Do Social Norms Influence Causal Inferences?

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Abstract

While it is well known that agents only tend to be held accountable for events they have caused, recent findings suggest that the inverse relation between causation and accountability also holds. According to this view, normative evaluations also affect responses to causal test questions. A key problem of this research is that causal queries are typically ambiguous. The question whether somebody has caused a specific outcome may on the one hand refer to causal relations, but it may also be understood as a request to assess the moral accountability of the agent. To test whether normative evaluations really affect causal inference, it is necessary to disambiguate the test question. In Experiment 1, we showed that the assumed influence of social or prescriptive norms on causality disappears when causal inference is measured using unambiguous test questions. Furthermore, Experiment 2 demonstrates that no influence of moral values is seen when the pragmatic context of the task highlights the causal meaning of the test question. Both findings cast doubt on the claim that normative evaluations influence causal inference.

Keywords: causal reasoning; moral judgment; causal selection; conversational pragmatics; norms

Introduction

Most theories of moral judgments assume that accountability judgments presuppose a causal relation between the agent and the evaluated outcome (Driver, 2008; Shaver, 1985; Sloman, Fernbach, & Ewing, 2009; Weiner, 1995). Agents are only held accountable for outcomes if, at least to some extent, they are a relevant contributing cause. Consistent with this relation, several studies have shown that the degree to which an agent is held morally accountable decreases when a second alternative cause is introduced that would have generated the outcome anyway (Gerstenberg & Lagnado, 2010; Moore, Clark, & Kane, 2008; Woolfolk, Doris, & Darley, 2006).

While it is well accepted that judgments about moral accountability presuppose causal relations, a number of recent studies have tried to show that the inverse relation also holds. According to these studies, moral evaluations also influence causal inferences (Alicke, 1992; Hitchcock & Knobe, 2009; Knobe & Fraser, 2008; Knobe, 2010). One popular example of this inverse relation is the *pen vignette* used in an experiment by Knobe and Fraser (2008). In this study, participants were presented with a story about employees working in a philosophy department. Although only the administrative assistants are allowed to take pens from the desk of the receptionist and the faculty members are not, everyone takes pens regularly. When Professor Smith and an administrative assistant meet in front of the desk and take pens one morning, a problem arises: There are no pens left. When subjects were asked about who has "caused the problem," they tended to name Professor Smith rather than the administrative assistant. As the only relevant difference between both agents is the wrongness of their behavior, Knobe and Fraser interpreted the finding as showing that causal attributions are influenced by moral evaluations.

More recently it has been called into question whether it is only moral norms that influence causal judgments (see Hitchcock & Knobe, 2009). Similar influences as in the pen vignette have also been demonstrated in scenarios in which agents follow or disregard other types of social norms, including legal and conventional norms. Our research will therefore be generally concerned with the potential influence of (prescriptive) social norms on causal inference.

The Ambiguity of Causal Queries

A key methodological problem of studies investigating the influence of norms on causal inferences is the notorious ambiguity of the term "cause," especially in the context of human actions. In physical domains, causal queries are less ambiguous. The question whether a specific button causes the light to go on asks for an assessment of a counterfactual relation between states of the button and the light. The presence of a causal relation implies that the light tends to go on when the button is pressed but without pressing the button the light would not have turned on. By contrast, in the context of human actions the term "cause" is ambiguous. It may refer to the presence of a mechanism underlying a causal counterfactual relation as in the button example, or it may refer to the question whether the agent can be held *accountable* for the outcome. Although accountability presupposes causation, its assessment also implies social norms. Sytsma, Livengood, and Rose (2011) point out this ambiguity when they state that "[c]ausal attributions are typically used to indicate something more akin to who is *responsible* for a given outcome than who *caused* the outcome in the descriptive sense of the term used by philosophers" (p. 815). Being accountable for a negative event often entails blame and punishment, whereas a positive outcome may lead to praise and approval.

Regarding responses to causal test questions, the ambiguity of the term "cause" can pose a problem since one has to know which of the two meanings a participant had in mind. This problem is particularly salient in Knobe and Fraser's (2008) question about "who caused the problem," which clearly has moral connotations. If the test question is interpreted as a request to assess (moral) accountability, it is trivial that Professor Smith is selected, who has broken the rules. But even if the question was interpreted as a request

to make a truly causal judgment, there are several possibilities of how social norms could influence causal inference. We will explicate two possibilities of how this influence could be understood.

Possible Influences of Social Norms on Causal Inference

Causal Models Causal representations could be influenced by normative evaluations in two ways. In the causal literature, a basic distinction has been made between causal structure and strength (see Lagnado, Waldmann, Hagmayer, & Sloman, 2007). Whereas causal structure refers to the presence or absence of a causal arrow between two events, causal strength quantifies the strength of this relation. Thus, one possibility is that norms influence the structure of causal model representation, or that they determine the relative strength of the different causal links within the model. The possibility that normative evaluations influence the causal structure has been raised by Knobe (2010), who writes: "(…) people's judgment that the professor is doing something wrong is somehow affecting their intuitions about whether or not the professor caused the events that followed" (p. 319-320). The second possibility is to acknowledge the existence of multiple causal links, but assign them different strengths. This possibility is raised by Liu and Ditto (2013) who say: "[t]he more participants believed that the action was immoral even if it had beneficial consequences, the less they believed it would actually produce those consequences (…)" (p. 318).

In sum, the claim may be that social norms influence causal inferences via changes in the causal structure of the assumed causal model or via changes of the size of parameters (e.g., causal strength).

Causal Selection Another possibility how norms could influence causality is that normative evaluations influence causal selection judgments without affecting the structure of the causal model or causal strength. It is well known that people distinguish between causes and mere background conditions although both are equally causal for the target effect. For example, a fire in a forest may both depend on a lightning bolt and oxygen, but typically the first factor is selected as the relevant cause. Hitchcock and Knobe (2009) accordingly state that "[p]eople seem to rely on extra-structural information to *select* certain candidate causes over others (…)" (p. 592).

There are various theories of causal selection. One of the many discussed selection criteria is *abnormality*, that is, the idea that people tend to pick abnormal factors over normal ones as causes (Hilton & Slugoski, 1986; Hitchcock & Knobe, 2009). But why should people select abnormal events as causes? One explanation, offered by Hitchcock and Knobe (2009), is that abnormal factors are often suitable as *targets of intervention*. Normality is broadly construed in this approach and may include moral, conventional, or statistical norms (i.e., rarity). For example, if somebody behaves immorally, we are more likely to think about interventions that lead to normal behavior than we think about ways to turn normal into abnormal behavior. Reasoning about an intervention leads to counterfactual thinking about what would have happened if the abnormal factor had been absent, which in turn highlights this factor as the relevant cause.

Hilton (1990) proposes another explanation for the selection of abnormal factors that traces the choice to informativeness. According to this "conversational pragmatics" view, abnormal factors tend to be selected because they add relevant new information, whereas normal factors are viewed as belonging to the tacit knowledge of discourse participants.

Apart from theories focusing on abnormality, there are also other theories of causal selection. Cheng and Novick (1991) for example argue that those factors are selected that covary with the effect within the focal set reasoners currently consider. Given the multitude of theories and experimental findings it seems unlikely that there is one true account of causal selection; different factors may determine causal selection in different contexts. Hitchcock and Knobe's (2009) position is unique in that it postulates that prescriptive social norms may influence causal selection.

Testing the Influence of Social Norms on Causal Inference

Current empirical findings are consistent with all mentioned accounts: normative evaluations could either influence causal inferences (via changes in causal representations or via causal selection) or merely subjects' interpretation of the causal test questions as requesting accountability judgments. Our goal is to distinguish between these accounts by using unambiguous measures of causal representations that target uniquely causal features.

Most causal theories focusing on causal structure and strength belong to the heterogeneous class of dependency theories (see Waldmann & Hagmayer, 2013, for an overview). According to dependency theories, a factor *C* is a cause of its effect *E* if *E* depends upon *C*. Dependency has been formalized differently in the various philosophical and psychological approaches. Probabilistic theories focus on statistical dependency: Causes raise or lower the probability of their effects. Interventionist theories emphasize the role of interventions that bring about effects. Finally, counterfactual theories describe an event *C* as a cause of *E* when it holds that if *C* had not occurred, *E* would not have occurred. All these approaches share the view that causes are difference makers and that causal relations express dependency (see also Mayrhofer & Waldmann, in press).

Thus, dependency theories generally contrast the case in which both cause and effect are present with the counterfactual case in which the cause is absent. They differ in the method of estimation of this contrast and in the quantification of the size of the contrast. Since in the literature on social norms, cover stories have been used that describe causal relations on a qualitative, not a quantitative level, these differences are irrelevant for the present

purpose. In Experiment 1, we therefore chose to use a general contrast measure, which is consistent with all dependency theories. To measure subjects' intuitions about causal structure and strength we had them estimate the probability of the effect in the presence and the counterfactual absence of the cause. The presence of a generative causal link is indicated by a positive contrast, that is, the probability of the effect should be estimated higher in the presence than in the absence of the cause. The size of assumed causal strength can be read off the size of the difference of the ratings. Since the contrast measure is less ambiguous than the typically used cause question, it allows for a clearer test of the hypothesis that norms influence causal representations of structure or strength. If these representations are affected by normative evaluations, the differences of the two probability ratings are expected to be higher for norm-violating factors compared to norm-conforming ones. Experiment 1 will test whether social norms influence causal representations comparing the contrast measure with the standard cause test question.

A lack of an effect on the contrast measure would demonstrate that normative evaluations do not influence causal representations, but would still be consistent with the second possibility that these evaluations affect causal selection. In Experiment 2 we therefore used Knobe and Fraser's (2009) cause question in all conditions, but varied details of the presentation of the cover story. The goal of this manipulation was to manipulate the pragmatic context of the task in a way that the causal meaning of the test question is highlighted in one condition. This condition is contrasted with the standard scenario. Given that both conditions present the same scenario involving the same norms, a theory that assumes that these norms influence causal selection via the highlighting of targets of intervention should predict similar effects in both conditions. By contrast, if causal test questions are ambiguous, a difference between the conditions is expected.

Experiment 1

In the literature, several cover stories have been used to demonstrate the influence of normative evaluations on causal judgments. In these studies, two agents jointly cause an outcome. In the instructions, norms are mentioned that make the action morally permissible for one, but not the other agent. We test three popular scenarios and compare a control condition in which the previously used cause question is used with a condition in which causal representations are measured by means of a contrast measure. If norms influence causal representations, they should affect both measures. If, however, the previously found effects were due to the ambiguity of the cause question, an effect should only be seen with this test question but not with the contrast measure.

Method

Participants 218 participants took part in the three reported conditions, which were part of a larger study. The experiment was run online in the U.K. 12 subjects failed a final attention test, which left 206 subjects for the analyses. Subjects earned 50 British pence for their participation.

Design The design of the experiment is based on a 3 (scenario: pen vs. computer crash vs. drug) × 2 (test question: cause vs. contrast) × 2 (normality: normal vs. abnormal) structure with the last factor being manipulated within subject. Participants were randomly assigned to one of six conditions; each subject was presented with one of the three scenarios and one type of test question.

One of the used scenarios was the pen vignette described in the introduction (Knobe & Fraser, 2008). In the computer crash scenario, two agents (Lauren and Jane) simultaneously log on a computer although only Lauren has the permission to do so. As a consequence, the computer crashes (Knobe, 2005). The drug scenario describes a pharmacist and an intern who both sign a request for a drug that a patient requires. Both sign off although the intern thereby transgresses the hospital's policy. Consequently, the patient gets the drug and recovers (Hitchcock & Knobe, 2009). This cover story was developed to test a condition in which the breaking of a norm leads to a good outcome.

After having read their scenario, subjects in the control condition were presented with the two cause questions that have been used in previous studies: "How strongly did agent A/agent B cause X (the outcome)?" Responses were given on an 11-point Likert scale ranging from "not at all" (0) to "completely" (100). Subjects in the contrast measure condition were asked to estimate the probabilities of the effect in the presence and absence of the cause. In the pen scenario, for instance, we asked subjects (i) how likely it is "that the problem occurred in the given situation", and then for each agent in randomized order (ii) how likely it is "that the problem would have occurred" if Professor Smith/the administrative assistant "hadn't taken any pen." To express their judgments, we gave subjects an 11-point Likert Scale ranging from "impossible" (0) to "certain" (100). The contrast measure is based on the difference between the two estimates for the presence and absence of the cause.

At the end of the experiment, subjects were presented a simple transitive inference task, which was used to exclude subjects who did not sufficiently pay attention to the task.

Results and Discussion

The results can be seen in Fig. 1, which, apart from a difference between scenarios, shows a clear interaction with the type of test question. Whereas we replicated the typical finding that abnormal factors yield higher ratings than normal factors with the cause question, this effect virtually disappeared with the less ambiguous contrast measure. The ANOVA confirms these impressions. Apart from main effects for scenario ($F(2, 200) = 5.72$, $p = .004$, $\eta p^2 = 0.05$), question type ($F(1, 200) = 74.6$, $p < .001$, $\eta p^2 = 0.27$), and normality ($F(1, 200) = 45.5$, $p < .001$, $\eta p^2 = 0.19$), the crucial interaction between normality and question type

turned out to be highly significant, $F(1, 200) = 40.9$; $p < .001$; $\eta p^2 = 0.17$.

In sum, the results of Experiment 1 clearly confirm the hypothesis that norms do not affect causal representations: when participants were confronted with a measure that specifically targets intuitions about the structure and parameters of causal models, causal judgments were unaffected by whether the protagonist violated or conformed to the norm.

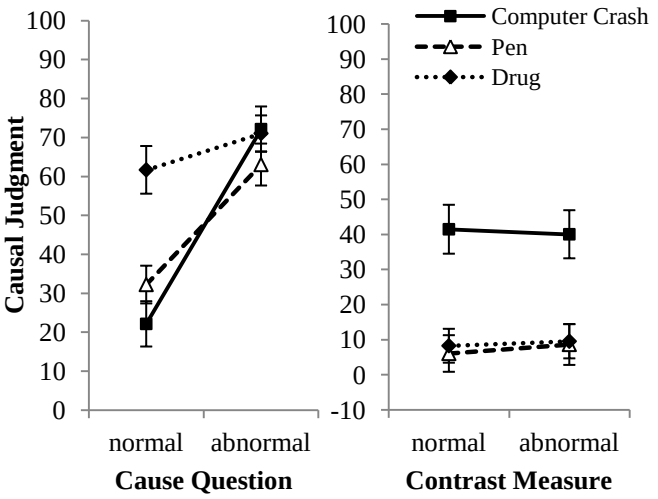

Figure 1: Results of Experiment 1. The judgments for the cause question can take values between 0 and 100; the contrast measure, which is based on differences, can take values between -100 and 100 (although the cover stories suggest positive values). Error bars represent standard errors of means (*SE*).

Experiment 2

The results of Experiment 1 refute the hypothesis that normative evaluations affect causal representations, but are still consistent with the possibility that these evaluations may affect causal selection within otherwise invariant causal models (Hitchcock & Knobe, 2009). The goal of Experiment 2 was to test this possibility against the alternative that social norms simply highlight the accountability meaning of the cause question.

In the present study we focused on the pen scenario. In Experiment 1 we compared the ambiguous cause test question with an unambiguous contrast measure. We expected that most subjects would interpret the cause test question as a request to assess accountability. Since in Experiment 2 we focused on causal selection which is not measured by the contrast measure, we solely used the cause question. Our goal was to compare variations of the cover story that we expected to either highlight the accountability or the causal meaning of the causal test question.

To manipulate how subjects represented the meaning of the cause question in this study, we compared a variant of the pen scenario (*knowledge condition*) in which all information is directly described as in the original version with a new *inference condition* in which information relevant for answering the test question had to be inferred by combining pieces of information from the previous instruction phase. Thus, the task of the inference condition was slightly more complicated. We hypothesized that the additional inference step makes it pragmatically more appropriate to interpret the test question as a query about causal relations rather than about accountability. By contrast, in the standard knowledge condition, the causal setup is extremely transparent so that it seems more likely that subjects infer that the experimenter cannot possibly intend to ask a trivial question about causal relations. Thus, whereas in the knowledge condition we expected the typically found influence of norms, we expected no such effect in the inference condition. Such an interaction would weaken theories that claim an influence of social norms on causal selection because the normative status of the agents' behavior did not change across conditions.

Method

Participants 104 subjects participated in the online experiment, and were reimbursed with 50 British pence. We excluded subjects who did not manage to pass the attention test (5 subjects in this study). Thus, we analyzed the data of 99 participants.

Design The design of the experiment is based on a 2 (instruction condition: knowledge vs. inference) × 2 (normality: normal vs. abnormal) structure with the last factor being manipulated within subject. Participants were randomly assigned to one of two conditions, the *knowledge* and the *inference condition*. In both conditions, subjects were presented with an adapted version of the pen vignette (Knobe & Fraser, 2008). The instructions in both conditions stated that in a philosophy department a chute system had been implemented so that office material can be delivered automatically into the offices of the employees. In order to get pens, rubbers or pencil sharpeners, everyone can simply push one of the buttons, which are located on the writing desks, and soon receive the requested office material in a damper. Each button had a different color and was assigned to a specific product. Subsequently, participants were tested whether they remembered the association between the color of the button and the respective product. Next, the normality assumptions were manipulated. Subjects read that, due to a shortage of material, only the administrative assistants are allowed to press the buttons inside their offices. As in the original pen vignette, subjects were then told that in contrast to the regulations both administrative assistants and faculty members order pens and that therefore the receptionist repeatedly sends notes to remind the employees of the rules.

The key difference between the inference and knowledge condition was that only in the inference condition an additional instruction phase followed. In this additional instruction, two administrative assistants (Mrs. Cooper and Mr. Wall) were introduced. Mrs. Cooper usually presses the blue button, as she needs a lot of pens, whereas Mr. Wall

typically presses the yellow one for pencil sharpeners. Next, two faculty members (Prof. Thompson and Prof. Smith) working in the department were mentioned. Professor Thompson usually presses the green button because she needs plenty of rubbers, and Professor Smith typically presses the blue button for pens. To ensure that subjects learned these relations, they were asked to assess the likelihood that a button press may lead to missing pens for each employee separately using a 7-point rating scale that ranged from (1) "impossible" to (7) "inevitable."

In the last section of the instruction, in both conditions the standard situation of the pen scenario was presented. Subjects were told that Professor Smith and the administrative assistant Mrs. Cooper pressed a button at the same time. The following instruction was presented in both conditions with the sole difference that in the knowledge condition the information in parentheses was given. Thus, in the inference condition subjects needed to recall the association between the employee, the colored button, and the requested item:

> "One Morning, both the administrative assistant Mrs. Cooper and the faculty member Professor Smith press **a [the blue]** button in their offices at the same time (09:37:58 am) For both, the requested **item [pen]** is delivered successfully. A few minutes later (09:41:22 am), the receptionist needs to take an important message, for which she needs a pen and therefore presses her blue button … but she has a problem. There are no pens left in the material stores."

Finally, subjects in both conditions were requested to indicate their agreement with the assertion the administrative assistant Mrs. Walter and Professor Smith "caused the problem." A rating scale was used for both questions that ranged from "not at all" (1) to "completely" (7). As in the previous study the transitivity question was given at the end of the experiment.

Results

The procedure contained various comprehension tests. First, most subjects were able to recall the assignment of color of button to the respective product (79 to 87 percent). Second, Mrs. Cooper (M = 5.07; SD = 1.85) and Prof. Smith (M = 4.87; SD = 2.07), who regularly press the blue button associated with pens, were rated to be more likely to be responsible for a shortage of pens than Mr. Wall (M = 2.52; SD = 1.93) and Prof. Thompson (M = 2.76; SD = 2.09), who usually press the yellow or the green buttons.

The most crucial result can be seen in Fig. 2. Whereas we replicated the effect of normality in the standard knowledge condition in which the causal structure was transparently conveyed, subjects made no difference between the two protagonists in the slightly more complicated inference condition, regardless of whether their behavior conformed to the norm or violated it. This pattern is statistically supported by an ANOVA that yielded a main effect for normality, F (1, 97) = 12.1, $p < .001$, $\eta p^2 = 0.11$, but more importantly also a significant interaction between normality and instruction condition, F (1, 97) = 14.1, $p < .001$, $\eta p^2 = 0.13$.

In sum, the results are consistent with the hypothesis that in conditions in which the underlying causal structure is trivial, subjects tend to shift their understanding of the test question to an accountability meaning. However, when the task is slightly more complicated, as in the inference condition, subjects seemed to have found it more plausible to interpret the test question as a query about causes. Consequently, in this condition the effect of norms disappeared.

A reviewer pointed out that an alternative interpretation of the lack of an effect of norms in the inference condition might be that in this condition there is more uncertainty about what the protagonists actually did. We will test this hypothesis in future experiments.

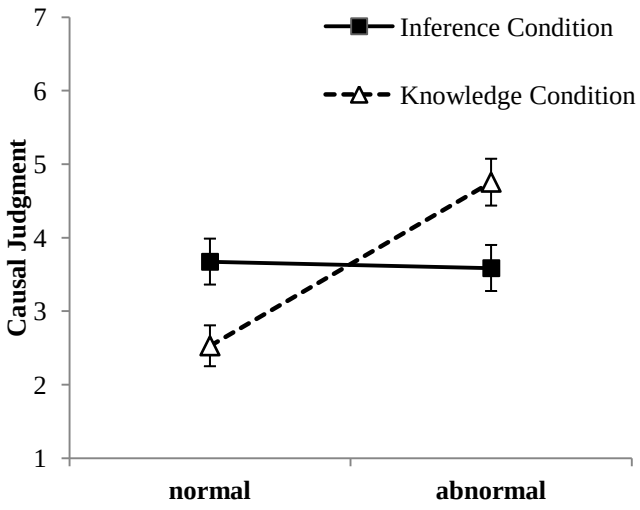

Figure 2: Results of Experiment 2. Error bars indicate standard errors of means (SE).

General Discussion

The present work revisits recent research suggesting an influence of prescriptive social norms on causal inference. According to these studies, people seem to view the behavior of an agent that violates a norm as more causal than one that conforms to norms (Alicke, 1992; Knobe & Fraser, 2008; Knobe & Hitchcock, 2009). Several possible influences on causal inference are possible. The most extreme hypothesis is that normative evaluations modify representations of causal structure or causal strength. Alternatively, social norms may leave causal representations unaffected but influence which of several causes is selected as primary.

In the present work we have tested these hypotheses against a third possibility. We suspected that the effects that have been shown in the literature might simply be due to an ambiguity of the test question. The question whether the

behavior of a specific person causes an outcome may refer to a causal relation but may also be interpreted as a request to assess accountability. It is not surprising that social norms affect answers to the test question if subjects understand the question as a request to assess accountability.

We have conducted two experiments that clearly support the ambiguous meaning hypothesis. In Experiment 1, we compared the standard test question with an unambiguous measure of causal structure and strength. Norms only affected responses to the standard test question that had been used in previous research but did not influence a contrast measure that specifically targets causal representations. In Experiment 2, we focused on the cause question but manipulated whether the context favors the causal or the accountability meaning. Again, social norms only influenced the responses in the knowledge condition that creates a context in which a causal interpretation is pragmatically implausible.

There are several directions for future research. In our work we have focused on the standard cover stories that had been used in the literature to demonstrate the influence of social norms. It would be interesting to test a larger variety of different types of norms and to investigate their similarities and differences.

Another interesting direction would be to tie the studies better to the literature on causes and conditions which has typically focused on physical or biological scenarios (e.g., Cheng & Novick, 1991). One attractive feature of the theory of Hitchcock and Knobe (2009) is that their account is not only applicable to prescriptive but also to *descriptive* norms (see also Sytsma et al., 2012; Roxborough & Cumby, 2009). Therefore, this theory can also motivate predictions for tasks in which nonsocial scenarios are presented. Although breadth is certainly a striking feature of this theory, we suspect that a closer look will reveal that there is no unique account of causal selection that explains all findings.

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