggests that the effect of processing style depends on the evaluations of negative stimuli, while the effect of processing style was limited to positive stimuli in the second experiment.

Our studies suggests that the remarkable accuracy of intuitive judgments can be explained in part by the fact that intuition takes sources of information into account that are based on processing fluency and affective reactions, both of which are based on experiential learning. Finally, our findings suggest that decisions can be improved by instructing decision makers about the differential effects of global versus local processing styles. In tasks that require careful deliberation, people may be advised to adopt a local processing style, which could be self-induced by focusing on the details of an object (i.e., focusing on the trees rather than the forest). When a decision is expected to benefit from intuitive judgment, however, people may instead be advised to adopt a global processing style. Focusing on the forest rather than the trees may mobilize affective sources of information that otherwise remain less accessible.

Chapter 5

Deliberation versus Intuition:

Decomposing the Role of Expertise in Judgment and Decision-Making

This chapter is based on Dijkstra, K.A., Van der Pligt, J., & Van Kleef, G. A. (2011). Deliberation versus intuition: Decomposing the role of expertise in judgment and decision-making. *Revised manuscript under review.*

Abstract

What produces better judgments: deliberating or relying on intuition? Past research is inconclusive. We focus on the role of expertise to increase understanding of the effects of judgment mode. We propose a framework in which expertise depends on a person's experience with and knowledge about a domain. Individuals who are relatively experienced but have modest knowledge about the subject matter ("intermediates"), are expected to suffer from deliberation and to benefit from a more intuitive approach, because they lack the formal knowledge to understand the reasons underlying their preferences. Individuals who are high ("experts") or low ("novices") on both experience and knowledge are expected to do well or poorly, respectively, regardless of decision mode. We tested these predictions in the domain of art. Studies 5.1 and 5.2 showed that intermediates performed better when relying on intuition than after deliberation. Judgments of experts and novices were unaffected. In line with previous research relating processing style to judgment mode, Studies 5.3 showed that the effect of processing style (global vs. local) on judgment quality is similarly moderated by expertise.

Keywords: expertise, knowledge, experience, judgment and decision-making, intuition, deliberation.

Traditionally it is thought that the best judgments and decisions are made after careful deliberation and a thorough analysis of the pros and cons of the available options. There is evidence however, that reasoning or deliberation is not always beneficial for the quality of our judgments and decision-making (e.g., Wilson & Schooler, 1991). Various researchers stress the importance of intuition in decisions under uncertainty (e.g., Damasio, 1994; Finucane, Alhakami, Slovic, & Johnson, 2000). Further, Haidt (2001) argued that moral judgments are better predicted by affective, intuitive reactions than by reasoning.

Intuition is studied in both philosophy and psychology. Not surprisingly, there are different definitions going back as far as Kant and Jung. We opt for a rather general definition presented by Betsch (2008): "Intuition is a process of thinking. The input to this process is mostly provided by knowledge stored in long-term memory that has been primarily acquired via associative learning. The input is processed automatically and without conscious awareness. The output of the process is a feeling that can serve as a basis for judgments and decisions."(p. 4)

Human intuition is assumed to yield better decisions and judgments in certain domains (see for an overview Evans, 2008). Empirical support for this claim has been obtained in studies on quality judgments of college courses (Tordesillas & Chaiken, 1999; Wilson & Schooler, 1991), judgments of Olympic dives (Halberstadt & Green, 2008), predictions of the result of basketball games (Halberstadt & Levine, 1999), the detection of deception (Albrechtsen, Meissner, & Susa, 2009), and quality judgments of paintings, apartments, and jelly beans (Nordgren & Dijksterhuis, 2009). But how do these effects relate to expertise? Would a person lacking experience in appreciating modern art make better quality judgments of art pieces when relying on intuition rather than deliberation? What about an expert who has seen thousands of pieces of art? To answer these questions we attempt to disentangle experience and knowledge, and argue that especially experienced individuals who lack adequate explicit knowledge are likely to benefit from intuitive judgment.

Judgment and decision-making occur within a wide variety of domains. These different domains often have characteristics that may affect judgment and decision processes. In the present paper we focus on judgment and decision-making in mundane settings. Implications for domains such as diagnostic or legal decision-making are considered in the General Discussion.

Intuition vs. Deliberation

In a classic experiment Wilson and Schooler (1991) asked participants to rank several types of strawberry jam that differed in overall quality. Participants who listed reasons for what they thought determined the quality of each jam before judging were outperformed by participants who judged the jams intuitively. Wilson and colleagues (e.g., Wilson, Hodges, & LaFleur, 1995; Wilson, Kraft, & Dunn, 1989; Wilson & Schooler, 1991) explained the effects of deliberating as a disruption, and related this to research showing how automatic behaviors are disrupted when people analyze and decompose them (Baumeister, 1984; Kimble & Perlmuter, 1970; Langer & Imber, 1979). Baumeister (1984) demonstrated this phenomenon in the context of games (*Pac Man* and a *roll-up* game), and his findings can be applied to other domains were behavior relies on learned and automatic responses (e.g., driving a car, hitting a ball in baseball).

In the same way can the process of judgment be disrupted when people reflect about reasons underlying their judgment (Wilson, Dunn, Kraft, & Lisle, 1989). People are often unaware of why exactly they feel the way they do (Nisbett & Wilson, 1977). When asked to verbalize their thoughts and analyze reasons, people tend to focus on reasons that are accessible in memory, plausible, and reportable (Tordesillas & Chaiken, 1999; Wilson et al., 1995; Yamada, 2009). As a consequence they may ignore aspects that are more difficult to verbalize. This focus on accessible and reportable reasons can be related to the way in which people attend to, select, and process information in general (Dijkstra, Van der Pligt, Van Kleef, & Kerstholt, 2010). Deliberation induces a local processing style in which people tend to focus on details, and pay less attention to the global picture. This focus on details can explain the detrimental effects on judgment.

Moderating Effects of Expertise

There seem to be two distinct traditions in the study of effects of expertise on judgment and decision-making. These two traditions show inconsistent results. On the one hand there is a tradition that focuses on knowledge. This research shows that judgments of experts are relatively stable while judgments of novices are more easily influenced (Englich & Soder, 2009), and can be harmed by deliberation (Wilson, Kraft et al., 1989; Wilson, Lisle, Schooler, Hodges, Klaaren, & LaFleur, 1993). Two explanations are provided for these results. First, knowledgeable people may have a better understanding of why they feel

the way they do, and are less likely to come up with a biased set of reasons. In contrast, less knowledgeable people are unsure of why they feel the way they do and might be more likely to generate reasons that are not, or only marginally, related to their attitude. A second, more tentative explanation is based on the assumption that less knowledgeable people have more evaluatively incongruent cognitions than more knowledgeable people. Focusing on a subset of these cognitions is therefore more likely to bias judgments (Wilson, Kraft et al., 1989).

In support of this rationale, analyzing reasons only affected liking for art posters among people who were less knowledgeable about art. No effects were found for participants who had enjoyed formal education in art (Wilson et al., 1993). Similarly, Wilson, Kraft and colleagues (1989) showed that analyzing reasons only reduced the correlation between dating couples' attitudes toward each other and break-up rates when they had been dating for a relatively short period of time (less than 5 months). Moreover, they showed that analyzing reasons only changed attitudes and reduced the correlation between attitude and willingness to promote a political candidate for participants who were relatively unknowledgeable about that candidate. Additional support is provided by Spence and Brucks (1997). They showed that experts base their judgment on more diagnostic information than non-experts, and also have a better understanding of *why* they feel the way they do. They compared judgment accuracy and information search of experts and novices in estimating the market value of property. Experts appeared to make more accurate judgments than novices, they were more confident, and they relied on fewer attributes.

On the other hand there is a tradition that focuses on experience. This research indicates that experts are often unaware of the cues that guide them and shows that experts are more susceptible to the effect of judgment mode. Hence, especially experts would benefit from intuition (Dijksterhuis, Bos, Van der Leij, & Van Baaren, 2009; Klein, 1993; 1998; see also Kahneman & Klein, 2009). This can be related to the view that the reliability of intuition depends greatly on past experiences in a specific area (e.g., Hogarth, 2001; see also Hogarth, 2010). This does not mean that experience always leads to better intuitions; but the likelihood that one's intuition is reliable tends to increase with experience.

Klein (1993; see also 1998) studied decision-making in domains that are characterized by uncertainty, high stakes and time pressure, such as management, military command and firefighting. He concluded that expert (in contrast to novice) decision makers

are able to draw on repertoires of patterns obtained by experience. This leads them to (unconsciously) recognize patterns that guide judgments and that help them to predict or anticipate outcomes (Recognition-Primed Decision strategy). Experts are unaware of this process and are unaware of the reasons for their judgment, at least at the moment when the decision is made. Analyzing reasons would therefore disrupt judgment and decision-making. Dijksterhuis and colleagues (2009) also argued that experts should rely on "the unconscious" and refrain from analyzing reasons. They showed that especially experts benefitted from unconscious thought in predicting soccer matches.

To summarize, we identified conflicting effects of expertise on the effect of judgment mode: One tradition claims that especially novices are susceptible to the effects of judgment mode, while the other tradition, in contrast, claims that experts are more sensitive to the effects of judgment mode. In addition to this inconsistency at the empiric level, there is also disagreement on a conceptual level. Wilson and colleagues (Wilson, Kraft et al., 1989; Wilson et al., 1993) compared participants that differed in *knowledge* about the subject matter. They assessed knowledge by means of a test or by measuring level of formal education. Dijksterhuis and colleagues (2009), on the other hand, compared *experts* to *non-experts*, with expertise being assessed by a test. Klein (1993) studied effects of expertise as assessed by participants' history of successful outcomes and on the basis of peer judgments. In the present paper we aim to provide a framework that can explain the inconsistent results and reconcile disagreement at the conceptual level.

Distinguishing Between Experience and Knowledge

As illustrated, most studies on the moderating effect of expertise distinguished between two levels: high and low expertise. Expertise is either operationalized as level of knowledge (e.g., Wilson, Kraft et al., 1989; Wilson et al., 1993) or as level of experience (e.g., Klein, 1993). We introduce a framework in which we consider both dimensions of expertise to explain the contradicting results that have been obtained in prior research. In our framework we differentiate between experience and knowledge. Level of *experience* in a domain is determined by the number and variety of situations and stimuli a decision maker has encountered. Experienced decision makers can therefore (implicitly) relate stimuli to stimuli they have encountered before. For instance, a person who regularly appreciates art can relate pieces of art to art she has seen before. She knows what she thinks

is art and what is not. In contrast, *knowledge* about a domain is more explicit. Such explicit knowledge can be obtained for instance by a study of the domain. We argue that people who possess knowledge in a certain domain know which factors determine quality and what determines their own judgment. For example, a person educated in art can verbalize why some pieces of art can be considered art and why other pieces cannot.

Using the two dimensions of experience and knowledge we can distinguish among three levels of expertise, as illustrated in Figure 5.1.

Expertise	Experience (Implicit Knowledge)	Knowledge (Explicit Knowledge)
Novices	Low	Low
Intermediates	High	Low
Experts	High	High

Figure 5.1. Three levels of expertise.

Individuals who are low in both experience and knowledge are considered to be novices. They have not yet developed their intuition and they lack knowledge about which attributes or criteria to rely on when making judgments. We expect these individuals to perform poorly, irrespective of the decision mode they adopt. Individuals high in experience but low in knowledge are considered to be 'intermediates'. They have developed their intuition through experience but lack conceptual knowledge to verbalize their intuition, and they have limited insight in the reasons for their preferences. Intermediates are expected to perform adequately when relying on intuition, but to perform relatively poor when asked to provide reasons before making their judgment. Finally, experienced individuals high in knowledge are considered to be experts. They have developed their intuition and have no problems explaining why they think the way they do. They are expected to perform adequately when relying on intuition as well as when relying on reasons. At present we will not consider the remaining combination of experience and knowledge (low experience and high knowledge), because only in very specific domains can a person have expert knowledge without experience. We return to this issue in the General Discussion.

In sum, we expect that intermediates (who have relatively high levels of experience but little formal knowledge) are most likely to profit from intuition and suffer

from deliberation. They lack the knowledge to 'unpack' their intuition and have limited insight in the reasons underlying their judgments and preferences.

Overview of the Experiments

In Study 5.1 we test whether the effects of judgment mode (intuitive vs. deliberative) on the accuracy of quality judgments of modern art differ as a function of expertise (novice, intermediate, expert), as determined by the different combinations of experience and knowledge. In Study 5.2 we replicate the results of Study 5.1 in a different domain (piano performances). Again, participants were divided into three groups on the basis of experience and knowledge. Study 5.3 aims to shed more light on the process underlying the interaction between expertise and judgment mode. We induced different processing styles and asked participants with different levels of expertise to rate high- and low-quality poems.

Study 5.1

In Study 5.1 we test our hypothesis that the effect of judgment mode (intuitive vs. deliberative) on judgment quality is limited to the intermediate group (relatively high experience but relatively low knowledge), and does not apply to novices (low/low) and experts (high/high). Participants possessing different levels of expertise in modern art were asked to judge the quality of low- and high-quality paintings. Half of the participants were asked to deliberate before making their judgment; the other half were asked to judge the paintings intuitively.

Method

Participants. One-hundred-and-twenty-seven participants that differed in knowledge of, and experience with modern art participated. Ninety-seven participants were students from the University of Amsterdam and participated for course credits (20 male). Age ranged from 18 to 53 years old (M = 22.35, SD = 7.46). Thirty professionals with a background in modern art participated voluntarily (8 male). Age ranged from 17 to 63 years old (M = 32.60, SD = 15.14). These professionals were employed by galleries, museums, and art schools.

Materials and procedure. Participants were divided in three groups on the basis of their background and self-ratings of interest in modern art. Interest in modern art was

assessed on a 100-point slider anchored with *very much* and *not at all*. Professionals with a background in modern art were assumed to possess a lot of knowledge about art and were consequently considered to be experts (n = 30). The remaining participants were divided into two groups (novices [n = 48] and intermediates [n = 49]) on the basis of a median split on the interest ratings[8]. We assumed interest to be related to experience with modern art. In support of this assumption, interest was strongly related to number of annual visits to art museums (r[95] = .49, p < .001).

Students from the University of Amsterdam were tested in the lab. The professionals were tested at a location of their own choice using a laptop. Participants were randomly assigned to either the intuitive or deliberate condition and asked to rate the quality of eight paintings. Similar to Nordgren and Dijksterhuis (2009), we selected four high-quality paintings from MoMA (Museum of Modern Art, New York, website: www.moma.org) and four low-quality paintings from MOBA (Museum of Bad Art, Boston, website: www.museumofbadart.org). To avoid recognition of paintings we selected paintings that were not particularly famous. These paintings have been pre-tested and used in previous research (Dijkstra et al., 2010). Quality ratings were assessed with a 100-point slider, anchored with *very good* and *very bad*.

To assess quality of the judgments we computed a composite accuracy score based on the ratings of the eight paintings for each participant (see Dijkstra et al., 2010). Composite accuracy scores are less sensitive to extreme ratings for individual paintings, which may arise from recognition. Composite scores therefore provide a more reliable indicator of quality of judgments. For each high-quality painting that was rated higher than a low-quality painting participants received a score of +1. Using this method the score could range from 0 (no high-quality painting is rated as higher quality than a lower-quality painting) to 16 points (all high-quality paintings are rated as better than all lower-quality paintings).

Before presenting the paintings we instructed participants in the deliberate condition to think carefully about what determined the quality of each painting. We asked participants to name the most important reasons, with a minimum of three reasons and a maximum of six (cf. Halberstadt & Green, 2008; Halberstadt & Levine, 1999). Participants

[8] Assigning participants to the three groups of expertise on the basis of a tertiary split on the self-rating yielded similar results.

in the intuitive condition were asked to simply rely on their intuition and not to think too much while judging the paintings. After judging the paintings we assessed interest in modern art, frequency of visiting art museums, and demographic data. In addition, we asked participants whether they had recognized any of the paintings. None of the participants reported to had recognized any low quality paintings. A minority of the experts recognized a high quality painting, which confirms the level of expertise of this group.

Results and Discussion

Composite accuracy scores were subjected to a 2 (judgment mode: intuitive or deliberative) by 3 (group: novices, intermediates, or experts) ANOVA. The ANOVA revealed a main effect of group (F[2,121] = 6.25, p = .003, η_p^2 = .09). Experts were more accurate in their judgment (M = 11.37, SD = 2.68) than novices (M = 8.96, SD = 2.94, t[124] = 3.57, p = .001, η_p^2 = .15); intermediates fell in-between (M = 9.59, SD = 2.97). No main effect of judgment mode (F[1,121] = 1.89, p = .17, *ns*) or group by judgment mode interaction was found (F < 1, *ns*). Since Rosenthal and Rosnow (1985) showed that omnibus interaction tests are highly conservative and not informative in the case of independent variables with more than two levels, we also executed simple effects analyses. Differences in accuracy scores between the intuitive and the deliberate condition were not significant for the novice group (intuitive: M = 9.05, SD = 3.17, deliberate: M = 8.89, SD = 2.81, F < 1, *ns*) and the expert group (intuitive: M = 11.56, SD = 2.87, deliberate: M = 11.14, SD = 2.54, F < 1, *ns*), but as expected we found an effect for the intermediate group (intuitive: M = 10.58, SD = 2.59, deliberate: M = 8.97, SD = 3.09, F[1, 121] = 3.62, p = .059, η_p^2 = .07). The interaction is depicted in Figure 5.2.

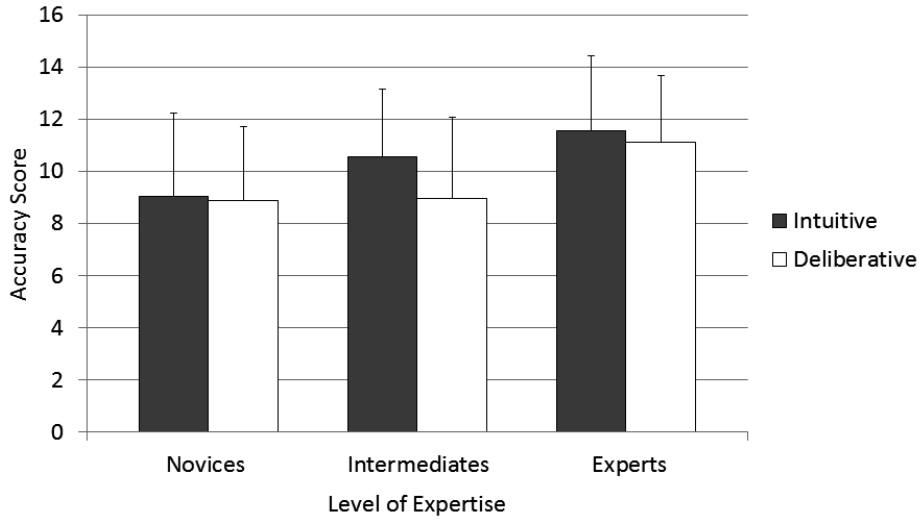

Figure 5.2. Accuracy scores of judgments of modern art for novices, intermediates and experts in the intuitive and deliberate condition.

Study 5.2

Study 5.1 demonstrated that the effect of judgment mode (intuitive vs. deliberative) on accuracy of judgment is limited to people with adequate levels of experience but limited knowledge about the domain. In a second study we decided to test the hypothesis in a different domain: classical music. Participants were again divided in three groups based on their experience and knowledge. We asked participants who differed in experience in playing a musical instrument *and* musical education to judge the quality of four piano performances of the same composition. Similar to Study 5.1, half of the participants were asked to deliberate before giving their judgment, while the other half were asked to judge the performances intuitively. Again, we expected to find a difference between judgment modes only for the intermediate group (high experience, low knowledge) and not for the novices (low/low) and experts (high/high). More specifically,

we expected that only participants who did not attend a music school but had experience in playing a musical instrument would give poorer judgments after deliberating as compared to judging intuitively.

Method

Participants. Ninety-six students from the University of Amsterdam and 49 students from the Rotterdam Conservatoire (Academy of Music) participated for course credits or a monetary reward (57 male). Age ranged from 18 to 47 years (M = 21.74, SD = 3.92).

All students of the Rotterdam Conservatoire had played a musical instrument for at least three years. Forty-four students of the University of Amsterdam had at least three years of experience playing a musical instrument. The remaining University of Amsterdam students (n = 52) had no experience whatsoever in playing a musical instrument.

Materials and procedure. Participants were divided into three groups: novices and intermediates (both from the University of Amsterdam, having none [N = 41] or at least three years of experience in playing a musical instrument [n = 44] respectively), and experts from the Rotterdam Conservatoire (n = 52). Participants were randomly assigned to either the intuitive or deliberate condition and listened to four performances of the same two-minute excerpt of the third part (*allegro ma non troppo*) of Beethoven's *Piano Sonata Op. 57 'Appasionata'*.

The four performances differed in overall quality. The low-quality performance was recorded by a mediocre amateur pianist, while the performance of high quality was one by the well-respected and famous pianist Sviatoslav Richter. Richter is considered to be one of the best pianists ever. The second highest quality excerpt was a performance by Artur Pizarro. Pizarro is an outstanding pianist but not considered to be on the same level as Richter. The third pianist was a performance by Sylvia Capova. The performances by Capova are pleasant but not outstanding, her performances are generally distributed by low-budget-labels. The ranking of the four performances was confirmed by three experts (two professional pianists and an Academy of Music graduate). After listening to the four performances, participants rated each performance on a scale from 1 (*poor quality*) to 10 (*high quality)*.

Similar to Study 5.1 we asked participants in the deliberate condition to listen carefully to the excerpts and to list their reasons (for one minute) after each excerpt, and

before their judgment. In the intuitive condition participants were asked to listen carefully but not to think too much while judging the performances. Before giving their judgment, participants listened to half of each performance again in a self-determined order.

For each performance that was correctly rated as higher quality than a performance of lower quality, participants received a score of +1. A score of +.5 was assigned when the ratings of the two performances tied. Using this method the score could range from 0 (none of the better performances were correctly rated as higher quality than the performances of lower quality) to 6 (all better performances were rated as higher quality than performances of lower quality). After judging the performances we assessed demographic data.

Results and Discussion

Accuracy scores were subjected to a 2 (judgment mode: intuitive or deliberative) by 3 (group: novices, intermediates, or experts) ANOVA. The ANOVA revealed a main effect of group ($F[2,139] = 10.73$, $p < .001$, $\eta_p^2 = .13$). Unsurprisingly, experts were generally more accurate in their judgments ($M = 3.94$, $SD = 1.28$) than novices ($M = 2.88$, $SD = 1.49$, $t[142] = 3.85$, $p < .001$, $\eta_p^2 = .13$) and intermediates ($M = 2.76$, $SD = 1.37$, $t[142] = 4.09$, $p < .001$, $\eta_p^2 = .17$). In addition we found a main effect of judgment mode. Participants in the intuitive condition made more accurate judgments ($M = 3.42$, $SD = 1.44$) than participants in the deliberate condition ($M = 2.99$, $SD = 1.49$, $F[1,139] = 3.70$, $p = .056$, $\eta_p^2 = .03$). There was no significant interaction ($F < 1$, *ns*). We again conducted simple effects analyses to probe the effect. These showed that the effect of judgment mode was only significant for the intermediate group. Participants in the intermediate group who judged the musical performances intuitively were more accurate ($M = 3.18$, $SD = 1.43$) than participants who deliberated before judging ($M = 2.34$, $SD = 1.21$, $F[1,139] = 4.10$, $p = .045$, $\eta_p^2 = .10$). Accuracy scores for the two judgment modes did not differ for the novice (intuitive: $M = 3.00$, $SD = 1.51$, deliberate: $M = 2.76$, $SD = 1.49$, $F < 1$, *ns*) and expert groups (intuitive: $M = 4.06$, $SD = 1.18$, deliberate: $M = 3.82$, $SD = 1.38$, $F < 1$, *ns*). The interaction is shown in Figure 5.3.

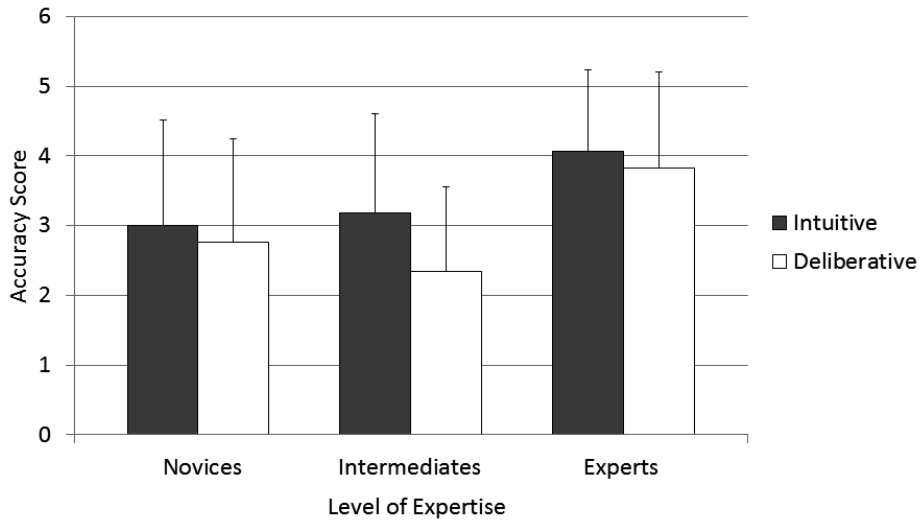

Figure 5.3. Accuracy scores of judgments of performances of Beethoven's Piano Sonata Op. 57 'Appasionata', for novices, intermediates and experts in the intuitive and deliberate condition.

Study 5.3

Studies 5.1 and 5.2 showed that the effect of judgment mode (deliberative vs. intuitive) on the quality of judgments of art is moderated by expertise. Judgment mode only affected judgments of participants who are experienced in the domain but are not professionals and had not received formal education. In Study 5.3 we aim to shed more light on the process underlying these effects.

Dijkstra and colleagues (2010) showed that the effect of deliberation versus judging intuitively is at least partially mediated by processing style. Processing style refers to the way people attend to information. People can either attend to the Gestalt of a stimulus or pay more attention to its details. A collection of trees, for example, can be seen as a forest, but people can also direct their attention to the individual trees (Gasper & Clore, 2002; Navon, 1977; Schooler, 2002). The attentional selection mechanism operating on a perceptual level is correlated with the attentional mechanism used to select conceptual

nodes within the semantic network. They both regulate perceptual and conceptual processes (Derryberry & Tucker, 1994; see also Förster, 2009b; Förster, Friedman, Özelsel, & Denzler, 2006). A local processing style is related to searching for details. In contrast, when in a global processing style people make sense of a stimulus by integrating it into superordinate, inclusive knowledge structures. Generally, a global processing style supports creativity and metaphor understanding, while a local processing style supports analytical thinking and concrete construals (Förster & Dannenberg, 2010a).

By manipulating processing style we aim to shed more light on the process underlying the interaction between expertise and judgment mode. Dijkstra and colleagues (2010) showed that deliberation induces a local processing style, which in turn can make it harder to judge stimuli adequately. This can be related to research showing that deliberation leads people to focus on accessible and reportable information, and to ignore non-verbalized knowledge (Tordesillas & Chaiken, 1999; Wilson et al., 1995). In line with the first two studies, we expect these effects especially for participants with adequate levels of experience but limited knowledge about poetry. If novices perform just as poorly in a local as in a global processing style, this would suggest that they lack reliable reasons and do not posses non-verbalized knowledge to base their judgment on. Conversely, if experts perform just as well in a local as in a global processing style, this would suggest that they can perform just as well while focusing on reasons as when judging intuitively.

In the present experiment we induced either a global or local processing style in a group of participants that differed in experience and knowledge in poetry. We recruited professionals with a background in literature and students that differed in their interest in, and experience with poetry. Participants were asked to judge the quality of low and high quality poems. Similar to Study 5.1 and 5.2 we expected a positive correlation between expertise and performance. In addition, we expected a stable performance for novice and expert participants in the local and global condition. The intermediate group is expected to show a better performance in the global condition than in the local condition.

Method

Participants. Eighty-five students of the University of Amsterdam participated for course credits or a monetary reward (23 male). Age ranged from 17 to 47 years old (M = 20.82, SD = 4.14). Forty-one professionals with a background in literature (prose and

poetry) participated voluntarily (16 male). Age ranged from 18 to 63 years old (M = 34.34, SD = 12.34).

Materials and procedure. Participants were divided in three groups based on their background and self-reported interest and expertise in poetry. Professionals (n = 41) were considered to be experts similar to Study 5.1. The remaining participants were divided into two groups (novices [n = 42] and intermediates [n = 43]) on the basis of a median split on interest and expertise ratings[9]. Both interest and expertise were assessed using a 100-point slider, anchored with *very much* and *not at all*. The interest and expertise self-ratings were combined to create a reliable measure of experience (α = .85). We assumed that self-rated interest and expertise to be related to experience with poetry. In support of this assumption, the combined scale was strongly related to number of annually read poems (r[82] = .49, p < .001).

Participants were randomly assigned to either the global or the local processing style condition. Processing style was induced by a variation of the global – local reaction time measure (Navon, 1977; see also Förster & Higgins, 2005). Participants were presented with a series of 'global' letters made up of smaller 'local' letters (an H made of L's, an H made of H's, an L made of L's, and an L made of H's). On each trial, participants were first presented with a fixation cross in the centre of the screen for 500 ms. Then, one of four global composite letters was randomly presented. In total 48 global composite letters were presented. In the global condition participants were instructed to indicate as quickly and accurately as possible whether the global letter was an H or an L. Instead, in the local condition participants were instructed to respond to the local letter.

After completing the processing style induction, participants were asked to rate the quality of eight poems using the same 100-point slider as in Study 5.1. Similar to Dijkstra and colleagues (2010), the four low-quality poems were taken from an amateur poem internet site. The four high-quality poems had all been published and received awards. After judging the poems we assessed interest and expertise in poetry, poems read annually, recognition of particular poems and demographic data.

Results and Discussion

[9] Assigning participants to the three groups of expertise on the basis of a tertiary split on the self-ratings yielded similar results.

No participant reported to had recognized a poem. Similar to Study 5.1, we calculated a composite accuracy score based on the ratings of the eight poems. One participant was excluded from the analyses because his accuracy score deviated more than 2.5 standard deviations from the mean accuracy score. The scores were subjected to a 2 (processing style: global or local) by 3 (group: novices, intermediates, or experts) ANOVA. The ANOVA revealed a main effect of group (F[2,119] = 62.37, p < .001, η_p^2 = .51). Experts were significantly more accurate in their judgments (M = 12.44, SD = 2.67) than intermediates (M = 8.45, SD = 2.89, t[122] = 6.58, p < .001, η_p^2 = .34). Intermediates were significantly more accurate than novices (M = 5.81, SD = 2.71, t[122] = 4.39, p < .001, η_p^2 = .19).

No main effect of processing style was found (F < 1, *ns*). The ANOVA did reveal a Processing Style x Group interaction (F[2,119] = 3.20, p = .044, η_p^2 = .05). Again we probed the effect with simple effects tests, which revealed that participants in the intermediate group made more accurate judgments in a global focus (M = 9.38, SD = 2.65) than in a local focus (M = 7.52, SD = 2.87, F[1, 119] = 4.89, p = .029, η_p^2 = .11). No differences were found between the two processing styles in the novices group (global: M = 5.29, SD = 2.19; local: M = 6.33, SD = 3.10, F [1, 119] = 1.56, p = .22, *ns*) and the expert group (global: M = 12.32, SD = 2.90; local: M = 12.58, SD = 2.46, F < 1, *ns*). The interaction is depicted in Figure 5.4.

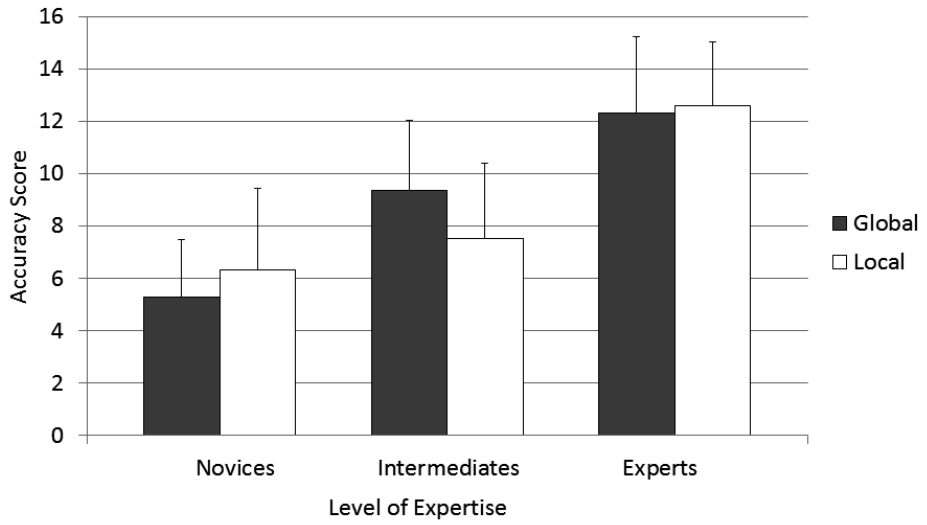

Figure 5.4. Accuracy scores of judgments of poems for novices, intermediates and experts in the global and local condition.

General Discussion

In three experiments we showed that the impact of deliberation versus intuition on judgments of a variety of stimuli (paintings, piano performances, poems) is moderated by experience and knowledge. Experienced individuals without formal training or professional background ("intermediates" in our typology) made poorer judgments after deliberation than when relying on intuition. Judgments of professionals and participants who had received relevant formal education (experts) did not differ as a function of judgment mode. Judgments of participants without formal education *and* without experience or interest in the subject matter (novices) also did not differ as a function of judgment mode[10]. Study 5.1 demonstrated this effect for judgments of modern art. Study 5.2 demonstrated the effect for

[10] A meta-analysis on the reported experiments revealed that the effect size is significantly larger among the intermediates (g = .609 [SE = .175]) than among the experts and novices combined (g = .0167 [SE = .122], Q [DF= 1] = 7.73, p = .005; separate analyses gave similar results). In the latter two groups, the estimated effect size is not significantly different from zero (Z = .137, p = .89).

judgments of piano performances. Finally, Study 5.3 showed that the effect of processing style (global vs. local) on judgments of poetry is similarly moderated by expertise. Judgments of intermediates were poorer in a local than in a global processing style, whereas judgments of novices and experts did not differ as a function of processing style.

Given that the effect of judgment mode on performance is at least partially mediated by processing style (Dijkstra et al., 2010), Study 5.3 provides additional insight in the process underlying the interaction between expertise and judgment mode. As noted earlier, Dijkstra and colleagues (2010) showed that deliberation induces a local processing style, which can have detrimental effects on the quality of judgment. The latter can be related to the finding that deliberation results in a tendency to focus on accessible and reportable information and to give less weight to non-verbalized knowledge (Tordesillas & Chaiken, 1999; Wilson et al., 1995). Novices performed equally poor in a global and a local processing mode. This suggests that novices neither have reliable reasons, nor do they posses non-verbalized knowledge to base their judgment on. Experts performed equally well in both processing style conditions.

This suggests that the adequate performance of experts in both judgment modes is not explained by the possibility that experts can maintain their global processing style while deliberating. Our results suggests that deliberation induces a local processing style among experts in the same way as it does for intermediates, but that experts can decompose their judgment and make accurate judgments when relying on reasons as well as when relying on intuition.

As mentioned in the introduction, other authors distinguished between two levels of expertise and either showed that the effect of judgment mode is limited to novices (Wilson, Kraft et al., 1989; Wilson, et al., 1993) or to experts (Klein, 1993; Dijksterhuis et al., 2009; see also Kahneman & Klein, 2009). We proposed a new framework that distinguishes between experience and knowledge to explain these contradicting results. Wilson and colleagues (Wilson, Kraft et al., 1989; Wilson, et al., 1993) demonstrated the moderating effect in domains of personal preference (candidates for presidency and preferences for posters). Unknowledgeable participants in these domains most likely had some experience; they had seen or heard about the candidates for presidency and as college students probably had some experience in evaluating posters. Knowledgeable participants, in contrast, had enjoyed formal education or possessed knowledge about the subject as

confirmed by a test. According to our typology, the unknowledgeable participants should therefore be regarded as intermediates: They are experienced, but lack formal knowledge. The knowledgeable participants possessed explicit knowledge in the domain and should consequently be classified as experts. Similar to the results of Wilson and colleagues (Wilson, Kraft et al., 1989; Wilson, et al., 1993) we would expect detrimental effects of analyzing reasons for intermediates and no effects for experts.

Klein (1993) studied professional decision-making in highly complex and uncertain domains such as management, military command, and firefighting. By definition, these professionals are experienced. However, it would most likely be impossible to identify and to possess knowledge about all relevant variables in those domains, and impossible to determine the best option or course of action by strict reasoning. In support of this line of reasoning Kahneman and Klein (2009) observed that experts are not able to articulate the reasons for their judgment. Hence, according to our typology it is impossible to be an expert in these domains. Klein (1993) tested professionals that differed in *experience*. In accordance with our framework, participants high in experience benefitted from intuition. The same argument can explain the moderating effects of expertise in predicting soccer matches (Dijksterhuis et al., 2009). There are countless variables that determine the outcome of a soccer match (e.g., selected players, referee, weather, crowd). It is impossible to possess knowledge about all these variables and to determine the outcome of a soccer match by strict reasoning. We argue that participants differed in experience and that, in accordance with our framework, experienced individuals profited from unconscious thought.

Additional theoretical support for our framework can be found in research on the *verbal overshadowing effect*. The verbal overshadowing effect shows that when *describing* a stimulus (typically faces) people experience more difficulty recognizing this stimulus afterwards. Verbalization can cause individuals to focus on information that can easily be verbalized at the expense of more appropriate non-verbal information, leading to impaired recognition (Schooler & Engstler-Schooler, 1990). This effect appeared to be different for people possessing different levels of perceptual and conceptual expertise. Verbalization only impaired recognition when language skill or conceptual expertise was lacking in comparison to perceptual skill (Fallshore & Schooler, 1995; Melcher & Schooler, 1996). Melcher and Schooler (2004) tested this hypothesis in an experimental design in an

unfamiliar domain (mushrooms). Participants received perceptual training (classifying mushrooms), conceptual training (lecture about the fundamentals of mushroom morphology) or no training at all. Perceptually trained participants performed worse on a subsequent recognition task after verbalizing, while conceptually trained participants appeared to benefit from verbalization. Participants who received no training at all were unaffected by verbalizing.

Both in the verbal overshadowing studies and in our experiments, participants possessing equal levels of conceptual and perceptual expertise (untrained participants) or experience and knowledge (novices and experts) were unaffected by verbalizing or judgment mode, while participants whose conceptual expertise or knowledge was overshadowed by their perceptual expertise or experience (intermediates) benefitted from intuition and suffered from verbalizing or deliberation. Intermediates lack conceptual or verbal knowledge to adequately describe their experiences. As a consequence, when asked to deliberate they will rely on details, ignore other sources of information, and are likely to make poorer judgments. Of course, novices, lacking both perceptual and conceptual expertise make relatively poor judgments no matter the judgment mode. In our experiments we relied on existing groups that differed in knowledge and experience. Further research is needed to provide causal support for our theoretical model. One option would be to train participants' perceptual and/or conceptual expertise and confront them at a later stage with a task in which some are allowed to rely on their intuition, while others are asked to deliberate.

Our explanation encompasses the explanation given by Wilson, Kraft et al. (1989): Knowledgeable people have a better understanding of why they feel the way they do *because* they can verbalize their experiences and are therefore less likely to come up with a biased set of reasons under deliberation. In contrast, unknowledgeable people are unsure of why they feel the way they do *because* they cannot verbalize their experience and are more likely to generate reasons that are not or only marginally related to their judgment.

In our experiments we tested the moderating influence of experience and knowledge on the relation between judgment mode and performance in the domain of art. It would be interesting to examine whether the same effect of expertise holds for other domains. The fact that we replicated the moderating effect of expertise in a domain involving audio, visual, and textual stimuli suggests that the effect is not limited to a

particular domain and that similar mechanisms may play a role in domains outside art. But what would be the effect of intuition and the moderating effect of experience and knowledge in rule-based decision-making, such as legal judgments? Intuition depends on experiential learning (Dijkstra, Van der Pligt, and Van Kleef, 2011b; Hogarth, 2001; Topolinski, & Strack, 2009b), so an intermediate or expert judge should be able to (unconsciously) relate new cases to cases in the past and rely on intuition. The key difference with judgments of art is that judges can rely on rules to make decisions. In this case we would still argue that an intermediate expert would experience detrimental effects of deliberating because he or she ignores knowledge obtained by experience. However, a novice judge, who has learned to use the code of law, would benefit from deliberating. The reasons on which to base judgment are indicated by the rules that can be found in the law. In this case, even though novice judges lack experience and knowledge, they can still locate reasons on which to rely in their judgment. This is the fourth level of expertise that we discarded in the Introduction.

Research in the medical (e.g., Groves, O'Rourke, & Alexander, 2003; Schmidt & Boshuizen, 1993) and psychodiagnostic domain (Witteman & Van den Bercken, 2007) also proposed a classification in three levels of expertise. These domains are characterized by acquisition of knowledge *before* acquiring experience. Physicians and diagnosticians first gain knowledge through extensive study. This qualifies them to put their knowledge into practice, which allows them to acquire experience. Inexperienced physicians and diagnosticians were therefore considered to be intermediates (Witteman & Van den Bercken, 2007). In these domains we would expect that inexperienced physicians and diagnosticians would benefit from deliberating. Some tentative support for the potential beneficial effects of deliberation in such domains is provided by Melcher and Schooler (2004). As noted above, they found beneficial effects of verbalizing on a recognition task for participants who only received conceptual training (lecture about the fundamentals of mushroom morphology) and no perceptual training (classifying mushrooms).

Overall, our studies and the presented framework help to improve our understanding of the effects of deliberation versus intuition on judgment and choice, and of the important role of experience and knowledge. Our research suggests that it might be especially harmful to deliberate, and profitable to rely on intuition, when experience is high while knowledge is relatively poor.

Chapter 6

General Discussion

The focus of this dissertation was on understanding of intuition versus deliberation in judgment and decision-making. In the empirical chapters I tested and discussed mediating and moderating mechanisms. Furthermore, I examined characteristics of both decision modes. I tested which sources of information are incorporated in a more intuitive versus deliberate mode of processing. In addition, I showed that people experience value of the decision outcome when the way they attend to information fits the decision mode they used. In this final chapter I will summarize the key findings and discuss limitations and practical implications.

Review of key findings

The first empirical chapter (Chapter 2) investigated processing style as an underlying mechanism of the effect of intuition versus relying on reasons on judgment and decision-making. Processing style is an important factor in human cognition. It refers to the way we attend to information (Förster, 2009b; Förster & Dannenberg, 2010a; 2010b). On the one hand, people may attend to the global picture and focus on the Gestalt: A collection of trees, for example, can be seen as a forest. On the other hand, people can focus on details; an individual tree in the forest (Navon, 1977). The attentional mechanism used to focus on perceptual information is correlated with the attentional mechanism utilized to select conceptual nodes within the semantic network: People who focus on the visual Gestalt also focus on the Gestalt conceptually (Derryberry & Tucker, 1994; see also Förster, 2009b; Förster et al., 2006). They have more associations, are more creative and more often think "out of the box" (Friedman et al., 2003).

Chapter 2 showed that induced as well as naturally occurring processing style affects quality of judgments of art. Furthermore, this chapter demonstrated that deliberation induces a local processing style, which makes it harder to judge art adequately. Intuition, in contrast, is related to a global processing style, which improved quality judgments of art. In addition, the effect of judgment mode on judgment appeared to be, at least partially, mediated by processing style.

The second empirical chapter (Chapter 3) examined the relation between processing style and judgment mode in more detail. Research in other domains has found that the way we make decisions can affect how we value the decision outcome (e.g., Avent & Higgins, 2003; De Vries et al., 2008). People experience *value* of the decision outcome

when the strategy they used *fits* their dispositional preference or current orientation (Higgins et al., 2003), as is the case when people who are generally concerned with the presence or absence of positive outcomes decide on the basis of possible gains rather than possible losses (Higgins, 2000).

Chapter 3 tested whether processing style and decision mode show similar value-from-fit effects. First, I showed that the relation between decision mode and processing style is bidirectional: In Chapter 2, I showed that deliberation versus intuition induces a local versus global processing style respectively. In this Chapter I showed that processing style induces decision mode and vice versa. Second, I showed that a fit between processing style and decision mode produces subjective value. Individuals induced with a global processing style who decided intuitively, and individuals with a local processing style who decided after deliberation, experienced more subjective *value* of the decision outcome than did those who made deliberative decisions in a global focus and those who made intuitive decisions in a local focus.

Chapter 4 examined the characteristics of intuitive versus deliberative decision-making. Past research suggests that the experience of intuition depends on affective reactions (Bechara et al., 1997; Wagar & Dixon, 2006; see also Slovic et al., 2002), and processing fluency (Fu et al., 2010; Topolinski & Strack, 2009a; Wippich, 1994; Wippich et al., 1994). Affective reactions refer to the (conscious or non-conscious) feelings that a stimulus elicits, demarcating a positive or negative quality of that stimulus. Lifelong learning results in positive or negative affective reactions to stimuli, which in term determine whether we approach or avoid stimuli (see for an overview Schwarz & Glore, 1996). Processing fluency refers to the ease with which stimuli are processed. Fluency is increased, for instance, when text is printed in easily readable fonts (Reber, Wurtz, & Zimmermann, 2004), when events are in line with expectations or are familiar (Parks & Toth, 2006), and when concepts related to the focal stimulus are activated in the semantic network (Topolinski et al., 2009; Topolinski & Strack, 2009a). Consider for example the following (trick) questions: What is the color of a fridge (most people will answer "white")? What does a cow drink? Because of the strong associations among these concepts, most people are inclined to answer "milk" (which is obviously not the correct answer).

Chapter 4 demonstrated an increased sensitivity for processing fluency and affective reactions among people in a global in comparison to a local processing style. In addition, these findings were obtained in a more mundane judgment task in which participants were asked to evaluate apartments: People in a local processing style were more affected by detailed information provided in the accompanying text, while people in a global processing style were more affected by information in pictures that conveyed a "feel" for the atmosphere of the various apartments.

Chapter 5 examined moderating effects of expertise on the effects of judgment mode. Previous research showed inconsistent results and disagreement at the conceptual level (Dijksterhuis et al., 2009; Kahneman & Klein, 2009; Klein, 1993; 1998; Wilson, Kraft et al., 1989; Wilson et al., 1993). I proposed a framework that helps to explain these inconsistent results and reconcile conceptual disagreement. The framework distinguishes among three levels of expertise on the basis of experience and knowledge: Individuals who are low in both experience and knowledge are considered to be novices. I argued that novices have not yet developed their intuition and that they lack knowledge about which attributes or criteria to rely on when making judgments. Individuals high in experience but low in knowledge are considered to be 'intermediates'. They have developed their intuition through experience but lack conceptual knowledge to verbalize their intuition, and have limited insight in the reasons for their preferences. Experienced individuals high in knowledge are considered to be experts; generally they also developed their intuition and have no problems explaining why they think the way they do.

Two experiments, in different domains, showed that novices and experts are unaffected by judgment mode. They performed poorly or adequately, respectively, irrespective of judgment mode. However, intermediates performed adequately when relying on intuition, but performed relatively poorly when asked to provide reasons before making their judgment. In another experiment processing style instead of judgment mode was induced, which yielded similar results. The adequate performance of experts in both processing modes suggests that deliberation induces a local processing style among experts in the same way as it does for intermediates, but that experts can decompose their judgment and make accurate judgments when relying on reasons as well as when relying on intuition. To sum up, individuals whose knowledge is outweighed by their experience profited from intuition, and did less well when relying on deliberation.

Implications

Previous research already showed that judgments and preferences of people who opt for deliberation might prove to be less in line with expert opinion (Halberstadt & Green, 2008; Tordesillas & Chaiken, 1999; Wilson & Schooler, 1991), be regretted more over time (Wilson et al., 1993), be less consistent (Nordgren & Dijksterhuis, 2009), and reveal lower correlations with expressed behavior (Wilson & Dunn, 1986; Wilson et al., 1984) than judgments that are made intuitively. Previous research also demonstrated the beneficial effect of intuition in a variety of different domains, such as quality judgments of college courses (Tordesillas & Chaiken, 1999; Wilson & Schooler, 1991), Olympic dives (Halberstadt & Green, 2008), predicting basketball games (Halberstadt & Levine, 1999), detecting deception (Albrechtsen et al., 2009), and judging the quality of apartments and jelly beans (Nordgren & Dijksterhuis, 2009). My research provides additional insights in this effect and the results of this research have several implications.

Relating processing style to decision-making (Chapter 2) for instance, provides opportunities to enhance decision-making. To profit from intuition and knowledge based on processing fluency and affective reactions (Chapter 4), it might be wise to induce a global processing style before making decisions, such as buying a house, choosing between jobs and selecting a university course. There are several ways to help induce such processing style (see for overviews Förster & Dannenberg, 2010a; 2010b). Moreover, research on processing style and creativity shows that people in a more global processing style exhibit greater cognitive flexibility and creativity than people in a more local processing style (Friedman et al., 2003; Nijstad et al., 2010). In conjunction with my findings this suggests that deciding intuitively can lead to more creative decisions than deciding deliberately.

The study on decisional fit between processing style and decision modes (Chapter 3) shows that it may not always be beneficial to rely on intuition, even if relying on intuition can yield objectively superior judgments and decisions. It may sometimes be more rewarding to make a decision that *feels* right, rather than selecting the objectively best option but being dissatisfied and feeling bad about it. This is most likely to apply to choices and decisions where subjective value is most important, such as when buying a painting or clothes.

Besides implications for personal or consumer decisions, my research has implications for judgments and decisions in professional settings. Most decision makers in

complex domains should be considered intermediates according to the way I operationalized the three levels of expertise (Chapter 5). Professional businessmen, firemen, or military personnel have a lot of experience in doing their job, but are often not aware of all relevant factors that should play a role in their decisions. Furthermore, they often cannot fully decompose their judgment or decision; their professional domains are just to complex. My research suggests that especially this group would profit from intuition. In line with this argument, previous research has found that decision makers in these domains often prefer to rely on intuition (Groenink, Vogelaar, & Essens, 2011; Klein, 2004). That does not mean that people should refrain from deliberation in all circumstances. Deliberation could help to analyze the hows and whys of certain decisions, which should make it easier to explain these to others and to teach new generations on how to make optimal decisions. To benefit from both intuition and deliberation it might be wise to analyze decisions afterwards.

Decision protocols, especially in the military and safety domain, often ask decision makers to make a judgment after identifying all relevant information and making an extensive analysis (e.g., Koninklijke Landmacht, 2000). Research showed that decision makers often rely on their intuition and execute their analysis in such a way that it supports their intuitive preference (Groenink et al., 2011). Even in the case that this analysis does not induce a local focus with possible detrimental effects, my research suggests that resources might still be used in a more appropriate way.

Of course adequate judgments and decisions should be based on relevant information. Since a local processing style is related to information search (Förster & Dannenberg, 2010a), it might be wise to first collect all relevant information in a local processing style and then induce a global processing style to profit from intuition when making decisions or judgments. Alternatively decision protocols might distinguish two separate roles. One employee is responsible for searching all relevant information in a local processing style and makes a list of pros and cons, while another employee attends to the global picture and makes an intuitive decision. Such documented analyses also might make it easier to communicate the basis for the decision.

Limitations and Future Research

Of course, my studies leave questions unanswered and also open up opportunities for future research. The studies that compared intuitive to deliberated judgments mostly concerned judgments of art (Chapters 2 & 5). Of course, the beneficial effects of intuition have already been shown in other domains by other authors (see above). Still, further research is needed to test whether processing style plays the same role in other domains. The fact that I found effects of processing style in judgments of paintings and poems (Chapter 2) indicates that the effect is not limited to the visual domain, suggesting that similar mechanisms may play a role in other domains.

Similar questions can be asked about the moderating effect of experience and knowledge. Again the effect was only shown in the domain of art (Chapter 5). Does experience and knowledge affect judgments in other domains the same way as it does in art? The effect was found in judgments of musical performances, paintings, and poems, which again suggests that similar mechanisms may play a role in other domains. My line of reasoning is also supported by research on the *verbal overshadowing effect*. The verbal overshadowing effect shows that when *describing* a stimulus (typically a human face) people experience more difficulty recognizing this stimulus afterwards. This effect appeared to be different for people possessing different levels of expertise. Verbalization only impaired recognition when language skill or conceptual expertise was lacking relative to perceptual skill (Fallshore & Schooler, 1995; Melcher & Schooler, 1996; Melcher & Schooler, 2004). This difference is reminiscent of the distinction between knowledge and experience, introduced in Chapter 5.

Generally my experiments showed that relying on intuitions provides better and more accurate judgments and decisions than a careful analysis of the pros and cons. As mentioned above, other research showed that this is true for a number of domains. But does it also hold for decisions or judgment tasks that require decision makers to follow strict rules or to focus on details? Relying on intuition or employing a global focus might distract from the optimal, analytical strategy. Also, what about more complex decisions, like strategic decisions in policy making and business? Does intuition or a global focus also increase performance in decision-making in these domains? I would argue that it does. People may profit from intuition in every domain where knowledge is overshadowed by experience (see Chapter 5). For novices however (i.e., those who do not possess experience

in the subject matter and have not yet developed their intuition), it might be wise to deliberate and follow guidelines. In those guidelines they can locate the reasons to rely on in their judgment, which would provide better guidance than their intuition.

Chapter 3 also raises interesting questions for future research. Besides increased subjective value, fit-effects have been shown to also yield other positive effects such as increased performance in sports (Plessner, Unkelbach, Memmert, Baltes, & Kolb, 2009), on academic tests (Keller & Bless, 2006), and in solving anagrams (Shah, Higgins & Friedman, 1998). Future research is needed to assess whether, and possibly when, fit-effects in decision-making would also lead to superior judgments and decisions.

In Chapter 4 I studied the characteristic of intuitive versus deliberative decision-making by inducing a global or local processing style. The reason for this is that inducing processing style is less obtrusive than asking people to deliberate or to follow their intuition. Manipulating processing style is therefore less likely to create demand effects. Second, instructing participants to rely on intuition, and especially instructing participants to deliberate, might be confusing, or even be impossible to comply with, in most of the paradigms I used. Nevertheless, future studies should investigate the role of intuition and deliberation in judgment and decision-making using alternative operationalizations and paradigms.

Closing Remarks

In sum, I may conclude that the way we make decisions affects how we attend to and process information, which in turn affects the quality of our judgments and decisions (Chapter 2). When we rely on reasons or analyze, we focus on details and possibly ignore other valuable sources of information. When relying on intuition we focus on the global picture and incorporate affective reactions and processing fluency as information in our judgment (Chapter 4). However, preference for decision strategies is affected by processing style. A local focus induces a preference for and reliance on deliberation, while a global focus induces a preference for and reliance on intuition (Chapter 3). Also, people experience more value of the decision outcome when the strategy they are using fits their current orientation, that is, when they make deliberate decisions in a local focus or intuitive decisions in a global focus (Chapter 3). The effects of relying on intuition or on reasons depend on individuals' knowledge and experience. Judgments and decisions made by

novices (individuals low on experience and knowledge) and experts (individuals high on experience and knowledge) are not affected by judgment mode. Novices perform poorly and experts adequately, irrespective of whether they rely on reasons or on intuition. Intermediates however (those who are high on experience and low on knowledge), benefit from relying on intuition, in comparison to relying on reasons (Chapter 5).

To sum up; it does not always hurt to trust your intuition.

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Summary

Research already showed, in a variety of domains, that judgments and preferences of people who opt for deliberation might prove to be less in line with expert opinion, be regretted more over time, be less consistent, and reveal lower correlations with expressed behavior than judgments that are made intuitively. My research provides additional insights in this effect and the results of this research have several implications.

The first empirical chapter (Chapter 2) investigated processing style as an underlying mechanism of the effect of intuition versus relying on reasons in judgment and decision-making. Processing style refers to the way we attend to information. On the one hand, people may attend to the global picture and focus on the Gestalt: A collection of trees, for example, can be seen as a forest. On the other hand, people can focus on details; an individual tree in the forest. The attentional mechanism used to focus on perceptual information is correlated with the attentional mechanism utilized to select conceptual nodes within the semantic network: People who focus on the visual Gestalt also focus on the Gestalt conceptually. They have more associations, are more creative and more often think "out of the box". Chapter 2 demonstrated that deliberation induces a local processing style with a focus on details, which makes it harder to judge adequately. Intuition, in contrast, is related to a global processing style, which improved quality judgments of art. In addition, the effect of judgment mode on judgment appeared to be, at least partially, mediated by processing style.

The second empirical chapter (Chapter 3) examined the relation between processing style and judgment mode in more detail. First, I showed that the relation between decision mode and processing style is bidirectional: processing style induces decision mode the same way as decision mode induces processing style. Second, I showed that a fit between processing style and decision mode produces subjective value. Individuals induced with a global processing style who decided intuitively, and individuals with a local processing style who decided after deliberation, experienced more subjective *value* of the decision outcome than did those who made deliberative decisions in a global focus and those who made intuitive decisions in a local focus.

Chapter 4 examined the characteristics of intuitive versus deliberative decision-making, and demonstrated an increased sensitivity for processing fluency and affective reactions among people who adopt a global –more intuitive– mode of processing, in comparison to a local –more analytic and deliberative– mode of processing. A mundane

judgment task revealed that people also assigned more weight to these sources of information in their judgments: people in a local processing style were principally affected by detailed information provided in accompanying text, while people in a global processing style were principally affected by information in accompanying pictures that conveyed a feeling.

Chapter 5 examined moderating effects of expertise on the effects of judgment mode. I proposed a framework that distinguishes among three levels of expertise on the basis of experience and knowledge: Three experiments, in different domains, showed that people who are low (novices) and high (experts) in experience and knowledge are unaffected by judgment mode or processing style. They performed poorly or adequately, respectively, irrespective of judgment mode. However, intermediates performed adequately when relying on intuition, but performed relatively poorly when asked to provide reasons before making their judgment. Individuals whose knowledge is outweighed by their experience profited from intuition, and did less well when relying on deliberation.

Implications

My research provides additional insights in the effects of relying on intuition or on reasons. The results of this research have several implications. To profit from intuition and knowledge based on processing fluency and affective reactions (Chapter 4), it might be wise to induce a global processing style before making decisions, such as buying a house, choosing between jobs and selecting a university course.

The study on decisional fit between processing style and decision modes (Chapter 3) shows that it may not always be beneficial to rely on intuition, even when relying on intuition can yield objectively superior judgments and decisions. It may sometimes be more rewarding to make a decision that *feels* right, rather than selecting the objectively best option but being dissatisfied and feeling bad about it.

Besides implications for personal or consumer decisions, my research has implications for judgments and decisions in professional settings. Most decision makers in complex domains should be considered intermediates according to the way I operationalized the three levels of expertise (Chapter 5). They have a lot of experience in doing their job, but are often not aware of all relevant factors that should play a role in their decisions. Furthermore, they often cannot fully decompose their judgment or decision; their

professional domains are just to complex. Our research suggests that especially this group would profit from intuition. That does not mean that people should refrain from deliberation in all circumstances. Deliberation could help to analyze the hows and whys of certain decisions, which should make it easier to explain these to others and to teach new generations on how to make optimal decisions. To benefit from both intuition and deliberation it might be wise to analyze decisions afterwards.

Of course adequate judgments and decisions should be based on relevant information. Since a local processing style is related to information search, it might be wise to first collect all relevant information in a local processing style and then induce a global processing style to profit from intuition when making decisions or judgments.

Limitations and Future Research

My studies leave questions unanswered and also open up opportunities for future research. The studies that compared intuitive to deliberated judgments mostly concerned judgments of art (Chapters 2 & 5). Of course, the beneficial effects of intuition have already been shown in other domains by other authors (see above). Still, further research is needed to test whether processing style plays the same role in other domains. The fact that I found effects of processing style in judgments of paintings and poems (Chapter 2) indicates that the effect is not limited to the visual domain, suggesting that similar mechanisms may play a role in other domains.

Similar questions can be asked about the moderating effect of experience and knowledge. Again the effect was only shown in the domain of art (Chapter 5). Does experience and knowledge affect judgments in other domains the same way as it does in art? The effect was found in judgments of musical performances, paintings, and poems, which again suggests that similar mechanisms may play a role in other domains.

Generally my experiments showed that relying on intuitions provides better and more accurate judgments and decisions than a careful analysis of the pros and cons. As mentioned above, other research showed that this is true for a number of domains. But does it also hold for decisions or judgment tasks that require decision makers to follow strict rules or to focus on details? Relying on intuition or employing a global focus might distract from the optimal, analytical strategy. Also, what about more complex decisions, like strategic decisions in policy making and business? Does intuition or a global focus also

increase performance in decision-making in these domains? I would argue that it does. People may profit from intuition in every domain where knowledge is overshadowed by experience (see Chapter 5).

Chapter 3 also raises interesting questions for future research. Besides increased subjective value, fit-effects have been shown to also yield other positive effects such as increased performance in sports, on academic tests, and in solving anagrams. Future research is needed to assess whether, and possibly when, fit-effects in decision-making would also lead to superior judgments and decisions.

In Chapter 4 I studied the characteristic of intuitive versus deliberative decision-making by inducing a global or local processing style. Future studies should investigate the role of intuition and deliberation in judgment and decision-making using alternative operationalizations and paradigms.

Closing Remarks

In sum, I may conclude that the way we make decisions affects how we attend to and process information, which in turn affects the quality of our judgments and decisions (Chapter 2). When we rely on reasons or analyze, we focus on details and possibly ignore other valuable sources of information. When relying on intuition we focus on the global picture and incorporate affective reactions and processing fluency as information in our judgment (Chapter 4). However, preference for decision strategies is affected by processing style. A local focus induces a preference for and reliance on deliberation, while a global focus induces a preference for and reliance on intuition (Chapter 3). Also, people experience more value of the decision outcome when the strategy they are using fits their current orientation, that is, when they make deliberate decisions in a local focus or intuitive decisions in a global focus (Chapter 3). The effects of relying on intuition or on reasons depend on individuals' knowledge and experience. Judgments and decisions made by novices (individuals low on experience and knowledge) and experts (individuals high on experience and knowledge) are not affected by judgment mode. Novices perform poorly and experts adequately, irrespective of whether they rely on reasons or on intuition. Intermediates however (those who are high on experience and low on knowledge), benefit from relying on intuition, in comparison to relying on reasons (Chapter 5).

To sum up; it does not always hurt to trust your intuition.

Samenvatting

(Summary in Dutch)

Het dagelijks leven zit vol met oordelen en beslissingen die gemaakt kunnen of moeten worden. Zo zijn er alledaagse beslissingen; zoals wat te eten 's avonds, hoe te reizen naar je werk, en welk shirt te kopen. Maar er zijn ook meer belangrijke beslissingen zoals om te gaan trouwen of niet en welk huis te kopen. Ook worden veel beslissingen gemaakt in een professionele context, bijvoorbeeld in de rechtspraak, het bedrijfsleven of in crisisbeheersing.

Deze oordelen en beslissingen kunnen gemaakt worden aan de hand van een gewoonte, op basis van grondige analyses van voor- en nadelen, of op basis van intuïtie.
In tegenstelling tot wat traditioneel wordt gedacht, blijkt een analyse van alle relevante factoren niet altijd tot de beste oordelen te leiden. Zo blijken intuïtieve oordelen soms beter te zijn dan oordelen die gemaakt zijn aan de hand van redenatie. Dat geldt voor oordelen over verschillende soorten aardbeienjam en het voorspellen van sportwedstrijden, maar ook blijken brandweermannen accurate en nauwkeurige beslissingen te kunnen nemen op basis van intuïtie.

Dit proefschrift richt zich op de vraag waarom dit zo is: hoe kunnen beslissingen die gebaseerd zijn op intuïtie tot betere beslissingen leiden dan beslissingen waarover diep is nagedacht en gebaseerd zijn op een grondige analyse? Wat zijn onderliggende psychologische mechanismen? Wat zijn de eigenschappen van oordelen die gemaakt zijn op basis van redenatie en oordelen die gebaseerd zijn op intuïtie? Wat voor effect heeft expertise op deze twee verschillende manieren van oordelen? En hoe waarderen mensen deze beslissingen?

Overzicht van de belangrijkste bevindingen

In het eerste empirische hoofdstuk (Hoofdstuk 2) ben ik ingegaan op een onderliggend mechanisme van het effect van oordelen (redenatie vs. intuïtie) op een oordeel. Ik laat zien dat de manier waarop mensen oordelen effect heeft op de manier waarop ze informatie verwerken. Uit eerder onderzoek blijkt dat mensen globaal naar de 'Gestalt' van een object kunnen kijken. Of mensen kunnen hun aandacht richten op lokale elementen van een object en zich richten op details. Bij het zien van een verzameling bomen kunnen mensen bijvoorbeeld een bos zien of aandacht kan gericht worden op een individuele boom. Deze aandachtsmechanismen op een perceptueel niveau blijken gecorreleerd te zijn met de aandachtsmechanismen op conceptueel niveau. Wanneer

mensen een globale verwerkingsstijl hanteren, hebben zij meer associaties, zijn ze creatiever en proberen informatie te begrijpen door informatie te integreren met kennis die ze al hebben. Wanneer zij een lokale verwerkingsstijl hanteren, richten zij zich op details en proberen informatie te begrijpen door middel van analyse. Binnen Hoofdstuk 2 laat ik zien dat redenatie een lokale verwerkingsstijl induceert, waarbij mensen zich richten op details. Vertrouwen op intuïtie aan de andere kant, is gerelateerd aan het hanteren van een globale verwerkingsstijl. Daarnaast laat ik zien dat een meer globale verwerkingsstijl tot betere oordelen leidt dan een lokale verwerkingsstijl. Het effect van de manier waarop je oordeelt (vertrouwen op intuïtie of op redenatie) op je verwerkingsstijl, verklaart -op zijn minst gedeeltelijk- de kwaliteit van je oordeel.

In Hoofdstuk 3 ga ik dieper in op de relatie tussen verwerkingsstijl en de manier waarop geoordeeld wordt. Het vorige hoofdstuk (Hoofdstuk 2) liet al een causale relatie zien tussen de manier van oordelen en de gehanteerde verwerkingsstijl. In Hoofdstuk 3 laat ik zien dat deze relatie wederzijds is. Net als dat vertrouwen op intuïtie en redenatie een globale, respectievelijk lokale, verwerkingsstijl veroorzaakt, zorgt een globale en lokale verwerkingsstijl voor een voorkeur voor respectievelijk intuïtief en beredeneerd oordelen. Daarnaast laat ik zien dat een bepaalde verwerkingsstijl past bij een bepaalde manier van oordelen. Mensen die een globale verwerkingsstijl hanteren, ervaren meer subjectieve waarde bij een beslissing, wanneer die gebaseerd is op intuïtie in plaats van redenatie. Terwijl mensen die een lokale verwerkingsstijl hanteren meer subjectieve waarde ervaren bij een beslissing die gebaseerd is op basis van redenatie in plaats van intuïtie. Mensen die in deze combinaties van verwerkingsstijl en oordeelmodus (intuïtief vs. redenatie) een keuze maken, schatten bijvoorbeeld de waarde (in euro's) van een gekozen product hoger in dan mensen die kiezen in de andere twee combinaties van verwerkingsstijl en oordeelmodus.

Binnen Hoofdstuk 4 bestudeer ik de eigenschappen van intuïtief en beredeneerd oordelen. Eerder onderzoek liet al zien dat mensen die beredeneren hun oordeel baseren op informatie dat makkelijk onder woorden te brengen is. Daarnaast liet Hoofdstuk 2 al zien dat beredeneren een lokale verwerkingsstijl veroorzaakt, waarbij mensen zich richten op lokale elementen van informatie. Intuïtie heb ik gerelateerd aan een globale verwerkingsstijl, waarbij mensen zich richten op het "hele plaatje". In Hoofdstuk 4 laat ik zien dat mensen in een globale, meer intuïtieve manier van informatieverwerking, meer

beïnvloed worden in hun oordeel door hun initiële affectieve reactie en de mate waarin informatie vloeiend of gemakkelijk verwerkt wordt. Beide zijn belangrijke vormen van informatie die opgedaan kunnen worden door ervaring. Een affectieve reactie kan bijvoorbeeld worden beïnvloed door positieve of negatieve ervaringen met een bepaald object. Informatie wordt makkelijker verwerkt wanneer je iets soortgelijks eerder hebt gezien of meegemaakt, of wanneer gerelateerde concepten al geactiveerd zijn in de hersenen. Overeenkomstig met resultaten uit eerder onderzoek blijken mensen in een lokale, meer analytische manier van informatieverwerking, vooral beïnvloedt te worden door informatie die makkelijk onder woorden te brengen is.

In Hoofdstuk 5 bekijk ik de effecten van expertise op de effectiviteit van de twee manieren van oordelen (vertrouwen op intuïtie vs. beredeneren). Ik introduceer een kader waarin ik onderscheid maak tussen ervaring en kennis, waaruit ik drie niveaus van expertise afleid: Leken, zij beschikken over weinig ervaring en kennis, zij blijken informatie te missen om tot een adequaat oordeel te kunnen komen of ze nu vertrouwen op intuïtie of redenatie. Intermediates beschikken over voldoende ervaring, zij blijken adequaat te kunnen oordelen wanneer ze vertrouwen op hun intuïtie. Zij hebben echter weinig kennis en blijken niet te weten op welke redenen ze kunnen vertrouwen wanneer ze redeneren. Wanneer intermediates redeneren, vertrouwen ze op redenen die plausibel klinken en makkelijk onder woorden te brengen zijn. Experts beschikken over veel ervaring en kennis. Zij blijken hun ervaring te kunnen gebruiken om tot een adequaat intuïtief oordeel te komen, maar kunnen door hun kennis ook een adequaat oordeel geven wanneer ze redeneren. Samengevat: mensen zullen profiteren van intuïtie en lijden onder beredeneren wanneer ervaring hun kennis overtreft.

Implicaties

Zoals hierboven al genoemd, laat eerder onderzoek zien dat mensen die vertrouwen op intuïtie soms tot betere oordelen en beslissingen komen dan mensen die hun oordeel baseren op redeneren of analyse. Mijn onderzoek bouwt hierop voort en heeft aanvullende toegepaste implicaties.

Het relateren van verwerkingsstijlen aan de manier waarop we oordelen en beslissen geeft mogelijkheden om besluitvorming te verbeteren. Om bijvoorbeeld te profiteren van kennis dat lastig onder woorden te brengen is, zoals geïnternaliseerde kennis

door ervaring (Hoofdstuk 4), kan het verstandig zijn om een globale verwerkingsstijl te induceren. Bijvoorbeeld bij het kopen van een huis of bij het kiezen tussen banen. Onderzoek naar informatieverwerking biedt verschillende mogelijkheden om dit te doen. Daarnaast laat onderzoek naar verwerkingsstijlen en creativiteit zien dat mensen in een globale verwerkingsstijl creatiever zijn dan mensen in een lokale verwerkingsstijl. In combinatie met mijn onderzoek zou dit kunnen betekenen dat vertrouwen op intuïtie tot creatievere beslissingen leidt dan beslissingen op basis van redenatie en analyse.

De studie naar de combinaties van globale en lokale verwerkingsstijlen en de twee verschillende oordeelsmodi (Hoofdstuk 3), laat zien dat het niet altijd aan te raden is om op intuïtie te vertrouwen. Dit is zelfs het geval wanneer vertrouwen op intuïtie tot objectief betere beslissingen zou leiden. Het kan bijvoorbeeld verstandiger zijn om beslissingen te nemen die beter voelen dan de objectief beste beslissing te nemen en hier later ontevreden mee te zijn. Dit zou met name gelden bij beslissingen waarbij subjectieve waarde het meest belangrijk is, zoals het kopen van kleren of kunst.

Behalve implicaties voor alledaagse en persoonlijke oordelen en beslissingen heeft mijn onderzoek ook implicaties voor beslissingen in een professionele context. De meeste professionals in complexe domeinen zijn in mijn operationalisatie van expertise intermediate experts. Ervaren zakenmensen, brandweermannen en militairen hebben veel ervaring opgedaan in hun werk. Zij zijn vaak echter niet volledig bewust van alle factoren die een rol spelen, of zouden moeten spelen, in hun oordeel of besluit. Het domein waarin ze werkzaam zijn is vaak te complex. Mijn onderzoek laat zien dat met name deze groep zou profiteren van intuïtie en lijdt onder beredeneren en analyse (Hoofdstuk 5). Eerder onderzoek heeft al laten zien dat professionals in deze domeinen vaak ook de voorkeur hebben om te vertrouwen op intuïtie. Dit betekent niet dat deze professionals altijd moeten vermijden om te beredeneren en te analyseren. Analyseren kan helpen te begrijpen waarom iets is zoals het is en waarom een bepaald besluit genomen is. Dit maakt het mogelijk om het besluit te communiceren en te verantwoorden, en maakt het mogelijk voor toekomstige generaties om te leren hoe optimale beslissingen te nemen. Om te profiteren van zowel intuïtie als beredeneren kan het daarom verstandig zijn om een beslissing te analyseren nadat het genomen is.

Besluitvormingsprocedures, bijvoorbeeld binnen defensie of crisismanagement, vragen vaak om voorafgaand aan een beslissing alle relevante informatie te identificeren.

Aan de hand van deze informatie worden vervolgens uitgebreide analyses gemaakt van consequenties van verschillende mogelijkheden van handelen. Onderzoek heeft al laten zien dat deze analyses en de daaruit voortvloeiende beslissingen in deze domeinen vaak gemaakt worden op een wijze die intuïtie bevestigt. Zelfs als analyse geen lokale verwerkingsstijl en focus op details induceert, met mogelijke negatieve effecten op besluitvorming, dan nog suggereert mijn onderzoek dat tijd en middelen op een meer gepaste manier besteed kunnen worden.

Natuurlijk zouden oordelen en beslissingen gemaakt moeten worden op basis van relevante informatie. Omdat een lokale verwerkingsstijl gerelateerd is aan het zoeken naar informatie kan het verstandig zijn om eerst alle relevante informatie te identificeren en analyseren, in een lokale verwerkingsstijl. Vervolgens kan een globale verwerkingsstijl geïnduceerd worden om de informatie in perspectief te zien en te profiteren van intuïtie in besluitvorming. Een andere mogelijkheid is om in besluitvormingsprocedures onderscheid te maken tussen twee verschillende rollen: een rol waarbij in een lokale verwerkingsstijl gezocht wordt naar relevante informatie en een andere rol waarbij informatie in perspectief wordt gezien en waarbij op basis van intuïtie een besluit genomen kan worden. Een dergelijke gedocumenteerde analyse kan ook helpen om de basis van een besluit te communiceren.

Kortom

In mijn onderzoek heb ik laten zien dat mensen die vertrouwen op intuïtie, een globale verwerkingsstijl hanteren waarbij ze informatie in een breder perspectief zien. Vertrouwen op redenatie, aan de andere kant, induceert een lokale verwerkingsstijl waarbij mensen zich richten op details (Hoofdstuk 2). Wanneer we vertrouwen op intuïtie integreren en relateren we informatie aan kennis die we (bewust of onbewust) al hebben, zoals geïnternaliseerde ervaring. Terwijl wanneer we beredeneren, we ons richten op informatie die makkelijk onder woorden te brengen is (Hoofdstuk 4). Ik laat ook zien dat verwerkingsstijl een voorkeur induceert voor oordelen op basis van intuïtie of op basis van redenatie. Daarnaast laat ik zien dat mensen meer subjectieve waarde ervaren van een beslissing wanneer het besluit is genomen op een manier die past bij hun verwerkingsstijl (Hoofdstuk 3). In het laatste empirisch hoofdstuk (Hoofdstuk 5) ben ik ingegaan op de effecten van ervaring en kennis op de twee manier van oordelen (intuïtie en redenatie). Oordelen van leken en experts (laag of hoog in zowel ervaring als kennis) worden niet

beïnvloed in hun oordeel door de manier waarop ze een oordeel vellen. Zij oordelen gebrekkig of adequaat ongeacht of ze vertrouwen op intuïtie of op redenatie. De kwaliteit van oordelen van intermediates (hoog in ervaring, laag in kennis) profiteert bij het vertrouwen op intuïtie, maar lijdt onder beredeneren.

Samengevat; het is niet altwijd kwalijk om naar je intuïtie te luisteren.

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