Journal of Behavioral Decision Making, *J. Behav. Dec. Making*, **26**: 285–294 (2013)
Published online 19 April 2012 in Wiley Online Library (wileyonlinelibrary.com) **DOI:** 10.1002/bdm.1759

Deliberation Versus Intuition: Decomposing the Role of Expertise in Judgment and Decision Making

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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. Experiments 1 and 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, Experiment 3 showed that the effect of processing style (global versus local) on judgment quality is similarly moderated by expertise. Copyright © 2012 John Wiley & Sons, Ltd.

KEY WORDS 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.

INTUITION VERSUS 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 where 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

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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, in press). 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, whereas judgments of novices are more easily influenced (Englich & Soder, 2009) and can be harmed by deliberation (Wilson et al., 1989; Wilson et al., 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 et al. (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 (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, were more confident, and 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 Klein, 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 predict or anticipate outcomes (recognition-primed decision strategy). Experts are unaware of this process and 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 et al. (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, whereas 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 who differed in *knowledge* about the subject matter. They assessed knowledge by means of a test or by measuring level of formal education. Dijksterhuis et al. (2009), on the other hand, compared *experts* with *non-experts*, with expertise being assessed by a test that tapped interest. 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 operationalized either 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

DOI: 10.1002/bdm

who regularly appreciates art can relate pieces of art to art he or 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 Table 1. Individuals who are low in both experience and knowledge are considered to be novices. They have not yet developed their intuition and 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 more poorly when asked to provide reasons before making their judgment. Finally, experienced individuals who also have extensive 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. In the present studies, we did not include the remaining combination of experience and knowledge (low experience and high knowledge). This combination tends to occur in decision domains that differ from those examined in the present series of studies. We return to this issue in the General Discussion.

Generally, we expect effects of judgment mode for more experienced judges with limited knowledge in domains in which they can rely on experience for their judgment but are likely to come to poorer judgments when deliberating. As argued before, one reason for this difference might be that they generate reasons that are not, or only marginally, related to their preferences. Sometimes, these effects are also obtained for experts but only in domains that are very complex and in which it is unlikely that people know the exact reasons for their judgment. Obviously, definitions of experience and knowledge will differ as a function of decision domain. This is an important issue; we will return to that issue in the concluding section and also relate our framework to contradictory results obtained in previous research.

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.

Table 1. Experience and knowledge in expertise

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

OVERVIEW OF THE EXPERIMENTS

In Experiment 1, we test whether the effects of judgment mode (intuitive versus deliberative) on the accuracy of quality judgments of modern art differ as a function of expertise (novice, intermediate, and expert), as determined by the different combinations of experience and knowledge. In Experiment 2, we replicate the results of Experiment 1 in a different domain (piano performances). Again, participants were divided into three groups on the basis of experience and knowledge. Experiment 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-quality and low-quality poems.

EXPERIMENT 1

In Experiment 1, we test our hypothesis that the effect of judgment mode (intuitive versus 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-quality and high-quality paintings. Half the participants were asked to deliberate before making their judgment; the other half were asked to judge the paintings intuitively.

Method

Participants

One-hundred twenty-seven participants who 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 men). Age ranged from 18 to 53 years ($M = 22.35$, $SD = 7.46$). Thirty professionals with a background in modern art participated voluntarily (eight men). Age ranged from 17 to 63 years ($M = 32.60$, $SD = 15.14$). 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 much 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 [$n = 49$])

DOI: 10.1002/bdm

on the basis of a median split on the interest ratings.[1] 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 laboratory. 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., in press). 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 on the basis of the ratings of the eight paintings for each participant (Dijkstra et al., in press). 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. With the use of 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 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 have recognized any low-quality paintings. A minority of the experts recognized a high-quality painting, which confirms the level of expertise of this group.[2]

Results and discussion

Composite accuracy scores were subjected to a 2 (judgment mode: intuitive or deliberative) × 3 (group: novices, intermediates, or experts) analysis of variance (ANOVA). The ANOVA revealed a main effect of group ($F[2, 121] = 6.25$, $p = .003$, $\eta_p^2 = .09$). Experts were more accurate in their judgment ($M = 11.37$, $SD = 2.68$) than novices ($M = 8.96$, $SD = 2.94$, $t[124] = 3.57$, $p = .001$, $\eta_p^2 = .15$); 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*). Because 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 deliberate conditions 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: $M = 8.97$, $SD = 3.09$, $F[1, 121] = 3.62$, $p = .059$, $\eta_p^2 = .07$). The interaction is depicted in Figure 1.

EXPERIMENT 2

Experiment 1 demonstrated that the effect of judgment mode (intuitive versus 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 on the basis of 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 Experiment 1, half the participants were asked to deliberate before giving their judgment, whereas 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 with judging intuitively.

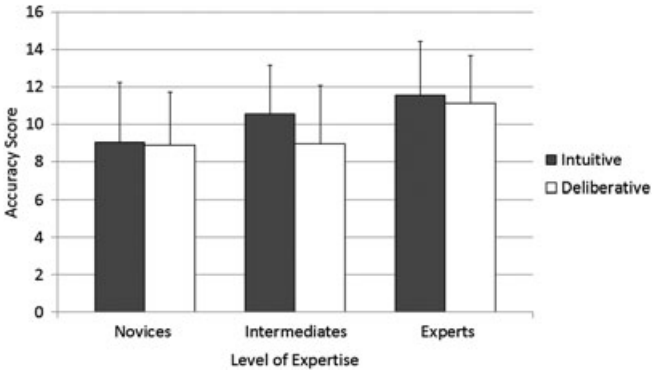

Figure 1. Accuracy scores of judgments of modern art for novices, intermediates, and experts in the intuitive and deliberate conditions

[1]Assigning participants to the three groups of expertise on the basis of a tertiary split on the self-rating yielded similar results.
[2]Removing experts who recognized paintings from the analysis did not affected the pattern of results.

DOI: 10.1002/bdm

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 men). 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 3 years. Forty-four students of the University of Amsterdam had at least 3 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 3 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 2-min 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, whereas 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 Experiment 1, we asked participants in the deliberate condition to listen carefully to the excerpts and to list their reasons (for 1 min) 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. With the use of 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, participants reported demographic data.

Results and discussion

Accuracy scores were subjected to a 2 (judgment mode: intuitive or deliberative) × 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 2.

EXPERIMENT 3

Experiments 1 and 2 showed that the effect of judgment mode (deliberative versus 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 Experiment 3, we aim to shed more light on the process underlying these effects.

Dijkstra et al. (in press) 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

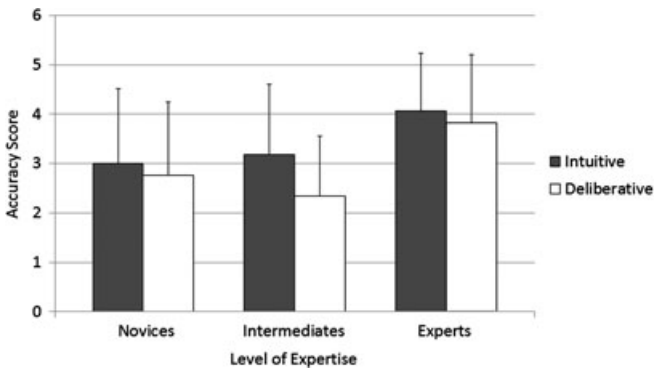

Figure 2. Accuracy scores of judgments of performances of Beethoven's Piano Sonata Op. 57 "Appasionata" for novices, intermediates, and experts in the intuitive and deliberate conditions

DOI: 10.1002/bdm

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, 2009; 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, whereas a local processing style supports analytical thinking and concrete construals (Förster & Dannenberg, 2010).

By manipulating processing style, we aim to shed more light on the process underlying the interaction between expertise and judgment mode. Dijkstra et al. (in press) 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 style 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 style 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 who differed in their interest in and experience with poetry. Participants were asked to judge the quality of low-quality and high-quality poems. Similar to Experiments 1 and 2, we expected a positive correlation between expertise and performance. In addition, we expected stable performance for novice and expert participants in the local and global conditions. The intermediate group is expected to show 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 men). Age ranged from 17 to 47 years ($M = 20.82$, $SD = 4.14$). Forty-one professionals with a background in literature (prose and poetry) participated voluntarily (16 men). Age ranged from 18 to 63 years ($M = 34.34$, $SD = 12.34$).

Materials and procedure

Participants were divided in three groups on the basis of their background and self-reported interest and expertise in poetry. Professionals ($n = 41$) were considered to be experts similar to Experiment 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.[3] 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 ($\alpha = .85$). We assumed 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 local processing style conditions. 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 center 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 Experiment 1. Similar to Dijkstra et al. (in press), 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

No participant reported to have recognized a poem. Similar to Experiment 1, we calculated a composite accuracy score on the basis of the ratings of the eight poems. One participant was excluded from the analyses because his or her 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) × 3 (group: novices, intermediates, or experts) ANOVA. The ANOVA revealed a main effect of group ($F[2, 119] = 62.37$, $p < .001$, $\eta_p^2 = .51$). Experts were significantly more accurate in their judgments ($M = 12.44$, $SD = 2.67$) than intermediates ($M = 8.45$, $SD = 2.89$, $t[122] = 6.58$, $p < .001$, $\eta_p^2 = .34$). Intermediates were significantly more accurate than novices ($M = 5.81$, $SD = 2.71$, $t[122] = 4.39$, $p < .001$, $\eta_p^2 = .19$).

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

DOI: 10.1002/bdm

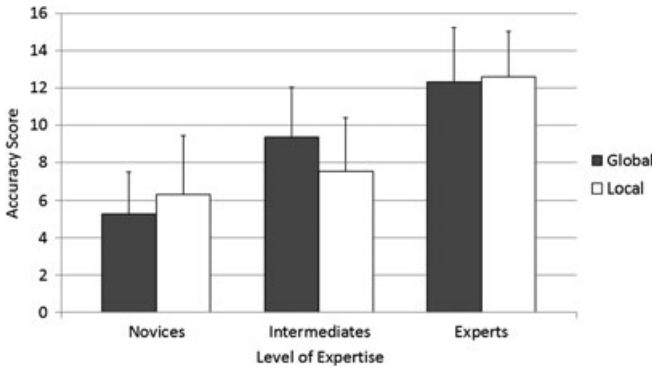

Figure 3. Accuracy scores of judgments of poems for novices, intermediates, and experts in the global and local conditions

No main effect of processing style was found ($F < 1$, *ns*). The ANOVA did reveal a Processing style × Group interaction ($F[2, 119] = 3.20$, $p = .044$, $\eta_p^2 = .05$). 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 ($M = 7.52$, $SD = 2.87$, $F[1, 119] = 4.89$, $p = .029$, $\eta_p^2 = .11$). No differences were found between the two processing styles in the novice 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 3.

GENERAL DISCUSSION

In three experiments, we showed that the impact of deliberation versus intuition on judgments of a variety of stimuli (paintings, piano performances, and 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.[4] Experiment 1 demonstrated this effect for judgments of modern art. Experiment 2 demonstrated the effect for judgments of piano performances. Finally, Experiment 3 showed that the effect of processing style (global versus local) on judgments of poetry is similarly moderated by expertise. Judgments of intermediates were poorer in a local style 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., in press), Experiment 3 provides additional insight in the process underlying the interaction between expertise and judgment mode. As noted earlier, Dijkstra et al. (in press) 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 poorly in global and local processing modes. This suggests that novices neither have reliable reasons nor possess 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 suggest 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 (Dijksterhuis et al., 2009; Klein, 1993; 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 be extremely difficult to identify, and to possess knowledge about, all relevant variables in those domains. Moreover in these domains it is often not likely or even impossible that one can determine the best option or course of action by strict reasoning. As a consequence there is a discrepancy between explicit theory and practice. In support of this line of reasoning, Kahneman and Klein (2009) observed that experts

[4]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 ($Z = .137$, $p = .89$).

DOI: 10.1002/bdm

in those domains are generally not able to articulate the reasons for their judgment. Expertise in these domains is often not primarily determined by explicit knowledge, but by experience. Hence, according to our typology and terminology a person is less likely to be an expert (in terms of experience *and* knowledge) 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, and 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 afterward. 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 with 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, whereas 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, whereas 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. In addition, the criterion to assign participants to the novice or intermediate group, in Experiments 1 and 3, was relatively arbitrary. In Experiment 2, we did use an objective criterion to assign participants to the novice or intermediate group, namely experience with playing a musical instrument. More research is needed to provide further 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, whereas others are asked to deliberate. This is similar to what Melcher and Schooler (2004) did in a very specific domain (classifying mushrooms).

Our explanation encompasses the explanation given by Wilson 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 particular sensory modalities.

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, 2012; Hogarth, 2001; Topolinski, & Strack, 2009), and we would expect legal judges to be able to (unconsciously) relate new legal cases to cases in the past and rely on intuition. The key difference between, for example, art critics and legal judges is that the latter group can rely on rules in the code of law. In this case, we could still argue that a legal judge with intermediate expertise would experience detrimental effects of deliberating because he or she ignores implicit knowledge obtained by experience. However, a novice judge, who has learned to use the code of law, could benefit from deliberating. The main reason being that reasons on which to base judgment are indicated by the rules that can be found in the law. In this case, even though novice legal judges lack experience and knowledge, they can rely on a set of explicit rules and reasons in their judgment. This is the fourth level of expertise that we briefly mentioned in the Introduction (high on knowledge/high on knowledge).

Interestingly, research on medical (e.g., Groves, O'Rourke, & Alexander, 2003; Schmidt & Boshuizen, 1993) and psychodiagnostic decision making (Witteman & Van den Bercken, 2007) also proposed a classification in three levels of expertise. These domains are characterized by the 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.

DOI: 10.1002/bdm

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. Melcher and Schooler (2004) found some tentative support for the potential beneficial effects of deliberation in such domains; they found beneficial effects of verbalizing on a recognition task for participants who only received conceptual training (attended a lecture about the fundamentals of mushroom morphology) and no perceptual training (classifying mushrooms).

Overall, our studies and the presented framework help 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.

ACKNOWLEDGEMENTS

We thank Matthijs Blankers, Jose Kerstholt, Joey Roukens, and Chantal Vrouwenvelder for their help and assistance at various stages of the research described in this article. We thank Jelte Wicherts for his help on the reported meta-analysis.

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DOI: 10.1002/bdm