The smell of suspicion:

How the nose curbs gullibility

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Suspicion is a mental state of doubt, leading us to wonder whether things may not be what they seem to be. Is the pricy gadget really as good as the sales person suggests? Did that colleague really mean it when he complimented us, or did he merely want to make us more receptive for the request that followed a few minutes later? And what about the faint smell of perfume on the husband's jacket when he returned from that conference? Not surprisingly, many observers warned that suspicion can cloud the mind and undermine cooperation and social relationships (for a discussion from the 17th century, see Bacon, 1893). Others observed that suspicion motivates extensive information search (e.g., Fein, 1996) and (sometimes) sophisticated reasoning (e.g., Fein, McCloskey, & Tomlinson, 1997; Mayo, 2015) to reduce ambiguity. These analyses usually focused on attributes of specific acts or attributes of the actor, the perceiver, and the nature of their interdependence (e.g., Deutsch, 1958; Kee & Knox, 1970) to understand the antecedents of suspicion

In contrast, everyday discourse often addresses suspicion in metaphorical terms that do not reference specific acts or attributes of the actor. Instead, perceivers may simply note that something "smells fishy" or does "not pass the smell test". While such metaphorical expressions have long been considered mere linguistic quirks, recent research showed that human thought about abstract concepts is grounded in more concrete sensory experience in the physical domain, as reviewed below. Building on this work, we tested whether incidental exposure to "smells of suspicion" is sufficient to influence people's behavior. This chapter summarizes what we learned.

We first identify metaphorical links between smell and suspicion and place them in the context of recent research into metaphors and grounded cognition. Next, we show that incidental exposure to fishy smells is sufficient to undermine cooperation in economic trust and public good games. Turning to suspicions' influence on reasoning, we further show that fishy smells increase the detection of misleading information and facilitate critical reasoning, including critical analysis of one's own beliefs. We highlight how other manipulations of distrust produce parallel effects, providing converging

evidence for interpreting the influence of incidental smells as a case of suspicion. The observed relationship between suspicion and smell is bidirectional: exposure to a fishy smell induces social suspicion and the induction of suspicion through social means, conversely, increases people's sensitivity to metaphorically relevant odors. Taking a step back, we end the chapter by discussing the role of incidental sensory experiences in the broader context of the situated, embodied, experiential, and pragmatic nature of human cognition.

Smell and Suspicion

A rapidly growing body of research highlights the role of sensory experience in cognition and emotion (for reviews, see Barsalou, 2008; Landau, 2017; Landau, Meier, & Keefer, 2010; Lee & Schwarz, 2014; Schwarz & Lee, in press). The influences of interest are usually reflected in metaphors that link an abstract target concept with a more concrete source concept derived from sensory experience. For example, saying that a "warm" person discusses "weighty" matters with a "close" friend conveys social meanings through reference to the physical dimensions of temperature, weight, and spatial distance. More important, variations in perceivers' sensory experience have metaphor-consistent social effects: people perceive others as socially warmer after holding a warm rather than cold cup of coffee (Williams & Bargh, 2008a), consider the same book more important when its heft is increased through a concealed weight (Chandler, Reinhard, & Schwarz, 2012; Jostmann, Lakens, & Schubert, 2009), and experience more emotional distance after having marked spatially distant rather than close points on a Cartesian plane (Williams & Bargh, 2008b).

The sensory experience that is metaphorically related to the psychological state of suspicion is smell. In languages around the world, saying that something does not "smell right", "has a smell", or fails to pass a "smell test" conveys that one doubts whether things are what seems to meet the eye. Linguistic analyses documented this smell-suspicion association in at least 18 languages, including Arabic, Chinese, English, French, German, and Spanish (Soriano & Valenzuela, 2008). However,

languages differ in which odor they specify as the smell of suspicion. For example, in English, the smell of suspicion is "fishy", in German it is "foul" and Italians catch "a whiff" that remains unspecified. This suggests that the smell-suspicion link may be a universal conceptual metaphor with culture specific instantiations. When a smell is specified, it is the smell of decaying organic matter that may be used as food, suggesting that the smell-suspicion link is an evolved mechanism that protects against premature ingestion of "suspicious" material: When you bring it close to your mouth and it doesn't "smell right" you better slow down and check it out more carefully.

While this conjecture provides a plausible account for why smell may be linked with suspicion, readers may wonder why this association should generalize beyond the assessment of smelly substances that one may eat? As observed for many subjective experiences – from bodily arousal (Zillman, 1978) to moods (Schwarz & Clore, 1983), emotions (Schwarz, Servay, & Kumpf, 1985) and metacognitive experiences of ease or difficulty (Schwarz et al., 1991)—people are more sensitive to their momentary experience than to its source (for reviews, see Schwarz, 2012; Schwarz & Clore, 2007). Hence, they misread their experience as bearing on whatever they focus on at the moment, even when the experience is elicited by an unrelated influence. We assume that the same is true for sensory experiences of metaphorical relevance and the subjective response they elicit – once a smell induces suspicion, it will be brought to bear on the task at hand. If so, a "suspicious" smell should influence one's response to a wide range of tasks to which suspicion may be relevant. Most importantly, it should reduce interpersonal trust and cooperation and influence judgment and reasoning in ways that parallel the influence of other manipulations of distrust. Empirically, this is the case.

Fishy Smells Curb Social Cooperation

People are attuned to a wide variety of cues that signal whether to trust or suspect. These signals include attributes of the target person, such as reputation (Burt & Knez, 1996), facial features (Zebrowitz, 1997), and nonverbal behaviors (Bond et al., 1992); attributes of the perceiver, such as risk

calculations (Dasgupta, 1988); and attributes of the context, such as social distance (Buchan & Croson, 2004), task structure (Sheppard & Sherman, 1998), and risk of betrayal (Bohnet & Zeckhauser, 2004). These cues reliably influence behavior in economic games designed to test different aspects of social cooperation. Hence, these games are a suitable tool for testing the influence of incidental odors.

Trust games: Will the partner reciprocate?

One type of economic game addresses issues of reciprocation: If I do something beneficial for you, will you reciprocate and do something good for me? In a typical game, decision-maker A receives an endowment from the researcher (say, $5 in quarters) and can freely decide how much of it, if any, he or she wants to send to decision-maker B. The researcher will increase any amount sent by some factor (say, a factor of 4), turning, for example, A's contribution of $2 into $8. Decision-maker B can then decide how much, if any, of this money he or she wants to send back to decision-maker A. If A suspects that B may walk off with the money, A should not share anything. If A trusts B to reciprocate, A should send B as much money as possible, turning the initial $5 into $20 after the researcher quadruples it. Of that sum, a "fair" partner would supposedly return more than A's initial $5 – yet an unfair one may simply walk off with the full $20. Would A's decision be influenced by an incidental smell?

To test this possibility, we (S.W.S. Lee & Schwarz, 2012, Study 1) had an experimenter spray fish oil, fart spray, or odorless water at a corner area in a campus building. Another experimenter, blind to the smell condition, approached students in a different area and invited them to participate in a one-shot trust game with another "participant," who was actually a confederate. Each player received 20 quarters ($5) and an investment form with instructions and response space. The true participant was always approached first and thus designated as decision-maker A (the sender), who could freely decide how much money to send to decision-maker B. Any amount sent would be quadrupled in value, as described above. As shown in the left-hand panel of Figure 1, participants in the odorless condition sent $3.34 of their $5 endowment to their partner. An incidental fishy smell significantly reduced this sum to

$2.53, a drop of about 25%. This effect was specific to the fishy smell condition and not observed for a different aversive and disgusting smell, produced by an (aptly named) “fart spray”. This negative influence of fishy smells on cooperation in one-shot trust games has been replicated by Sheaffer, Gal, and Pansky (2017, Study 1).

Figure 1

Public good games: Will be partner be a free-rider?

Another type of economic game addresses issues of free-riding: Will the partner contribute his or her share to a common good or take a free ride and enjoy the good without making a contribution? In this type of game, each participant receives an endowment (say, $5 in quarters) and decides how much he or she wants to contribute to a common pool. The researcher multiplies the money in the pool by some factor (say, 1.8). Finally, the amount in the pool is equally divided among all players, independent of what they contributed. If player A suspects that the other player(s) will not contribute, A should simply keep the endowment. If A can assume that the other(s) contribute as well, all are better off the larger the pool that will be equally divided among them.

Following the procedures described above, we (S.W.S. Lee & Schwarz, 2012, Study 2) tested the influence of incidental smells on cooperation in the described game. As shown in the right-hand panel of Figure 1, participants contributed $3.86 of their endowment under neutral smell conditions, but only $2.65 under fishy smell conditions. Incidental exposure to a fart smell did not significantly affect their contribution ($3.38).

Using a similar one-shot public good game, Sebastian, Kaufmann, and Garcia (2017) replicated the negative influence of an incidental fishy smell, as well as the lack of influence of a fart smell, in Australia. They also observed that a fishy smell was sufficient to overcome the influence of dispositional trust on cooperation. In their study, a measure of dispositional trust (taken from Yamagishi &

Yamagishi, 1994) predicted participants' contributions under neutral smell conditions but not under fishy smell conditions.

Summary

In combination, these studies highlight that incidental exposure to a subtle smell with metaphorical meaning is sufficient to elicit suspicion about the motives and trustworthiness of one's partners, with adverse effects on cooperative behavior. The effect is not driven by the generic valence of the sensory experience but by its specific metaphorical associations, as the comparisons between fishy and farty smells indicate.

Fishy Smells Curb Gullibility

Suspicion is a mental state in which people "suspect" that something is wrong but are uncertain what it might be. They wonder how things may be different from what meets the eye and are likely to entertain alternative perspectives and interpretations to assess their plausibility. Indeed, experiences of suspicion and distrust are associated with increased generation of alternative interpretations (Fein, 1996; Schul, Burnstein, & Bardi, 1996), increased accessibility of opposing concepts (Schul, Mayo, & Burnstein, 2004), and more divergent reasoning (Mayer & Mussweiler, 2011). While the observation that fishy smells curb social cooperation is indicative of reduced trust, it is silent on whether incidental exposure to fishy smells affects cognitive performance – after all, deciding not to part from one's money when something feels wrong does not require complex reasoning. We therefore turned to classic reasoning tasks to test whether incidental exposure to fishy smells curbs gullibility and increases critical thinking.

Identifying misleading information: There's something fishy about this question

A key element of guarding against potential attempts to mislead us is the critical examination of what others have to say: Does their utterance make sense? May things be different from what they say? These concerns should prompt close attention to the details of a message to test whether something is

wrong. Accordingly, people should be more likely to identify misleading information when they feel suspicious than when they do not. However, it is also conceivable that suspicion fosters the rejection of any information, independent of its veracity.

A task that allows researchers to assess people's sensitivity to misleading information that is subtly embedded in a seemingly innocuous question was developed by Erickson and Mattson (1981) and became known as the "Moses illusion". Participants are asked to answer trivia questions and informed that they may or may not encounter questions that lack a correct answer if taken literally. For example, the question "In which year did Obama fly to the moon?" presupposes something that did not happen, making it impossible to answer with a year. Participants are asked to mark those questions as ones that cannot be answered, while giving substantive answers to all questions that can be answered. In this paradigm, most people who are asked "How many animals of each kind did Moses take on the Ark?" answer "Two" despite knowing that the biblical actor was Noah, not Moses (Erickson & Mattson, 1981). People fail to notice the distortion in the question because of the semantic overlap (Park & Reder, 2003) between Moses and Noah -- both are old men associated with water in biblical stories. This gives the Moses question a feeling of familiarity that reduces the likelihood that people notice that something is wrong – it feels like they heard this before.

Manipulations that make the question feel less familiar attenuate the Moses illusion. In general, familiar material is easier to process than novel material – it is easier to recognize, read, pronounce, and remember (Schwarz, 2004, 2015). But not everything that is easy to process is also familiar. Instead, the ease of processing may be due to other variables, such as a difficult to read print font, poor color contrast, or a hard to understand accent. Unfortunately, people are more sensitive to their feelings than to where their feelings come from. They therefore misread ease of processing as bearing on what they are thinking about, even when it is merely due to an incidental variable, such as the print font. Hence, Song and Schwarz (2008) found that 88% of their participants failed to notice the distortion in the Moses

question when it was presented in an easy to read print font (black Arial 12), whereas only 53% did so when it was presented in a difficult to read print font (grey Brush script 12).

This experimental paradigm provides a test of the potential influence of fishy smells: Would an incidental fishy smell make it more likely that people notice something is wrong with Moses? To find out, we included the above Moses and Switzerland questions in a questionnaire that participants completed in a booth that did or did not have a fishy odor (D. Lee, Kim, & Schwarz, 2015, Study 1). Participants received instructions from an experimenter who was blind to conditions and were then assigned to an experimental booth in which another experimenter had attached a small piece of paper sprayed with fish oil (or water) under the table. As expected, an incidental fishy smell attenuated the Moses illusion. Whereas only 16.7% of participants in the neutral smell condition noticed that something was wrong with Moses, 41.9% did so in the fishy smell condition. We also included an undistorted question, "Which country is famous for cuckoo clocks, chocolate, banks, and pocket knives?". The correct answer is "Switzerland" and participants' performance on this question was unaffected by the smell to which they were exposed.

In a different experimental paradigm, introduced by Loftus, Miller, and Burns (1978), misleading questions are used to implant false memories. In a typical study, participants see a series of slides that visually portray an event, for example, an accident involving a car and a pedestrian. Next, they answer questions about the event and some of these questions include a misleading proposition; for example, participants may be asked whether the car stopped at the stop sign, even though there was no stop sign in the scene they saw. After a delay, people who were asked a question that implied the presence of a stop sign erroneously "recognize" a stop sign as having been part of what they saw. This false memory effect is attenuated when participants are alerted that something may be wrong with the questions asked (Green, Flynn, & Loftus, 1982). Would a fishy smell also be able to protect people against false memories? To test this possibility, Rona Sheaffer and her colleagues (2017, Study 2) presented the

misleading questions in a room that had been sprayed with a fishy or a pleasant smell. Next, they tested their participants' recognition memory 48 hours later, in a neutral smell context. Those who had thought about the questions in the presence of a fishy smell were now less likely to erroneously "recognize" objects that were mentioned in the questions, but absent in the original scene. Presumably, suspicion at the time of reading the questions resulted in closer scrutiny, which reduced the impact of the misleading information.

In combination, the Moses study (D. Lee et al., 2015, Study 1) and false memory study (Sheaffer et al., 2017, Study 2) converge on indicating that olfactory cues of suspicion can curb gullibility. In the Moses study, an incidental fishy smell improved the identification of a misleading question without inducing a bias to falsely identify an undistorted question as problematic. In the false memory study, an incidental fishy smell decreased the likelihood that elements of the question were incorporated into the memory of the scene, presumably because participants noticed that something may be wrong with the question. Future research may fruitfully address whether fishy smells can also influence the impressions we form of other people, even when those people do not engage in any suspicious behavior. To date, research into suspicion effects in person perception has focused on conditions where suspicion is elicited by information about the target person (Fein, 1996; Hilton & Darley, 1991) and has largely neglected the potential influence of incidental suspicion.

Thinking critically about one's own thoughts: May I be wrong?

Suspicion pertains to things others do or say. Hence, the influence of olfactory suspicion cues may be limited to how we think about information presented by others, as in the above experiments with misleading questions. However, incidental influences on how we feel and think usually generalize to unrelated tasks, as has been observed for moods and emotions (for a review, see Schwarz & Clore, 2007), distrust (for a review, see Mayo, 2015), and cognitive procedures (for a review, see Xu & Schwarz, 2018). This suggests that fishy smells may even influence how critically we examine our own thoughts.

Wason's (1960) classic rule discovery task lends itself to testing this possibility. In this task, participants are asked to discover the rule underlying the number series 2–4–6. Most assume that the rule is "+2". Next, they are instructed to test their assumption by generating a number series that the experimenter will mark as consistent or inconsistent with the correct rule. Following this feedback, participants can correct their hypothesis and state what they now think the correct rule is.

In all published studies, people overwhelmingly rely on a positive-testing strategy (Klayman & Ha, 1987) and generate number series that are consistent with their hypothesis (e.g., 6–8–10; for a review, see Oswald & Grosjean, 2004). The feedback they receive on these series always informs them that their series is compatible with the rule. Although correct, this affirmative feedback does not allow them to recognize that their hypothesis is false. The correct rule is, somewhat sneakily, "Any increasing series of numbers". Participants can only discover the correct rule when they generate at least some series that can falsify their own +2-hypothesis. Hence, discovery of the correct rule is facilitated by a negative testing strategy, aimed at disconfirmation, and impaired by a positive testing strategy, aimed at confirmation (for a review, see Oswald & Grosjean, 2004).

If distrust and suspicion make people consider how things may be otherwise, they may facilitate a negative testing strategy and hence improve detection of the correct rule. Indeed, Mayo, Alfasi, and Schwarz (2014, Study 1) observed that people who are very low in dispositional trust perform better on this task than people high in dispositional trust. Moreover, experimentally inducing distrust through exposure to an untrustworthy face increases the prevalence of negative hypothesis testing, again resulting in improved rule discovery (Mayo et al., 2014, Study 2). Would the presence of an incidental smell similarly induce people to be more critical in testing their own, self-generated hypotheses?

To find out, participants had to work on Wason's (1960) rule discovery task in a cubicle that had a fishy or neutral smell (D. Lee et al., 2015, Study 2). They first received their instructions from an experimenter who was blind to conditions and were then assigned to a cubicle that another

experimenter had prepared with the respective smell. After generating six test series, participants called the experimenter and received feedback on their series. Finally, they reported what they now thought the rule was, given the feedback they received.

The results parallel the findings of Mayo and colleagues (2014). Overall, all participants generated more confirmatory than disconfirmatory number series, independent of smell condition. Nevertheless, smell significantly influenced whether participants made *any* attempt to disconfirm. Specifically, 47.7% (21 out of 44) of the participants assigned to the fishy cubicle listed as least one negative hypothesis, whereas only 27.7% (13 out of 47) of those assigned to the neutral smelling cubicle did so. This difference in testing strategy is also reflected in the likelihood of discovering the correct rule. Whereas only 6.4% of the participants in the neutral smell condition discovered the correct rule, 20.5% in the fishy smell condition did so.

Sebastian and colleagues (2017) replicated this result in Australia, adding a fart spray condition as an additional control. In their study, participants exposed to an incidental fishy smell were twice as likely to generate at least one negative hypothesis test than participants exposed to an incidental fart smell. The latter condition did not significantly differ from a neutral smell condition, again indicating that the influence of fishy smells does not merely reflect their aversive or disgusting nature (S.W.S. Lee & Schwarz, 2012).

Summary

In combination, the reviewed studies indicate that incidental exposure to olfactory cues that are metaphorically related to suspicion can curb gullibility. They make people more likely to scrutinize information they receive from others, which increases the correct identification of misleading questions (D. Lee et al., 2015, Study 1) and reduces the generation of false memories (Sheaffer et al., 2017, Study 2). This more critical approach to information is not limited to the examination of material presented by others, but also extends to assessments of one's own thoughts. When asked to test their own, self-

generated hypotheses, people take a more critical approach to testing when exposed to a smell of suspicion (D. Lee et al., 2015, Study 2; Sebastian et al., 2017). This influence of olfactory cues parallels the influence of other cues that something may be wrong, including chronic or temporary distrust (Mayo et al., 2014) and low processing fluency (Song & Schwarz, 2008).

Suspicion Increases Sensitivity to Fishy Smells

The results discussed so far are consistent with metaphors that associate suspicion with smell. Potential theoretical accounts of the smell-suspicion link differ in whether they predict that this relationship is unidirectional, indicating an influence of smell on suspicion, or bidirectional, indicating the ability of smell and suspicion to influence one another. We review the evidence bearing on the directionality of the influence before we turn to its theoretical implications in the final section.

Suspicion improves sensory perception

To test the influence of suspicion on people's sense of smell we (S.W.S. Lee & Schwarz, 2012, studies 3a to 3c) handed participants a set of test tubes containing fragrance oils or food substances, such as cinnamon, orange nectar, "creamy caramel", minced onion, and fish oil. Participants were asked to close their eyes, sniff each test tube sequentially, and write down any smell that came to mind. Half of the participants began the sniffing task right away. For the other half, the experimenter induced suspicion by adding to the instructions, "Obviously, it's a very simple task and, you know, there's… there's nothing we're trying to hide here." She then suddenly noticed a document underneath the participant's response sheet, hastily took it away, put it in her bag, came back, smiled awkwardly, and said, "Sorry, it shouldn't have been there. But… ahem… anyway. Where was I? Oh yes, it's all very simple. There's nothing we're trying to hide or anything. Any questions? Ok, good, good, you can get started whenever you're ready." Next, participants began the sniffing task and recorded their responses. Responses that indicated any ingredient of the smell substance (e.g., fish, sardine, anchovy, in the case of fish oil) were coded as correct labeling.

Three variants of this procedure, using different combinations and intensities of pleasant and unpleasant smells, converged on the same conclusion: a socially induced state of suspicion significantly enhances the correct identification of fishy smells. When the fishy smell was blatant and 50% of participants identified it correctly without suspicion, suspicion increased identification to 72.5%; when the smell was subtle and only 6.7% identified it without suspicion, suspicion increased correct identification to 33.3%. In contrast, suspicion did not significantly influence the identification of any of the other smells in any of these studies.

Going beyond this observation, we further found that suspicion selectively increases people's ability to detect subtle fishy smells presented at low levels of concentration (S.W.S. Lee & Schwarz, 2012, Study 7). In this study, participants received test flasks that contained either no odor or fish oil or fart spray at three different levels of concentration. In contrast to the preceding study, participants did not have to identify what the smell is but were instead told to determine whether a specified smell was present. For example, in a practice trial they were handed a flask with nail polish remover and told that their task is to identify whether that smell is also present in other flasks, where it may either be absent or mixed with other odors. Next, they received 31 test flasks that contained different concentrations of nail polish remover and reported for each how confident they are that the target smell is present. Following this practice trial, the experiment induced suspicion as described above and proceeded to another set of 31 flasks that contained either fish oil or fart spray at different concentrations.

Figure 2

As shown in Figure 2, compared with non-suspicious participants, suspicious participants' confidence ratings increased more sharply with the concentration of fish oil, indicating that it increased their sensitivity to low levels of the odor. This was not observed for fart spray, indicating that the effect of suspicion is limited to metaphorically associated smells and does not generalize to other smells of an unpleasant nature. Equally important, suspicion did not increase participants' overall confidence ratings

for fish oil or fart spray, indicating that it did not induce a response bias. Instead, the effect is limited to low levels of concentration of the metaphorically related smell, documenting increased odor specific sensory sensitivity.

Perspectives on Gullibility:

The Situated, Experiential, Embodied, and Pragmatic Mind

The findings we reviewed in this chapter can be discussed from the perspective of evolutionary, cognitive, affective, and embodied theorizing. It is tempting to favor one or the other to identify the "real" process underlying the observed bidirectional relationships between olfactory cues, feeling, and thinking. However, the different theoretical perspectives are not mutually exclusive and we conclude this chapter with a discussion of their interplay.

Evolution

That smell and suspicion are associated in different cultures and languages around the globe (Soriano & Valenzuela, 2008) suggests a universal metaphorical association with culture specific implementations. From an *evolutionary perspective*, it would be adaptive to step back and take the time for closer inspection when something that one may touch or ingest does not smell right. Indeed, when languages specify a smell of suspicion, it is the smell of rotting organic material. A hesitant response to things that have the wrong smell is shared by many organisms (@REF power of smell). To be adaptive, this response should not be limited to the smell that is specified in the metaphors of one's culture but should also be elicited by other smells that pose the same adaptive problem. If so, a fishy smell should elicit suspicion even when one's culture that does not specify "fishy" as the smell of suspicion. The limited available evidence is compatible with this prediction. As noted earlier, Sheaffer and colleagues (2017) observed that fishy smells undermined cooperation in a public goods game (study 1) and attenuated the impact of misleading information (study 2). Importantly, they obtained these results with Israeli participants in studies administered in Hebrew, a language that does not specify "fishy" as the

smell of suspicion. Future research may fruitfully explore the influence of a broader range of odors across a broader range of cultures and languages.

Metaphors

From an evolutionary perspective, smell-suspicion *metaphors* are themselves an expression of an evolved adaptive mechanism. But this does not preclude that the culture specific implementations of the general smell-suspicion metaphor can have a unique causal impact. Several aspects of this assumption are worth systematic testing. One pertains to the relative impact of different smells. Frequent exposure to the metaphors of one's culture should strengthen the link between suspicion and the culturally specified smell, which should make this particular smell more influential than other adaptively relevant smells. We would expect, for example, that "fishy" as well as "foul" smells can elicit suspicion in Americans as well as Germans but that both respond more strongly to the smell specified in their respective cultural metaphors. Unfortunately, any test of differences in the relative impact of different smells requires a calibration of smell intensity, which is a challenging task: how much of a fishy smell is equivalent to how much of a foul smell?

More tractable is the influence of semantic representation. The smell specified by one's cultural metaphors becomes part of one's knowledge about suspicion. Hence, the general rules of *knowledge accessibility* apply. Indeed, priming English speakers with concepts of suspicion increases the accessibility of fish related concepts (S.W.S. Lee & Schwarz, 2012, study 5). This makes them more likely, for example, to complete the letter string "FI__ING" with FISHING rather than FITTING, FILLING or another applicable word. The increased accessibility of fish related concepts, in turn, facilitates the correct identification of fishy smells (S.W.S. Lee & Schwarz, 2012, study 6). Theoretically, semantic representations provide a cognitive pathway for mutual influences between concepts related to suspicion and concepts related to smell that are independent of a concurrent online experience of

suspicion. We assume that such knowledge effects are culture specific, making it unlikely, for example, that concepts of suspicion would prime fish related concepts for German participants.

Finally, it is worth noting that the reviewed findings indicate a bidirectional relationship between smell and suspicion – much as a fishy smell can induce suspicion, suspicion induces increased sensitivity to fishy smell. At first glance, this bidirectionality seems at odds with the unidirectional nature of the metaphor's representational structure, which implies an influence from smell to suspicion. As we discussed in detail elsewhere (S.W.S. Lee & Schwarz, 2012; S.W.S. Lee, 2016), bidirectional effects are compatible with conceptual metaphor theory (Lakoff & Johnson, 1999) because even if a conceptual metaphor has a unidirectional representational structure, its use can produce bidirectional psychological consequences (see also, Ijzerman & Koole, 2011).

Feelings

Smell is just one of many variables that can elicit suspicion. Indeed, most research into suspicion and distrust has used other manipulations, ranging from memories of bad experiences to attributes of one's interaction partner (Burt & Knez, 1997) and incidental exposure to faces that are considered worthy of distrust (Mayo et al., 2014). More important, such manipulations have produced results that parallel the impact of smells, as noted throughout this chapter (see also, Mayo, 2015, this volume). These parallel effects highlight that the experience of suspicion is sufficient to reduce social cooperation and gullibility, independent of its specific induction.

As observed in many domains, people are more sensitive to their subjective experiences than to where these experiences come from. Hence, they misread their current feelings and fleeting thoughts as part of their response to whatever is in the focus of their attention. This influences the judgments they form and the processing strategy they choose, as conceptualized in feelings-as-information theory (for reviews, see Schwarz, 2012; Schwarz & Clore, 2007). From this perspective, incidental feelings of suspicion undermine cooperation because they are perceived as part of one's response to the partner

and the nature of the game. If participants became aware of the incidental nature of their feeling, its informational value would be undermined and its influence attenuated or eliminated as has been observed for moods (Schwarz & Clore, 1983), emotions (Schwarz, Servay & Kumpf, 1985), bodily arousal (Zillman, 1978) and metacognitive experiences of ease and difficulty (Sanna, Schwarz, & Small, 2002). Hence, subtle smells are likely to be more influential than intense smells, which attract more attention and carry a higher risk of awareness. Because feelings are associated with semantic and episodic information about circumstances in which they are experienced (Bower, 1981), they also bring to mind related declarative information that further feeds into judgment (for a review, see Forgas, 2001).

In addition to serving as input into a judgment, feelings inform people about the nature of the current situation. As assumed by many accounts of situated cognition (for a review, see Smith & Semin, 2004), thought processes are tuned to meet the requirements of the situation at hand and feelings play a key role in this tuning process (Schwarz, 1990, 2002). When distrust and suspicion signal that things may not be what they seem, processing is oriented towards potential alternative interpretations of reality (see Mayo, 2015, this volume). As reviewed above, this influence is sufficient to overcome one of the most robust biases in the psychology of reasoning, namely reliance on confirmatory hypothesis testing strategies (D. Lee et al., 2015; Mayo et al., 2014).

Situated, experiential, embodied, and pragmatic

While each of these perspectives sheds light on some aspect of the reviewed research, it is useful to consider their interplay in the overall picture of human feeling and thinking. As William James (1890) emphasized, thinking is for doing. We do things in specific contexts and our pragmatic pursuits benefit from close attention to the situation at hand. This renders the abundantly observed context sensitivity of human cognition beneficial, occasional errors and biases notwithstanding (Schwarz, 2007; Smith & Semin, 2004). Feelings play a key role in this process by providing fast information about the situation at hand, often before relevant sources can be identified (Zajonc, 1980). Moreover, we interact

with the world through our bodies and experience it through our senses. This makes sensorimotor information important building blocks for knowledge representation and reasoning (Barsalou, 2008; Lakoff & Johnson, 1999). As the rapidly growing work on embodied cognition illustrates, higher mental processes are scaffolded onto phylogenetically or ontogenetically older sensorimotor processes, reflecting that evolution is largely a recycle and reuse enterprise (Anderson, @). Many of these linkages are reflected in conceptual metaphors (Lakoff & Johnson, 1999) that have stimulated extensive research into the role of sensorimotor inputs in human judgment and decision making (for reviews, see Landau, 2017; Schwarz & Lee, in press). The picture that emerges emphasizes the situated, experiential, embodied and pragmatic nature of human cognition and these features "seep" into everything we do, allowing an incidental fishy smell to impair social cooperation and curb our gullibility.

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Figure 1. Amount of investment in a one-shot trust game as a function of incidental smell in Study 1. Error bars represent standard errors (S.W.S. Lee & Schwarz, 2012, study 1).

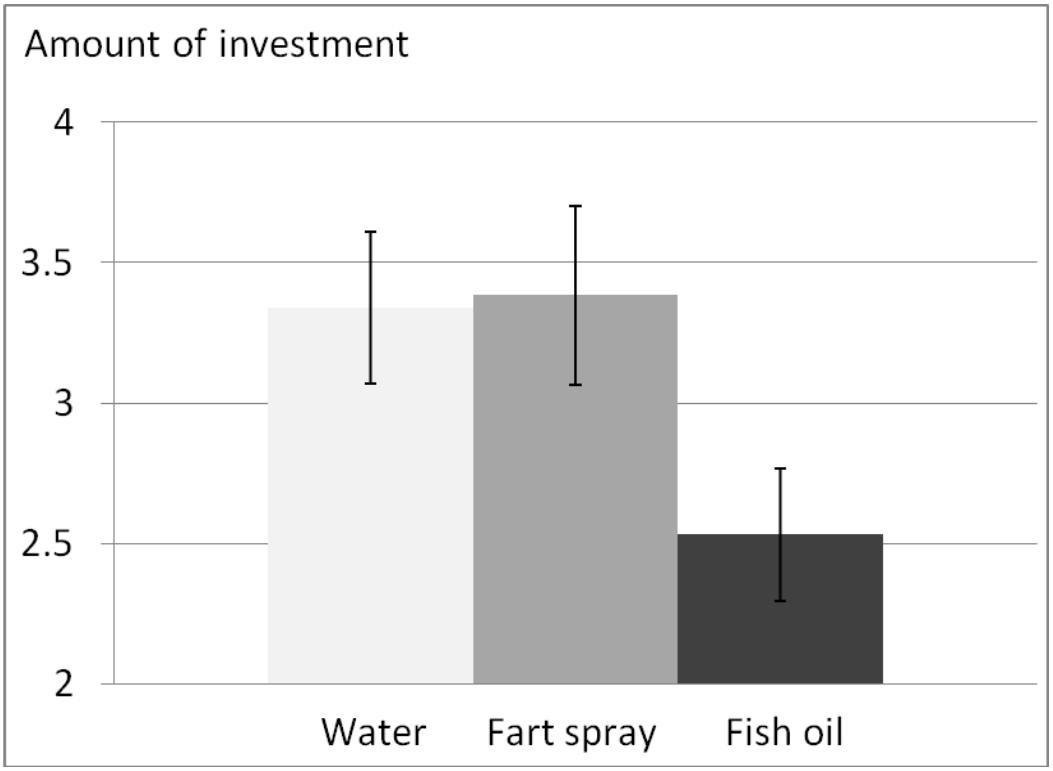

Figure 2. Confidence ratings for smell presence as a function of fish oil concentration with and without suspicion. Error bars represent 95% confidence intervals (S.W.S. Lee & Schwarz, 2012, study 7).