

Deduction from If-Then Personality Signatures

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Personality signatures are sets of *if-then* rules describing how a given person would feel or act in a specific situation. These rules can be used as the major premise of a deductive argument, but they are mostly processed for social cognition purposes; and this common usage is likely to leak into the way they are processed in a deductive reasoning context. It is hypothesized that agreement with a Modus Ponens argument featuring a personality signature as its major premise is affected by the reasoner's own propensity to display this personality signature. To test this prediction, Modus Ponens arguments were constructed from conditionally phrased items extracted from available personality scales. This allowed to record (a) agreement with the conclusion of these arguments, and (b) the reasoner's propensity to display the personality signature, using as a proxy this reasoner's score on the personality scale without the items used in the argument. Three experiments ($N = 256$, $N = 318$, $N = 298$) applied this procedure to Fairness, Responsive Joy, and Self-Control. These experiments yielded very comparable effects, establishing that a reasoner's propensity to display a given personality signature determines this reasoner's agreement with the conclusion of a Modus Ponens argument featuring the personality signature.

Keywords Conditionals, Personality, Reasoning, Social Cognition, Deduction

In the domain of social cognition, a personality signature is a set of *if-then* rules describing how a given person feels or acts in specific situations, as a reflection of some underlying personality trait (Mischel, 2004; Shoda, Mischel, & Wright, 1993). For example, Conditionals (1-a-b) are a personality signature of student Betty:

- (1) a. If Betty is with professors, she behaves in a friendly manner;
- b. If Betty is with fellow students, she behaves in an unfriendly manner.

Previous research suggests that people can infer personality traits from personality signatures, and vice versa (Kammrath, Mendoza-Denton, & Mischel, 2005; Shoda, Mischel, & Wright, 1989; Vonk, 1998). For example, people are likely to infer from the signature (1-a-b) that Betty is a 'kiss-up', one who flatters superiors in order to get extra attention; and conversely, if told that student Betty is a kiss-up, they are likely to generate statements (1-a-b) as a personality signature of Betty (Kammrath et al., 2005).

The fact that personality signatures take the form of con-

ditional statements¹ implies that they can also be featured in deductive arguments such as (2-a-c):

- (2) a. If Betty is with professors, she behaves in a friendly manner;
- b. Betty is with professors;
- c. Therefore, she behaves in a friendly manner.

Logically speaking, (2-c) follows validly and unambiguously from (2-a-b) by Modus Ponens. Following the deductive logic of Modus Ponens, reasoners should unanimously and confidently conclude that Betty behaves in a friendly manner. The premise of the current research, though, is that personality signatures such as (2-a) are likely to trigger social cognition processes that affect reasoning on problems such as (2-a-b).

Personality signatures are a staple of social cognition, which people routinely use in order to predict the dispositions, thoughts, and actions of other persons. Now, the processes that individuals engage when dealing with personality signatures in daily social life, are likely to leak into the way these same individuals manipulate personality signatures in deductive reasoning contexts. This leakage is in turn likely to make them doubt the conclusion of a deductive argument such as (2), to make them project their own personality onto

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¹Personality signatures are defined as *sets* of conditionals. While sets can technically contain a single element, I am still abusing the language to some degree when I describe individual conditionals as personality signatures. It would be more appropriate to use a longer phrase such as 'individual conditionals within a personality signature'. For the sake of brevity, and where there is no risk of conceptual confusion, I will simply write of personality signatures, whatever the number of rules within the signature.

the character featured in the argument, and to make them believe the conclusion of the argument in proportion to their own propensity to display the personality signature. This general claim is detailed further in the next section.

Leak, Doubt, Project

Leakage effects can occur for classes of conditionals that are mostly used for another purpose than reasoning. To illustrate, *utility conditionals* (Bonnefon, 2009) are mostly used for decision-making, and this common purpose leaks into the way they are processed in reasoning contexts. Utility conditionals are ‘if p then q ’ statements where p , q , or both, are of value to one agent or another. For example, in conditional (3), q clearly has negative value for the speaker:

- (3) If I eat nuts, I will need emergency care.

Utility conditionals are commonly used to make or justify decisions. For example, a rational agent who has the belief (3) would presumably decide not to eat nuts. It is this assumption about the way agents use utility conditionals in their decisions that leaks into the inferences reasoners are willing to draw from (3): Typically, it makes them infer that the speaker is not going to eat nuts (Bonnefon & Hilton, 2004; Evans, Neilens, Handley, & Over, 2008).

A slightly different leakage might occur with personality signatures. Contrarily to utility conditionals, personality signatures are not primarily used for another purpose than reasoning; but they are primarily used for a highly specialized form of reasoning, namely, social-cognitive inferences involving the personality traits that underlie the behavior of others. The leakage of these social cognitive-processes into deductive reasoning is likely to take two forms. First, a general doubt about a conclusion such as (2-c); second, a projection phenomenon whereby one expects others to behave and think similarly to oneself.

If social cognition processes do leak into the way people reason about deductive problems featuring personality signatures, then people might be wary of conclusion such as (2-c). Indeed, in the domain of social cognition, people are known to hedge the trait conclusions they derive from personality signatures (Wright & Mischel, 1988), and to suspend their judgment if they feel that they need to collect more information about the personality signature of a given individual (Hilton, Fein, & Miller, 1993). In the social realm, inferences about dispositions, feelings and actions require strong and diversified support before people can feel confident about them.

Let us assume that reasoners adopt this intuitive, socially contextualized outlook toward deductive problems featuring personality signatures. From this intuitive outlook, one element of a personality signature (one conditional rule) is not a firm basis to predict the actions or feelings of an individual of whom reasoners know nothing about. One consideration is immediately available to the reasoners, though; namely, their feeling about whether the conclusion would be accurate if they were themselves concerned.

Generally speaking, people show a tendency to expect others to be similar to themselves, in personality and behavior. This robust phenomenon is known as social projection (Robbins & Krueger, 2005), and it is assumed to play a substantial role when people attempt to predict what others are like, or what they are likely to do. Although research on social projection has not specifically focused on personality signatures, Kammrath (2010) offers results suggesting that people do project personality signatures onto hypothetical interaction partners. People who score high on the communion personality dimension, for example, have more extreme reactions to warm and cold interpersonal behavior than people who score low: They react especially positively to warm behavior, and they react especially negatively to cold behavior. Now, and quite interestingly for our current purpose, these individuals tend to project this personality signature onto others: Not only do they react strongly to warm and cold behavior, but they expect others to react the same.

We now have a reasonably complete picture of what may happen when people are asked to evaluate the conclusion of deductive arguments featuring personality signatures. To begin with, the way people commonly use these signatures for social cognition is likely to leak into the way they process them in the reasoning task. As a result, they may come to doubt that the conclusion is necessarily correct; and they may project their own personality onto the character featured in the problem, using their own dispositions as a cue to how likely it is that someone would act or react that way. If this picture is correct, then reasoners should feel confident about the conclusion in direct proportion to their own propensity to display the personality signature featured in the problem.

This claim, though, is not as straightforward to test as it is straightforward to formulate. We need to develop an implicit, nontransparent way to assess one’s propensity to display the personality signature featured in the deductive argument. The next section introduces a solution to this practical challenge.

From Personality Scales to Modus Ponens Arguments

In this article, the aforementioned difficulty is solved by capitalizing on a property of some personality scales. More precisely, some personality scales include items that are phrased as personality signatures. For example, the 10-item Fairness scale, available from the IPIP website (Goldberg et al., 2006, <http://ipip.ori.org/>), includes the following item:

- (4) [I] would feel very badly for a long time if I were to steal from someone.

By design, the agreement a given individual would express with this statement covaries with that individual’s score on the rest of the Fairness scale. That is, the score of an individual on the Fairness scale *without* item (4) gives an excellent indication of that individual’s propensity to display the personality signature featured in (4). As a consequence, it should be possible to test whether an individual’s score on the reduced Fairness scale predicts this individual’s response to

Table 1
Reasoning materials extracted and reformulated from personality scales.

Trait	Original items (from scale)	Reformulated conditional rules
Fairness	Would feel very badly for a long time if I were to steal from someone.	If Alice steals something, she feels very badly.
	Would not regret my behavior if I were to take advantage of someone impulsively.	If Béatrice takes advantage of someone, she feels proud.
Responsive Joy	Find it hard to stay in a bad mood if the people around me are happy.	If people around Alain are happy, he forgoes his bad mood.
	Usually end up laughing if the people around me are laughing.	If people laugh around Bruno, he gets irritated.
Self-Control	Forego things that are bad for me in the long run even if they make me feel good in the short run.	If Béatrice likes a dish that is bad for her health, she forgoes eating that dish.
	Can't resist eating candy or cookies if they are around.	If Alice sees a cookie, she does not resist the temptation to eat it.

Note. Two items with a conditional phrasing were extracted from each scale (shown in the *Original items* column). They were then rephrased (and otherwise simplified) as third-person conditional rules, to be used in deductive problems. The first conditional features a behavior matching the personality trait, the second conditional rule features a behavior mismatching the personality trait.

deductive problems featuring a personality signature of Fairness:

- (5) a. If Alice steals something, she feels very badly.
 b. Alice steals something.
 c. Therefore, Alice feel very badly.

If really reasoners process the personality signature (5-a) in the same intuitive fashion as they would do for purposes of social cognition, then their agreement with conclusion (5-c) should reflect the only source of confidence they have for (5-a), that is, their own propensity to display this personality signature. This propensity can be measured by their score on the Fairness scale from which (5-a) was extracted and adapted. Since the signature (5-a) is a positive indicator of Fairness, we can expect higher Fairness scores to be associated with higher agreement with (5-c).

It is also possible to construct problems where the major premise is a negative indicator of Fairness. For example, the Fairness scale item '[I] would not regret my behavior if I were to take advantage of someone impulsively' covaries negatively with the overall Fairness score. A simplified version of this item can be used in a problem such as :

- (6) a. If Béatrice takes advantage of someone, she feels proud.
 b. Béatrice takes advantage of someone.
 c. Therefore, Béatrice feels proud.

Mutatis mutandis, the same reasoning as above applies to this problem. That is, we can expect higher Fairness scores to be associated with *lower* agreement with the conclusion (6-c). The strategy adopted in this research was to scan the online IPIP database of personality scales to find scales that would feature at least two conditionally phrased items. These two items were used to create two Modus Ponens arguments, one that matched (positively covaried with) the personality

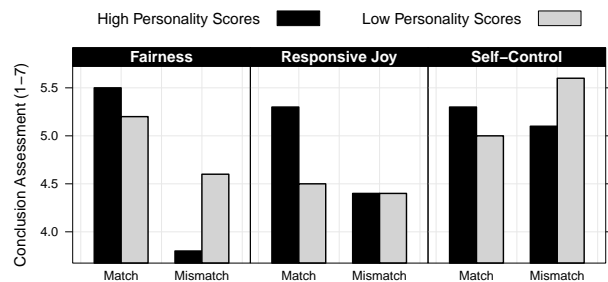


Figure 1. Agreement with the conclusion as a function of whether the personality score is high or low (top and bottom quartiles, respectively) and whether the content of the conditional matches or mismatches the personality trait.

trait, and one that mismatched (negatively covaried with) the personality trait (see Table 1). The original phrasing of the items could be somewhat cumbersome when used in a deductive argument, and was therefore simplified. The rest of this article addresses in turn the data obtained with the Fairness scale, the Responsive Joy scale, and the Self-Control scale, which were featured in three experiments drawing on three different samples of participants.

Study 1: Fairness

Method

Participants were recruited by third-year psychology students as a course requirement. Each student made a list of several men and women who were older than 18, not studying psychology, and willing to take part in a series of unrelated experiments (no other restriction applied, e.g., family members were permitted). Each student then randomly selected one male and one female participant from this list.

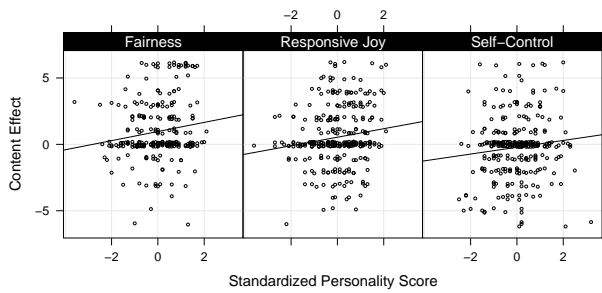


Figure 2. Content effect as a function of standardized personality score. In the three panels, the correlation coefficients are, from left to right, .15, .15, and .12.

This recruitment procedure promotes variety in age, occupation, and education, while ensuring equal proportions of male and female participants. No incentive was offered to participants. In the rare cases when a randomly selected participant did not consent to take part in the survey, the student made a second random selection from his or her list.²

Of the 256 participants who returned a fully completed questionnaire (46% women, mean age = 29, $SD = 12$), 15% had completed graduate school or an equivalent school form, 40% had the equivalent of an undergraduate education, 30% graduated from high school only, and the educational level of 15% was lower than high school. The sample included a large proportion of students (40%), but the remaining 60% came from a large variety of professional perspectives.

Participants took part to two sessions of data collection. During the first session, among other tasks, they took a reduced, 8-item version of the Fairness scale available from the IPIP website (Goldberg et al., 2006, <http://ipip.ori.org/>). The two items that were not presented to participants were the two items used to build the deductive reasoning problems that the participants solved during the second session of data collection.

About three weeks after the first session, participants took part to the second session. Among other tasks, they solved two deductive reasoning problems, and (later on) they took the 8-item personality scale a second time. The two deductive reasoning problems were the following:

- (7) a. Think about the following problem: If Alice steals something, she feels very badly. Alice steals something. Is the following conclusion correct: ‘Alice feels very badly’?
- b. Think about the following problem: If Béatrice takes advantage of someone, she feels proud. Béatrice takes advantage of someone. Is the following conclusion correct: ‘Béatrice feels proud’?

Whereas the contents of problem (7-a) match the personality trait Fairness, the contents of problem (7-b) mismatch this same personality trait. Participants evaluated the correctness of each conclusion on a 7-point scale (1 = *Not at all*,

7 = *Absolutely*).

Results

The reduced Fairness scale had a rather low $\alpha = .56$ during the first session, although this statistics increased to $\alpha = .61$ during the second session. The two resulting scores were highly correlated, $r(256) = .72$, $p < .001$ (all p -values are two-tailed). Averaging these two scores and standardizing the resulting variable yielded the Personality covariate. This covariate was then entered in a repeated-measure ANOVA with the Content of the deductive problem as the repeated factor and the agreement with the conclusion as the explained variable.

Agreement with the conclusion of the deductive problems was influenced by the Content of these problems, $F(1, 254) = 46$, $MSE = 2.6$, $p < .001$, $\eta_p^2 = .15$ but not by the Personality covariate, $F(1, 254) = .02$, $MSE = 2.6$, $p = .89$, with an essentially null value of η_p^2 . The critical Personality \times Content interaction was detected, $F(1, 254) = 6.2$, $MSE = 2.6$, $p = .013$, $\eta_p^2 = .02$.

This interaction is depicted in the left panels of Figures 1 and 2. Figures 1 displays the mean assessment of conclusions based on conditionals that match or mismatch Fairness, for participants with high or low Fairness scores. High and low scores refer to scores in the top and bottom quartiles of the distribution, respectively. For an alternate display of the data, Figure 2 displays the correlation between the Fairness score and the effect of content, that is, the correlation between the Fairness score and the preference for a conclusion that matches Fairness (defined as the assessment of the matching conclusion minus the assessment of the mismatching conclusion.) Both figures point to the same conclusion: Participants with higher (viz., lower) Fairness scores found conclusions more correct when they were based on conditionals that matched (viz., mismatched) Fairness.

Study 2: Responsive Joy

Method

The recruitment procedure was the same as in Study 1, with the additional requirement that participants to Study 1 could not take part to Study 2. Of the 318 participants who returned a fully completed questionnaire (50% women, mean age = 30, $SD = 13$), 15% had completed graduate school or an equivalent school form, 45% had the equivalent of an undergraduate education, 30% graduated from high school only, and the educational level of 10% was lower than high school. The sample included a large proportion of students (42%), but the remaining 58% came from a large variety of professional perspectives.

The procedure was the same as in Study 1, except that Study 2 used a reduced version of the Responsive Joy scale,

² This recruitment procedure was introduced in Bonnefon and Villejoubert (2006), and has been applied since to a rich variety of psychological issues, including investigations of collective judgement (Bonnefon, 2007), life regrets (Bonnefon & Zhang, 2008), and comparative happiness (Vautier & Bonnefon, 2008).

also available from the IPIP website, and solved the following deductive problems:

- (8) a. Think about the following problem: If people around Alain are happy, then he forgoes his bad mood. People around Alain are happy. Is the following conclusion correct: 'Alain forgoes his bad mood'?
- b. Think about the following problem: If people laugh around Bruno, then he gets irritated. People laugh around Bruno. Is the following conclusion correct: 'Bruno feels irritated'?

- (9) a. Think about the following problem: If Alice sees a cookie, she does not resist the temptation to eat it. Alice sees a cookie. Is the following conclusion correct: 'Alice does not resist the temptation to eat it'?
- b. Think about the following problem: If Béatrice likes a dish that is bad for her health, she forgoes eating that dish. Béatrice likes a dish that is bad for her health. Is the following conclusion correct: 'Béatrice forgoes eating that dish'?

Results

The reduced scale showed acceptable reliability during the first ($\alpha = .67$) and the second session ($\alpha = .66$). The two resulting scores were highly correlated, $r(318) = .70$, $p < .001$. Averaging these two scores and standardizing the resulting variable yielded the Personality covariate. This covariate was then entered in a repeated-measure ANOVA with the Content of the deductive problem as the repeated factor and the agreement with the conclusion as the explained variable.

Agreement with the conclusion of the deductive problems was influenced by the Content of these problems, $F(1, 316) = 21$, $MSE = 2.3$, $p < .001$, $\eta_p^2 = .06$, as well as by the Personality covariate, $F(1, 316) = 4.1$, $MSE = 2.3$, $p = .04$, $\eta_p^2 = .01$. These main effects, however, were qualified by an interaction effect. The critical Personality \times Content interaction was detected, $F(1, 316) = 7.3$, $MSE = 2.3$, $p = .007$, $\eta_p^2 = .02$.

This interaction is depicted in the central panels of Figures 1 and 2. Both figures suggest that participants with higher (viz., lower) Responsive Joy scores found conclusions more correct when they were based on conditionals that matched (viz., mismatched) Responsive Joy. This phenomenon is more salient when looking at the full distribution of personality scores (Figure 2) than when focusing on the top and bottom quartiles of personality scores (Figure 1).

Study 3: Self-Control

Method

The recruitment procedure was the same again, with the requirement that participants to Study 1 or Study 2 could not take part to Study 3. Of the 298 participants who returned a fully completed questionnaire (53% women, mean age = 32, $SD = 13$), 15% had completed graduate school or an equivalent school form, 40% had the equivalent of an undergraduate education, 30% graduated from high school only, and the educational level of 15% was lower than high school. The sample included a large proportion of students (36%), but the remaining 64% came from a large variety of professional perspectives.

The procedure was the same as in Study 1, expect that Study 3 used a reduced version of the VIA Self-Control scale, also available from the IPIP website, and solved the following deductive problems:

Results

The reduced scale showed acceptable reliability during the first ($\alpha = .64$) and the second session ($\alpha = .65$). The two resulting scores were highly correlated, $r(298) = .76$, $p < .001$. Averaging these two scores and standardizing the resulting variable yielded the Personality covariate. This covariate was then entered in a repeated-measure ANOVA with the Content of the deductive problem as the repeated factor and the agreement with the conclusion as the explained variable.

Agreement with the conclusion of the deductive problems was not influenced by the Content of these problems, $F(1, 296) = 3.1$, $MSE = 2.6$, $p = .08$, $\eta_p^2 = .01$, nor by the Personality covariate, $F(1, 296) = 0.4$, $MSE = 2.6$, $p = .53$, $\eta_p^2 = .001$. The critical Personality \times Content interaction was detected, $F(1, 296) = 4.1$, $MSE = 2.6$, $p = .04$, $\eta_p^2 = .014$.

This interaction is depicted in the right panels of Figures 1 and 2. Both figures point to the same phenomenon: Participants with higher (viz., lower) Self Control scores found conclusions more correct when they were based on conditionals that matched (viz., mismatched) Self Control.

General Discussion

Personality signatures are sets of *if-then* rules describing how a given person would feel or act in a specific situation. Just as any other conditional, a conditional featured in a personality signature can be used as the major premise of a deductive argument such as Modus Ponens. Unlike many conditionals, though, the conditionals featured in personality signatures are mostly processed for social cognition purposes; and this common usage is likely to leak into the way they are processed in a deductive reasoning context. Specifically, this research hypothesized that agreement with a Modus Ponens argument featuring a personality signature as its major premise would be affected by the reasoner's own propensity to display this personality signature. To test this prediction, Modus Ponens arguments were constructed from conditionally phrased items extracted from available personality scales. This procedure allowed to record, on the one hand, the agreement with the conclusion of these arguments; and, on the other hand, the reasoner's propensity to display the personality signature, using as a proxy this reasoner's score on the personality scale without the items used in the argument.

Three experiments ($N = 256$, $N = 318$, and $N = 298$, respectively) applied this procedure to three different per-

sonality scales: Fairness, Responsive Joy, and Self-Control. These three experiments yielded very comparable effects, establishing the robustness of the following phenomenon: The stronger is the reasoner's own propensity to display a given personality signature, the greater is this reasoner's agreement with the conclusion of a Modus Ponens argument featuring this personality signature. I have interpreted this effect as pertaining to the more general category of leakage effects. Personality signatures, although they can be expressed as conditional statements, are not primarily used for deductive reasoning, but rather for social judgment. As a consequence, when personality signatures are used in a reasoning task, reasoners might be unable not to engage the typical social-judgmental routine that they usually associate with personality signatures.

One aspect of this routine is to refrain from drawing hasty conclusions on the basis of a single conditional working as a personality signature. As a consequence, reasoners appear not to fully trust Modus Ponens arguments whose major premise is a personality signature. What they do instead is to accept the conclusion as a function of their *own propensity* to display the personality signature in question. This response presumably reflects the output of a mental process akin to a Ramsey test (Evans & Over, 2004). In order to decide about their agreement with the Modus Ponens conclusion, reasoners need to assess their agreement with the major conditional premise. To do so, they might suppose that the antecedent p is true (e.g., someone steals something), and evaluate their confidence in the consequent q (e.g., that person feels very badly) under that supposition. Because they do not have any information about the character featured in the conditional, their only source of confidence is social projection, that is, the insight they have about whether *they* would feel very badly after stealing something. Clearly, though, this is not a sensible treatment of the problem, for it is plainly wrong to assume that a random character is likely to display broadly the same personality traits as we do. In essence, this is what the participants to Studies 1-3 are doing: They are assuming that some random unknown person is going to be broadly as fair, as responsive to joy, and as self-controlled as they themselves are. But what are the odds, really?

This being said, it remains to be noted that the effect is small, and would be undetectable with smaller samples than that used in Studies 1-3. There is one optimistic and one pessimistic take at this small effect size, which are not necessarily exclusive. The optimistic take is simply to consider that although the participants displayed irrational behavior, the effect is small enough not to be consequential. The pessimistic take is to consider that reliability issues are likely to downplay the true size of the effect. Indeed, the reduced personality scales used in Studies 1-3 showed below-average reliability coefficients, and reasoning tasks have their own reliability issues (Bonnefon & Vautier, 2008; Bonnefon, Vautier, & Eid, 2007). As a consequence, there is a severe limit on the correlation that can be measured between the personality score and the reasoning response, and the correlation of about .15 that was repeatedly observed in the three studies might actually be quite close to this upper limit.

Additionally, one must note that using Modus Ponens in the three experiments was the hardest possible test of the research hypothesis, considering that, outside suppression experiments (Demeure, Bonnefon, & Raufaste, 2009; Politzer & Bonnefon, 2006; Stevenson & Over, 1995), Modus Ponens is the conditional inference showing the least inter-individual variability. Now that this test has been passed, further research may be able to use other conditional inferences, which may deliver bigger effect sizes and require smaller samples than the current research did.

Future research may also explore an intriguing explanation of the results, suggested by a reviewer. The reviewer noted that the task used in Studies 1-3 was not, strictly speaking, framed as a deduction task. Participants were not asked to assume the premises, nor to only make necessary inferences. Furthermore, they were asked to evaluate the degree to which conclusions were 'correct', rather than logically valid. Now, 'correctness' could have been construed in an evaluative way, rather than in an epistemic way. That is, some participants may have interpreted the question 'To which degree is this conclusion correct?' as 'To which degree is this behavior appropriate?' Personal preferences would then have influenced this judgment, but the judgment itself would not be an instance of reasoning proper.

Nothing in the current methods or data can definitely rule out this explanation of the findings. One way to investigate this explanation further would be to run a replication of the studies that would use strict deductive instructions, but even that might not be conclusive, because strict deductive instructions might also attenuate leakage effects. In any case, the general suggestion that participants to reasoning experiments might switch from an epistemic stance to an evaluative stance, as a function of task contents and instructions, certainly deserves investigations of its own.

Assuming that participants did engage in reasoning, rather than moral evaluation, the current findings contribute to both social and cognitive investigations of reasoning. Firstly, the current findings provide social judgment scientists with a demonstration that conditional reasoning tasks can be used to test predictions derived from personality psychology, and therefore add a new, useful method to the toolbox of social psychology.

Secondly, the current findings help provide conceptual clarification to cognitive studies of reasoning. Indeed, the idea that people import into reasoning tasks their real-world cognitive propensities is not new, but it has often been used to dismiss odd findings under the generic label of pragmatic, social, context or content-based influences (Bonnefon & Villejoubert, 2007). As argued by Bonnefon and Politzer (2010), progress towards a grand unified theory of conditional reasoning will require a more systematic classification of all these influences. The social projection effect identified in the current article does not necessarily have much in common with the conversational implicatures underlying conditional perfection (Van Canegem-Ardijns, 2010), or with the long-term memory processes underlying counterexample retrieval (De Neys, Schaeken, & d'Ydewalle, 2003).

Leakage effects, which occur for conditionals whose pri-

marily use is not deductive reasoning, constitute one of the distinct sources of extra-logical influences on reasoning, and must be studied on their own right. The main leakage effect identified so far has been linked to conditionals whose primary use is decision-making (Bonnefon, 2009). The current findings show that leakage effects also occur for conditionals whose primary use is social judgment. Future research will keep on charting the territory of leakage effects, with the ultimate aim to provide a self-contained module to the incoming grand theory of conditional reasoning.

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