Holism and Causal Responsibility:

The Role of Number and Valence of Event Consequences

David Santos[1*,] Blanca Requero[2], & Manuel Martín-Fernández[2]
[1]*IE Business School, IE University*
[2]*Psychology Department, Universidad Autónoma de Madrid*

*Corresponding author:
David Santos
IE Business School
IE University
david.santos@ie.edu

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Abstract

The present research examines the effect of holistic-analytic thinking style on causal responsibility. Across seven studies ($N = 4,103$), participants' thinking style was either measured or manipulated. Then, the valence or number of consequences were varied in several scenarios involving a cause-consequence relationship. As a dependent measure, participants indicated the degree of responsibility attributed to the cause mentioned in each scenario. The results revealed that holistic (vs. analytic) participants assigned more responsibility to the cause when the consequences presented were a combination of positive and negative outcomes (vs. univalent), and when multiple consequences were triggered in the scenario (vs. single). To explore the explanatory factor for these results, a final study manipulated the complexity of the consequences, along with the number. The results of this research suggested that holistic (vs. analytic) individuals consider the degree of complexity of consequences to establish causal attribution.

Keywords: attribution, consequence, holism, thinking style, causal complexity

People engage in attributional processes in an effort to explain and predict certain events or people's behavior on a daily basis. Most theories of attribution (Heider, 1958; Jones, 1990; Kelley, 1973, see also Brun et al., 2021 for review) have focused on dimensions of the cause (e.g., distinctiveness, consistency or consensus; stability, controllability or desirability) to provide a basis for inferring responsibility for the consequence of an event (e.g., a behavior, an outcome). Interestingly, however, virtually no research has looked at the consequence dimensions to infer the strength of a cause (for notable exceptions, see Knobe, 2003; Preston & Epley, 2005). We propose that just as different dimensions of the cause can influence the cause-effect strength as described in the classic literature on attribution, so too can the presence of different dimensions of the consequences (e.g., the valence or the number). One psychological construct that might be relevant to understanding cause-consequence(s) relationship strength is holistic-analytic thinking style (Choi et al., 1999). The aim of this research is to examine the effect of holistic-analytic thinking style on attributions of causal responsibility by exploring two new dimensions that complement and extend previous literature on causal complexity.

Holistic-Analytic Thinking Styles

In a nutshell, individuals with a holistic thinking style tend to form more complex causal relationships, consider the universe as interconnected, focus attention on objects as 'a whole' rather than breaking them down into fragments, perceive environments in a continuous state of flux rather than as linear trends, and prefer to sustain harmony by pursuing a middle posture between two opposing arguments (Choi et al., 2007). On the contrary, individuals with an analytic thinking style tend to pay more attention to the details of a picture. That is, they tend to see the trees instead of the forest. Consequently, they attend more to the object and the category to which it belongs, and for them time is linear rather than a cycle. Furthermore, their beliefs are guided by formal logic and the

"law of non-contradiction," according to which it is necessary to reject one proposition if two opposing propositions exist (Nisbett et al., 2001).

Most of the research in this field explores holistic-analytic thinking style at a cross-cultural level, often comparing cultures that are characterized as possessing a more holistic style, like Eastern cultures, with cultures characterized as possessing a more analytic style, like Western cultures. However, the different modes of thinking can be also treated as individual-difference variables –individuals might have a more holistic or analytic tendency within a given culture or community (Choi et al., 2007; Wong et al., 2021). Thus, in the same way as thinking style can vary at a broad level across cultures, so too can thinking style vary on an individual level within the same culture.

Prior literature has shown that differences in holistic-analytic thinking styles are capable of explaining numerous phenomena related to how people think in domains such as attentional processes (Masuda et al., 2008), logical reasoning (Li et al., 2018), categorization (Wong et al., 2021), tolerance of contradiction (Santos et al., 2021) or causal attribution (Choi et al., 2003; Maddux & Yuki, 2006). Of special relevance for this research is the latter factor that involves attributional processes.

Holistic Thinking and Attributional Complexity

Previous research on thinking styles has suggested that individuals with a holistic mode tend to have broader, more complex attributional processes than their analytic thinking counterparts. In general, these studies have typically focused on investigating the dimensions that impact individuals' attributions regarding the *causes* of behavior to determine the cause-effect strength rather than examining the potential role played by attributions regarding the *consequences* of behavior. The present research holds that some attributional complexity dimensions regarding the consequence side can contribute to determine the cause-effect strength, such as the valence and number of the consequences.

Early research on a phenomenon known as the fundamental attribution error (i.e., the tendency to overemphasize the role of dispositional versus situational factors when making attributions for others' behavior; Ross, 1977) suggested that it is more pervasive in Western than in Eastern cultures. For instance, at least compared to Westerners, East Asians are more prone to attribute the cause of others' behavior to situational/external factors that influence the agent's behavior rather than to dispositional/internal factors (Morris & Peng, 1994, Nisbett et al., 2001). As an illustrative example suggesting the attributional complexity of holistic thinkers, Morris and Peng (1994) explored how causal attributions made by Americans and Chinese differed for different events. In one of the studies, participants watched a film of a group of fishes in motion, from which one of them was a blue fish. This blue fish moved differently than the others. Then, they answered questions about the internal or external forces driving the blue fish's movements. The authors found that, compared to Americans, Chinese participants were more likely to explain the behavior of the fish (i.e., its motion) as a function of external causes. This is consistent with the idea that holistic thinkers perceive interdependent relations among objects and their associated contexts while analytic thinkers detach the object from its context.

Furthermore, the fact that Eastern cultures make more external attributions than Western cultures can be explained by their relatively greater focus on the environment, which reveals a complex world of interconnections, thus prompting individuals from Eastern cultures to consider more information than their Western counterparts. Consequently, taking more information into account should also lead to cultural differences in the number of causes that an individual may consider when making attributions for others' behavior. In line with this, Choi et al. (2003) showed that East Asians tend to focus on many causes when making attributional judgments while North

Americans tend to focus on fewer causes. In one of the studies, participants from Korea and North-America were presented with a list of 100 possible factors that may have contributed to the decision of a graduate student to murder her advisor. Some of the factors were more relevant to determine the cause(s) of the behavior, such as the graduate student's history of mental disorders, and some less relevant, such as her favorite color. The results showed that Korean participants selected a larger number of potential causes (both more and less relevant) as plausible contributors of the murder than American participants. This suggests that when making causal attributions, individuals with a holistic thinking style tend to consider a wider array of causes for the same behavior as compared to individuals with more analytic style.

Another illustration of the complex causal attribution process of holistic individuals can be found in the idea that individuals with a holistic style, compared to more analytic individuals, tend to expect less of a correspondence between the magnitude of a cause and the magnitude of its subsequent consequence, such as bigger tornadoes leading to more destruction than smaller tornadoes. In a series of studies, Spina et al. (2010) demonstrated the role of thinking style in this cause-consequence matching when it comes to magnitude, which is clearly an important dimension for causal attribution. For example, in one of the studies, participants were presented with two pictures: one showing a tall basketball player (high magnitude cause) and the other showing a short basketball player (low magnitude cause). Next, participants were asked to indicate which basketball player scored the highest number of points (high magnitude consequence) or the lowest number of points (low magnitude consequence). The results showed that Canadians associated the tall basketball player with the highest number of points and the short basketball player with the lowest number of points significantly more than Chinese participants. In sum, relative to Chinese participants, Canadians linked the causes to the consequences as a function of the matching

in their magnitude. This can be explained because holistic thinkers (i.e., Chinese participants in this case) tend to perceive environments in a continuous state of fluctuation while analytic thinkers (i.e., Canadian participants in this case) tend to perceive the relationship between events in linear trends (Ji et al., 2001). Thus, these results illustrate cultural variations regarding how individuals assume a correspondence between cause and consequence when it comes to their magnitude.

As noted, whereas the majority of prior attribution and holism research focused predominantly on investigating dimensions of causes (e.g., origin, number, or magnitude), relatively few studies have examined the role played by dimensions of consequences in attributional processes. For example, Maddux and Yuki (2006) revealed that individuals with a holistic style tended to focus on the distal consequences of a cause, whereas analytic individuals tended to focus more on the proximal consequences. In one study, participants were presented with a picture of a game of pool and asked to what extent one shot could affect the next shot, the third shot, the sixth shot, and the entire outcome of the game. In line with expectations, Asian Americans, compared to European Americans, predicted that the focal shot (i.e., the cause) would have a greater impact on the sixth shot and on the entire game (i.e., distal consequences). Taken together, these data support the proposition that individuals with a holistic thinking style perceive a single cause as being capable of having a greater impact on subsequent consequences, especially very distal consequences.

Beyond distal consequences, we propose and test two additional dimensions of consequences that may also have an impact on causal responsibility, namely the valence and the number of consequences. In sum, previous literature has demonstrated that individuals with a holistic (vs. analytic) thinking style tend to have more complex and interactive causal attributional process, and their reasoning about the world involves numerous factors and large webs of causal chains (Ji et al., 2009; 2023; Maddux & Yuki,

2006; Norenzayan & Lee, 2010). Prior studies have shown that holistic individuals react more favorably towards mixed information comprised of both positive and negative elements than analytic individuals (Luttrell et al., 2022), tend to be more inclined towards endorsing traits that are semantically opposite to each other (Choi & Choi, 2002; Hamamura et al., 2008), and experience more mixed emotions of both positive and negative valence, referred to as "emotional complexity" (Grossmann et al., 2016; Scollon et al., 2005). For example, Santos et al. (2021) showed that individuals with a holistic thinking style (assessed with the Analysis-Holism Scale) experienced more mixed-valence emotions (both positive and negative) than individuals with a more analytic thinking style. Although this research has examined outcomes such as evaluations, preferences, or experiences, we suspect that the same would hold true for causal responsibility given that holistic (vs. analytic) individuals are more open to accepting contradictory information either in terms of logic (e.g., true vs. false) or meaning (e.g., positive vs. negative).

Secondly, numerosity (or amount of information) is also an important factor that might influence causal complexity and has a differential impact on attributions of causal responsibility depending on the thinking style of the person processing the information. As we mentioned, past research has shown that holistic individuals tend to consider larger amounts of information when explaining an event compared to analytic individuals (Choi et al., 2003). That is, the former seems to make broader, more complex attributions for behaviors than the latter, focusing on a wider number of causes for the same action. Holistic thinkers are accustomed to viewing objects contextually by processing a greater number of informational cues linked to the situation compared to analytic thinkers, who are more accustomed to focusing their attention on discrete objects, isolated from their context (Masuda et al., 2008). This translates into better information management when information is extensive and complex. For example, Wang and colleagues (2012) found

that holistic people were predisposed to produce more information-rich ideas and were better at handling this information compared to analytic thinkers. Most relevant for the purpose of this work, holistic people are more cognizant of the downstream effects of actions and events. Thus, because their attention is directed toward the broader context and toward the interrelationships among the objects embedded in a situation, holistic people tend to perceive a given action as affecting more distal consequences (Maddux and Yukki, 2006). The present research seeks to complement and extend the literature on thinking styles and attributional processes by focusing on these two dimensions of consequences, the valence and the number. Specifically, we hypothesized:

H1: Holistic (vs. analytic) participants would assign more responsibility to the cause when the cause produced mixed valence (vs. univalent) consequences.

H2: Holistic (vs. analytic) participants would assign more responsibility to the cause when the cause produced multiple (vs. single) consequences.

In conclusion, analytic individuals concentrate on a limited set of objects and environmental factors and construct straightforward, simple causal models. In contrast, holistic individuals consider a wider and more complex range of factors, which leads them to expect contradictions, changes, and nonlinear developments in causality. Thus, we also hypothesized:

H3: Holistic (vs. analytic) participants would assign more responsibility to the cause when the cause produced more complex (vs. less complex) consequences.

Study 1

The goal of study 1 was to examine how individuals' thinking style (holistic vs. analytic) may affect the way they assign responsibility to a cause of an event as a function of whether the cause produces two consequences of the same valence (i.e., two negative outcomes) or two consequences of mixed valence (i.e., one positive and one

negative outcome). Specifically, we predicted that individuals with a holistic thinking style would assign more responsibility to a cause that produces two consequences of mixed valence (vs. univalent) as compared to individuals with an analytic thinking style.

Method

Participants and Design

A power analysis was performed using G*Power (Faul et al., 2009). Because no prior research had examined the predicted interaction on attributional responsibility, we could not look at prior work to obtain an estimated effect size. Thus, we planned for a generic relatively small effect in multiple regression (Cohen's f^2 = .030). Results of this analysis suggested that the desired sample size for a two-tailed test (α = .05) of a two-way interaction with .80 power was N = 264 participants. Our final sample size (474 participants) exceeded the estimated one because we wanted to be sure we had enough participants to detect the effect even if it was smaller than anticipated. Four hundred seventy-four participants were recruited anonymously via MTurk. Each participant was compensated $0.50 USD (35.4% females, M_{age} = 35.27, SD = 10.90). Participants were randomly assigned to conditions in a 2 (Valence of Consequences: Univalent vs. Mixed valence) between-subjects design. Thinking Style (continuous variable) was measured as an additional predictor. The degree of responsibility assigned to the cause described in the scenario was measured as the key dependent variable. All data, code, and materials are publicly available in an open repository at:

https://osf.io/y8bmc/?view_only=d61dc664b65d4159ac903bce66f24f57. The present set of studies were not pre-registered. The University Research Ethics Board approved this research protocol.

Procedure

Participants completed the study on Qualtrics. As a cover story, participants read a passage that informed them that they were going to participate in a reading comprehension task. First, they completed the reduced version of the Analysis-Holism Scale (AHS). Then, they were randomly assigned to one of two conditions of the valence of consequences manipulation. Next, they reported the degree of responsibility assigned to the cause mentioned in the scenario (vs. other possible causes not mentioned). Finally, participants responded to socio-demographic questions and were debriefed about the purpose of the study.

Predictor/Independent Variables

Thinking Style. Participants' thinking style was measured using the reduced version of the AHS (Choi et al., 2007), namely the AHS-12 (Martín-Fernández et al., 2022). We chose this reduced version because of its efficiency in measuring holistic-analytic thinking style without compromising its psychometric properties and dimensionality. Participants indicated how much they agreed with items such as "The whole, rather than its parts, should be considered in order to understand a phenomenon," and "It is more important to pay attention to the whole than its parts" on a 7-point Likert-type scale anchored at 1 ("Strongly disagree") to 7 ("Strongly agree"). Thinking style scores did not differ as a function of the valence of consequences manipulation ($t[472] = -0.620$, $p = .536$). Higher scores indicated a more holistic thinking style whereas lower scores indicated a more analytic thinking style ($\alpha = .82$).[1] Values ranged from 2.50 to 6.58 ($M = 4.72$, $SD = 0.57$).

Valence of Consequences. After completing the scale, the valence of the consequences was manipulated by presenting a scenario with a cause that produced two consequences of the same (negative and negative) or mixed (positive and negative)

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[1] This alpha was computed only for the nine direct items. The alpha for the three reverse items was .76.

valence. In the univalent consequences condition, participants read the following passage: "A lieutenant sent his soldiers to take control of a strategic point (Thompson Hill). The soldiers could not take control of the hill, and they suffered many casualties." This scenario contained one cause (sending the soldiers to the hill) with two negative consequences: "not taking control of the hill" and "suffering many casualties". In the mixed valence consequences condition, participants read the following passage: "A lieutenant sent his soldiers to take control of a strategic point (Thompson Hill). The soldiers took control of the hill, but they suffered many casualties." This scenario contained the same cause (sending the soldiers to the hill) with one positive ("taking control of the hill") and one negative consequence ("suffering many casualties"). This scenario was extracted from previous research (Knobe, 2003) and it is similar to the dilemmas used in moral psychology (e.g., trolley dilemma; Swann et al., 2009).

Dependent Variable

Degree of Responsibility. After participants read the scenario, they were asked to evaluate the degree of responsibility that different factors contributed to the consequences. Specifically, two questions were asked. The first question was "To what extent would you say the consequences of the event are due to *sending the soldiers to the hill*?" The second question was "To what extent would you say the consequences of the event are due to other causes?" Participants responded to these items using a scale ranging from *0%* to *100%*. These two items were the same dependent measures used in previous research in attributional theory (Duval & Wicklund, 1973). Participants were informed that the percentage of both answers should add up to 100, and the questions in Qualtrics were implemented so that this rule could not be broken. The first item was used as the dependent variable. Higher values reflected a greater responsibility to the cause mentioned in the scenario. Values ranged from 0 to 100 ($M = 60.12$, $SD = 20.54$).
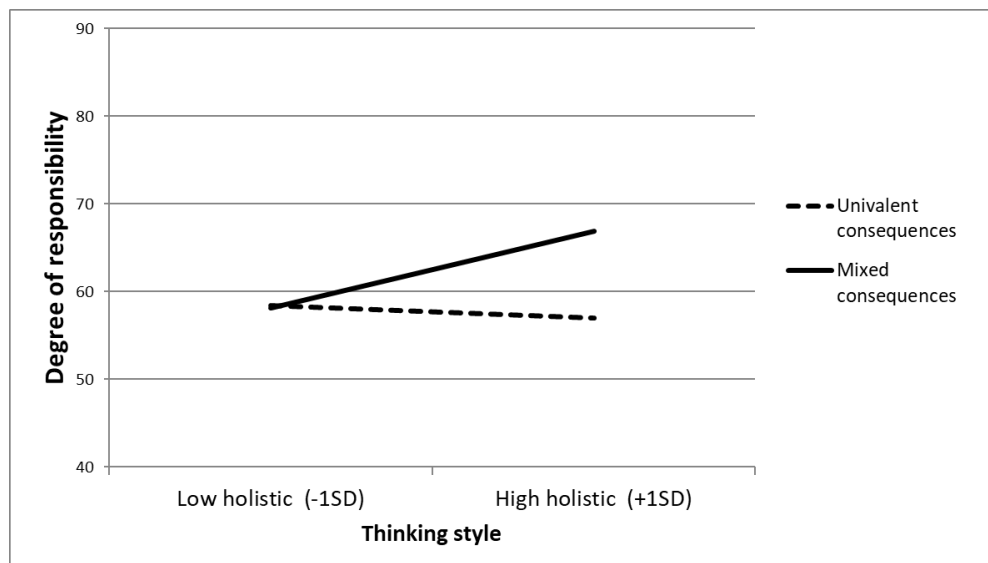
Results

The dependent variable was submitted to a multiple regression analysis. Thinking style (continuous variable), valence of consquences (contrast coded), and the interaction term (e.g., thinking style × valence of consquences) were entered as predictors. This key two-way interaction was tested by using the PROCESS add-on for SPSS (model 1; Hayes, 2013). The dependent variable (i.e., degree of responsibility) was regressed onto the predictors (thinking style and valence of consequences), as well as their interaction term, using a hierarchical regression (i.e., main effects in the first step, followed by the two-way interaction in the second step). In this study, a main effect of thinking style was found, $B = 3.254$, $t(471) = 1.965$, $p = .050$, 95% CI: 0.001, 6.508, indicating that participants assigned more responsibility to the cause described in the scenario as their thinking style scores tended towards the holistic mode. Moreover, a main effect of the valence of consequences manipulation also emerged, $B = 4.782$, $t(471) = 2.556$, $p = .011$, 95% CI: 1.106, 8.458, suggesting that participants assigned more responsibility to the cause described in the scenario in the mixed valence consequences condition ($M = 62.62$, $SD = 21.45$) than in the univalent condition ($M = 57.50$, $SD = 19.68$).

Importantly, we found a significant interaction between thinking style and the valence of consequences manipulation, $B = 8.980$, $t(470) = 2.730$, $p = .007$, 95% CI: 2.516, 15.444, Cohen's $f^2 = .016$.[2] As illustrated in Figure 1, this interaction showed that for the mixed valence consequences condition, individuals with higher holistic thinking style (+1SD) assigned more responsibility to the cause compared to individuals with lower holistic thinking style (more analytic thinking style; -1SD), $B = 7.749$, $t(470) =$

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[2] When we use the difference between scores in the probability of assigning responsibility by subtracting scores on the second item from the first item, the results are the same, $B = 17.960$, $t(470) = 2.730$, $p = .007$, 95% CI: 5.032, 30.887.

3.330, $p < .001$, 95% CI: 3.176, 12.322. However, for the univalent consequences

condition, no significant difference in assigned responsibility emerged between

individuals with high vs. low holistic thinking style, $B = -1.231$, $t(470) = -0.530$, $p =$

.597, 95% CI: -5.799, 3.337 (decomposition of this interaction by thinking style can be

found in supplemental materials).

Figure 1. Study 1. Degree of responsibility as a function of thinking style and valence of

consequences (univalent vs. mixed valence).

Discussion

The results of study 1 revealed that individuals with higher levels of holistic

thinking assigned more responsibility to the cause mentioned in the scenario when it

produced mixed valence consequences than univalent consequences. However, for more

analytic individuals, no differences in the assignment of responsibility emerged.[3] This

aligns with previous research demonstrating the superior integration of positive and

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[3] These results were replicated in an additional sample using the lieutenant scenario as in study 1, but taking an experimental approach to thinking styles. In this study, 503 participants recruited via *Connect CloudResearch* were randomly assigned to a holistic or analytic induction using the Navon task manipulation (see study 2). Then they were randomly assigned to a cause that produced univalent or mixed valence consequences. Consistent with study 1, a significant Thinking Style × Valence of Consequences interaction emerged, $F(1, 499) = 6.661$, $p = .010$, $\eta_p^2 = 0.013$ (see additional study A in supplemental materials for details).

negative information by holistic thinkers (Ein-Gar et al., 2011; Luttrell et al., 2022). The mixed nature of the valence of consequences is only one dimension of causal complexity that can be studied in relation to thinking styles. In the next study, we explored a different dimension of causal responsibility by looking at the number of consequences that a given cause can produce. Specifically, we examined how individuals with a holistic (vs. analytic) thinking style would assign responsibility to a cause that produces either multiple or single consequences. Given that thinking style in the previous study was measured rather than manipulated, there may be other confounding variables co-varying along with thinking style. In order to resolve this concern and isolate the effect of thinking style, we moved to an experimental approach by inducing holistic *versus* analytic style. That is, another goal of the next study was to increase causal control of our core construct by manipulating participant's thinking style. In addition, we introduced a different scenario related to a relevant social topic, namely climate change. The previous scenario was inter-personal and we wanted to generalize to a scenario in which person perception was not involved. Thus, we implemented this change to increase generalizability by demonstrating that it does not matter whether the scenario is inter-personal or not.

Study 2

The aim of study 2 was to generalize and extend the results of study 1 to a different dimension related to holism and attributional complexity. Specifically, this study was designed to examine how individuals' thinking style (holistic vs. analytic) assign responsibility based on whether a cause generates single or multiple consequences. We also manipulated the thinking style rather than measuring it. Moreover, we changed the scenario to a socially relevant topic such as climate change to increase the generalizability of the effect. We predicted that individuals induced to

think holistically would assign more responsibility to a cause that produces multiple (vs. single) consequences as compared to individuals induced to think analytically.

Method

Participants and Design

Assuming a small-to-medium interaction effect of $f^2 = 0.016$ (obtained in study 1), the desired sample size for a two-tailed test ($\alpha = .05$) with .80 power was $N = 493$ (as indicated by an *a priori* power analysis using G*Power, see Faul et al., 2009). Our final sample ($N = 387$) was below that number because of the funding available at the time data was collected. There were no exclusions. Three hundred and eighty-seven (387) participants were recruited anonymously via MTurk. Each participant was compensated $0.50 USD (59.7% females, $M_{age} = 29.48$, $SD = 10.77$). Participants were randomly assigned to conditions in a 2 (Thinking Style: Holistic vs. Analytic) $\times$ 2 (Number of Consequences: One vs. Five consequences) between-subjects factorial design. The degree of responsibility assigned to the cause described in the scenario was measured as the key dependent variable.

Procedure

Participants completed the study on Qualtrics. As a cover story, participants read a passage that informed them that they were going to participate in a study about climate change. First, they were randomly assigned to the holistic or analytic condition. Then, they were randomly assigned to one of the two conditions of the number of consequences manipulation. Next, they reported the degree of responsibility assigned to the cause mentioned in the scenario. Finally, participants responded to socio-demographic questions and were debriefed about the purpose of the study.

Independent Variables

Thinking Style. Participants were first exposed to a Navon task with the aim of inducing them to either think holistically versus analytically (Navon, 1977). On a computer screen, participants were presented with a series of "global" letters made up of smaller "local" letters (e.g., small 'L's in the shape of a large 'P'). This task included 44 trials in which participants were instructed to click the corresponding letter as fast as they could. Participants were randomly assigned to one of two experimental conditions: holistic *versus* analytic condition. In the holistic processing condition, the target letters always appeared as the global letter. In the analytic processing condition, the target letters always appeared as the local letter. This manipulation was extracted from previous research in which it has successfully induced holistic vs. analytic thinking styles (Smith & Redden, 2020).

Number of Consequences. After being exposed to the thinking style induction, the number of consequences was manipulated by presenting a scenario with a cause that produced one or five consequences. Specifically, all participants read the following passage: "Climate change refers to any change in the climate due to natural variability or as a result of human activities." On the one hand, participants in the one consequence condition received the following information: "Makes glaciers and ice sheets melt." On the other hand, participants in the five consequences condition received the following information: "Makes glaciers and ice sheets melt," "Generates less access to clean water and basic food, especially for developing countries," "Produces high frequency of extreme weather events," "Puts plant and animal species at risk of extinction," and "Produces huge expenditures for society and the economy both in health and infrastructure."

Dependent Variable

Degree of Responsibility. After participants read the scenario, they were asked

to evaluate the degree of responsibility using the same two questions as in the previous

study and previous research (Duval & Wicklund, 1973). Specifically, the two questions

were: "To what extent are the consequences of the event due *to climate change*?" and

"To what extent are the consequences of the event due to other causes?" The first item

was used as the dependent variable. Higher values reflected a greater responsibility to

the cause mentioned in the scenario. Values ranged from 10 to 100 ($M = 68.71$, $SD =$

17.60).

Results

The dependent variable was submitted to an ANOVA 2 (Thinking Style: Holistic

vs. Analytic) × 2 (Number of Consequences: One vs. Five consequences). There were

no significant main effects of either Thinking Style, $F(1, 383) = 0.367$, $p = .545$, $\eta_p^2 =$

0.001, or Number of Consequences, $F(1, 383) = 2.910$, $p = .089$, $\eta_p^2 = 0.008$.

Importantly, we found a significant interaction between the thinking style

manipulation and the number of consequences manipulation, $F(1, 383) = 6.741$, $p =$

.010, $\eta_p^2 = 0.017$. As illustrated in Figure 2, this interaction showed that, in the five

consequences condition, individuals in the holistic thinking style condition ($M = 68.92$,

$SD = 15.59$) tended to assign more responsibility to the cause compared to individuals

in the analytic thinking style condition ($M = 65.39$, $SD = 18.78$), although this pattern

did not reach significance, $F(1, 383) = 1.996$, $p = .159$, $\eta_p^2 = 0.005$. However, in the one

consequence condition, individuals in the analytic thinking style condition ($M = 73.02$,

$SD = 17.45$) assigned significantly more responsibility to the cause compared to

individuals in the holistic thinking style condition ($M = 67.34$, $SD = 17.89$), $F(1, 383) =$

5.088, $p = .025$, $\eta_p^2 = 0.013$ (decomposition of this interaction by thinking style can be

found in the supplemental materials).

Figure 2. Study 2. Degree of responsibility as a function of thinking style (holistic vs.

analytic) and number of consequences (one vs. five).
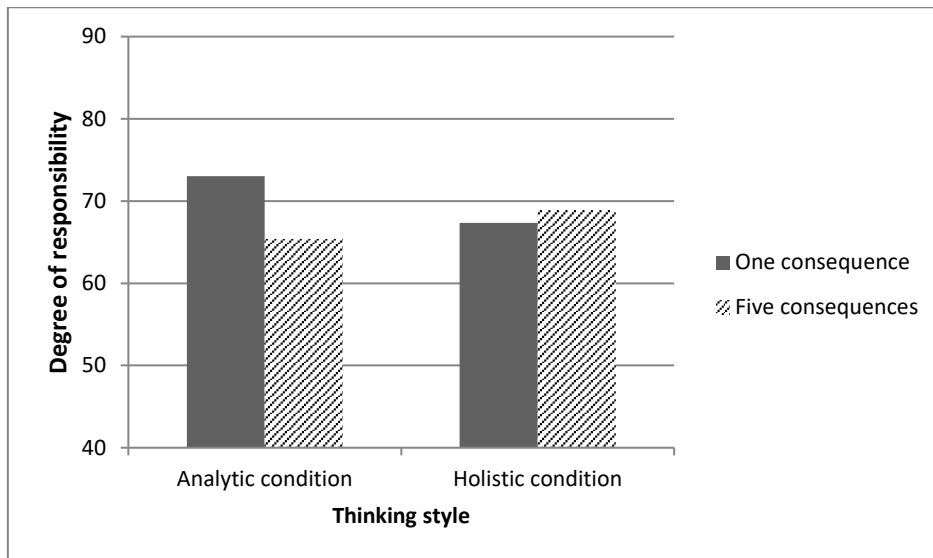
Discussion

The results of study 2 revealed that, as predicted, individuals induced to think

holistically tended to assign more responsibility to the cause when produced five

consequences than when it produced just one consequence. However, individuals

induced to think analytically assigned more responsibility to the cause when produced

just one consequence as compared to when it produced five consequences. This finding

is consistent with previous research that demonstrates that holistic thinkers manage

complex (large amounts of) information better (Masuda et al., 2008; Wang et al., 2012)

than analytic thinkers.[4]

Most importantly, these data extended the previous study by showing evidence

of the causal role of holistic-analytic thinking style by manipulating this construct.

Although manipulating the thinking style might be a direct way of obtaining initial

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[4] These results were replicated in an additional sample using the lieutenant scenario as in study 1, but taking a measurement approach to thinking styles. In this study, 503 Mturkers were randomly assigned to a cause that produced one or five consequences. Holistic-analytic thinking style was measured with the same brief scale as in study 1 (the AHS-12). Consistent with study 2, a significant Thinking Style $\times$ Number of Consequences interaction emerged, $B = 6.545$, $t(499) = 2.192$, $p = .029$, 95% CI: 0.680, 12.410, Cohen's $f^2 = .010$ (see the additional study B in supplemental materials for details).

evidence of the underlying process, thinking style is a rather broad construct that influences a variety of processes (i.e., logical reasoning, categorization, tolerance of contradiction, etc.). Thus, the next study aimed at identifying the specific element of the attribution process that is driving the effect. Our assuption is that attributional complexity is the explanatory element that causes individuals with a holistic thinking style to attribute greater responsibility to a cause when it results in multiple consequences instead of a single consequence. Therefore, we designed our final study to isolate the complexity of consequences by manipulating this component.

Study 3

The goal of study 3 was to manipulate the explanatory factor of the effect. We argue that attributional complexity is the variable that leads holistic (vs. analytic) individuals to attribute more responsibility to a cause when it produces multiple rather than single consequence(s). We predicted that if we disrupted the normal link between number and complexity, we could modify the results. Thus, in addition to manipulating the number of consequences, we manipulated the complexity of the consequences orthogonally to the other variables. The procedure to instantiate the proposed mechanism followed a similar logic to the one described in previous research by Gascó et al. (2018).

Thus, we predicted a new two-way interaction between thinking style and complexity of consequences on causal responsibility. Specifically, we expected that individuals with a holistic thinking style would assign more responsibility to a cause that produces high (vs. low) complex consequences as compared to individuals with an analytic thinking style, regardless of the number of consequences. When breaking down this interaction, we expected holistic (vs. analytic) individuals would assign more responsibility to a cause when the five consequences are framed with high complexity

and the one consequence with low complexity. This two-way interaction would be the one that is closer to the interaction found in the previous studies. Similarly, we expected holistic (vs. analytic) individuals would assign more responsibility to a cause when the one consequence is framed with high complexity and the five consequences with low complexity.

Method

Participants and Design

Assuming an interaction effect of $f^2 = 0.017$ (study 2)[5], the desired sample size for a two-tailed test ($\alpha = .05$) with .80 power was $N = 464$ (as indicated by an *a priori* power analysis using G*Power, see Faul et al., 2009). Our final sample ($N = 935$) was double that number because we added a new factor (i.e., complexity of consequences) with two conditions and thus we wanted to detect the potential three-way interaction with this third factor. Nine hundred and thirty-five (935) participants were recruited anonymously via MTurk. Each participant was compensated $0.50 USD (64.4% females, $M_{age} = 41.68$, $SD = 15.28$). Participants were randomly assigned to conditions in a 2 (Number of Consequences: One vs. Five consequences) $\times$ 2 (Complexity of Consequences: High vs. Low) between-subjects factorial design. Thinking Style (continuous variable) was measured as an additional predictor. The degree of responsibility assigned to the cause described in the scenario was measured as the key dependent variable.

Procedure

Participants completed the study on Qualtrics. As a cover story, participants read a passage that informed them that they were going to participate in a study about

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[5] If we enter the Holistic Thinking $\times$ Type of Consequences interaction effect of Cohen's $f^2 = 0.0165$ (averaged effect of study 1 and 2), the desired sample size for a two-tailed test ($\alpha = .05$) with .80 power was $N = 478$.

climate change. First, they completed the whole Analysis-Holism Scale (AHS). Then,

they were randomly assigned to the one or five consequences condition that was made

to appear either high or low in complexity. Next, they reported the degree of

responsibility assigned to the cause mentioned in the scenario. Finally, they completed

the socio-demographic questions and were debriefed about the purpose of the study.

Independent Variables

      Thinking Style. Participants' thinking style was measured using the 24-item

AHS (Choi et al., 2007), as we wanted to use a more comprehensive measure than the

brief scale used in study 1. Although the scale was measured before the experimental

induction, we still ensured that random assignment was successful by showing that

holistic thinking scores did not differ as a function of the number of consequences

manipulation, $F(1, 931) = 0.554$, $p = .457$, $\eta_p^2 = 0.001$.[6] There was no Number $\times$

Complexity interaction, $F(1, 931) = 0.403$, $p = .526$, $\eta_p^2 < 0.001$. Higher scores

indicated a more holistic thinking style whereas lower scores indicated a more analytic

thinking style ($\alpha = .74$). Values ranged from 1.88 to 6.71 ($M = 4.87$, $SD = 0.56$).

      Number of Consequences. After completing the scale, the number of

consequences was manipulated using the same induction and the same scenario as in

study 2. Specifically, participants were randomly assigned to a scenario containing one

consequence or five consequences.

      Complexity of Consequences. Perceived complexity was manipulated

orthogonal to number of consequences. The consequence(s) appeared inside globes,

with arrows from another globe with the cause inside. For the five consequences high

complex condition, the five consequences were portrayed in a net of interconnections

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[6] AHS scores differed as a function of the complexity of consequences manipulation, $F(1, 931) = 5.049$, $p = .025$, $\eta_p^2 = 0.005$, but this difference of small magnitude was against our hypothesis, revealing a higher AHS score in the low complexity ($M = 4.91$, $SD = 0.57$) than in the high complexity ($M = 4.83$, $SD = 0.55$) consequences condition.

with the cause, spread in the context/layout and with arrows pointing to most of them. For the five consequences low complex condition, the five consequences were portrayed in a linear connection with the cause, ordered in the context/layout, and without arrows among them. In the one consequence high complex condition, the consequence was presented spread in the context/layout and with some other blank globes, indicating potential additional factors, and arrows pointing between them, but the number of the consequences and the content was constant with the other condition with one consequence and low complexity. In the one consequence low complex condition, the consequence was presented in order and in a linear connection with the cause, without other globes or other arrows. As should be evident from this description, conditions differed in many features associated with complexity (number of arrows, interrelationships, position of the globes, etc.). We used multiple features of complexity because different people might look at different aspects of this construct, but the goal was to create conditions of high vs. low complexity that would be successful for most participants (see the methodology file for a full visualization of this variable). We conducted a pre-test to compare the degree of complexity among the scenarios showing the effectiveness of this manipulation (see supplemental materials for details about this pre-test).

Dependent Variables

Degree of Responsibility. After participants read the scenario, they were asked to evaluate the degree of responsibility using the same two questions as in the previous two studies and previous research (Duval & Wicklund, 1973). The first item with "climate change" as the cause was used as the dependent variable. Higher values reflected a greater responsibility to the cause mentioned in the scenario. Values ranged from 0 to 100 ($M = 71.12$, $SD = 25.05$).

Results

Degree of Responsibility. The criterion variable was submitted to a multiple regression analysis following the same procedure used in study 1. The regression analysis revealed a main effect of thinking style, $B = 7.717$, $t(931) = 5.338$, $p < .001$, 95% CI: 4.880, 10.554. There was also a main effect of the number of consequences manipulation, $B = -2.018$, $t(931) = -2.506$, $p = .012$, 95% CI: -3.599, -0.438. No main effect of the compelxity of consequences manipulation emerged, $B = 0.416$, $t(931) = 0.515$, $p = .607$, 95% CI: -1.169, 2.001.

Importantly, we found a significant interaction between thinking style and the complexity of consequences manipulation, $B = 3.261$, $t(931) = 2.254$, $p = .024$, 95% CI: 0.422, 6.100, Cohen's $f^2 = .005$. As illustrated in Figure 3, this interaction showed that, in the high complex consequences condition, individuals with higher holistic thinking style (+1SD) assigned more responsibility to the cause compared to individuals with lower thinking style (more analytic individuals; -1SD), $B = 11.143$, $t(931) = 5.384$, $p < .001$, 95% CI: 7.081, 15.205. This pattern was the same in the low complex consequence condition, $B = 4.622$, $t(931) = 2.021$, $p = .022$, 95% CI: 0.655, 8.588, but significantly reduced as indicated by the significant two-way interaction (decomposition of this interaction by thinking style can be found in supplemental materials).

Figure 3. Study 3. Degree of responsibility as a function of thinking style and complexity of consequences (low complexity vs. high complexity).
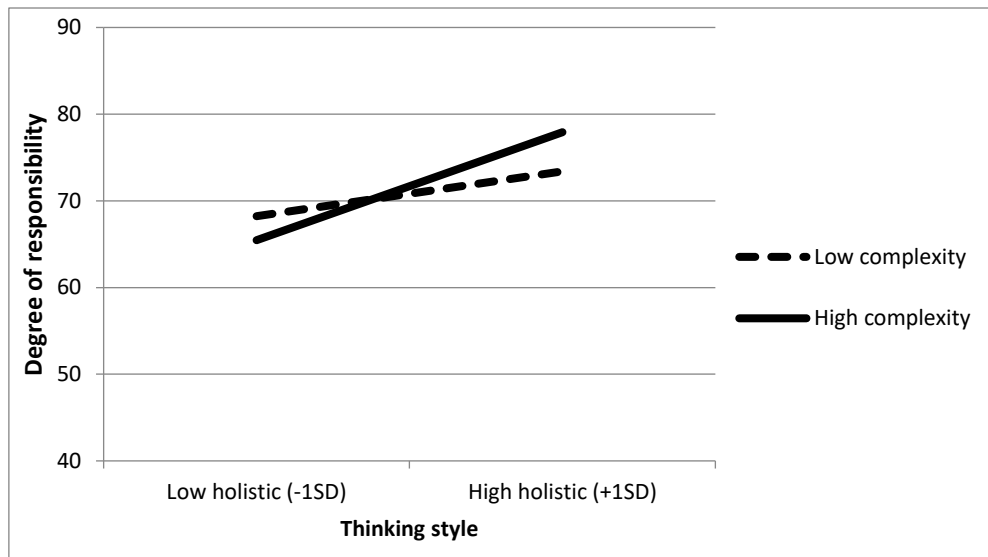
None of the other two-ways were significant (Holistic Thinking × Number of Consequences, p = .416; Number of Consequences × Complexity of Consequences, p = .194). The absence of the Holistic Thinking × Number of Consequences and the three-way interaction indicate that once the complexity of the consequences was accounted for (because we experimentally varied it to be high or low orthogonally to the other manipulated variable), the number of consequences *per se* no longer had an impact on the outcome, suggesting that the variarions in complexity are the key element for the effects observed in the previous studies.

Next, we conducted two other two-way interactions to further test the effects of complexity. A Holistic Thinking × 2 (Number/Complexity: one consequence with low complexity vs. five consequences with high complexity) interaction was first tested. Conceptually, this comparison should mimic the findings of study 2 where the five consequences condition seemed to be by default more complex than the one consequence condition. This interaction was significant, B = 3.891, $t(460)$ = 1.971, p = .049, 95% CI: 0.012, 7.771, conceptually replicating the pattern observed in study 2 (see Figure 4, Panel a). Then, a Holistic Thinking × 2 (Number/Complexity: one consequence with high complexity vs. five consequences with low complexity)

interaction was tested. Although not significant, this interaction showed the same pattern as the previous overall interaction, $B = 2.849$, $t(467) = 1.332$, $p = .184$, 95% CI: -1.354, 7.053. As shown in the Panel b of Figure 4, when the one consequence condition is framed higher in complexity than the five consequences condition, the effects observed in study 2 tended to be reversed.

Figure 4. Study 3. Degree of responsibility as a function of thinking style, and number/complexity of consequences (Panel a = Thinking Style × 2 Number/Complexity: one consequence with low complexity vs. five consequences with high complexity; Panel b = Thinking Style × 2 Number/Complexity: one consequence with high complexity vs. five consequences with low complexity).

Panel a
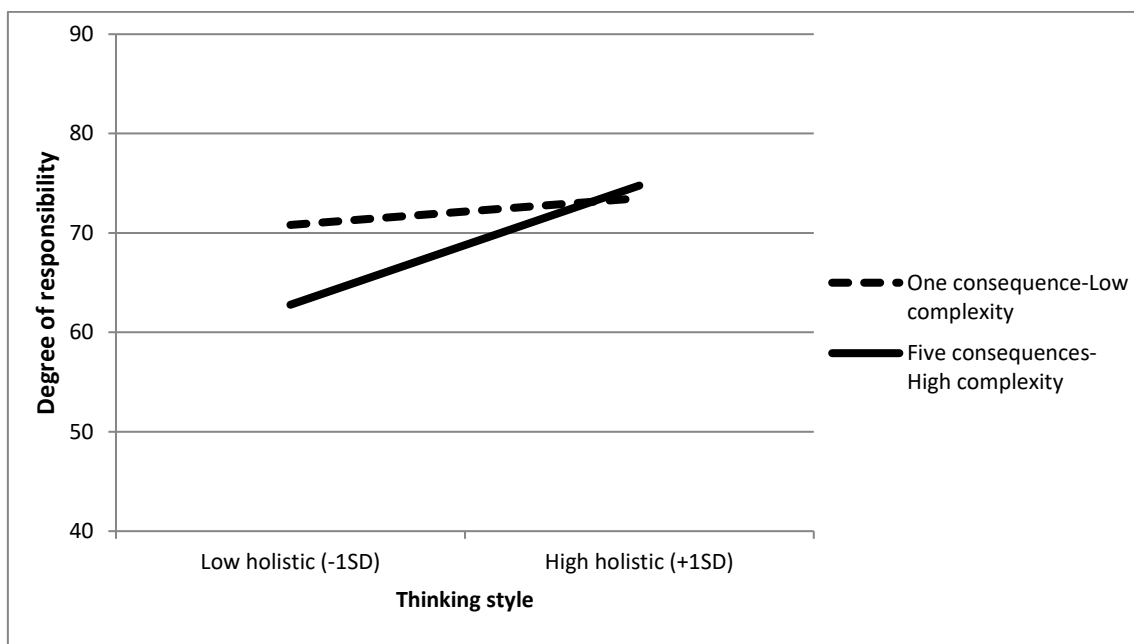
Panel b
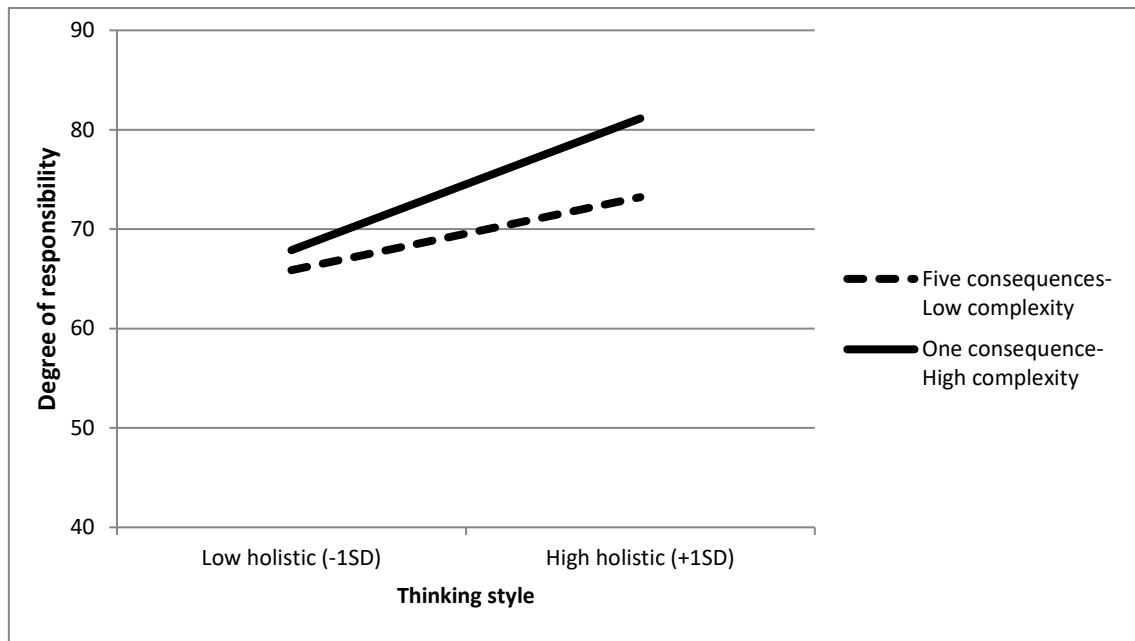
Discussion

The results of study 3 extended our previous findings. In line with study 2, we observed that holistic (vs. analytic) individuals would assign more responsibility to a cause when the five consequences are framed with high complexity and the one consequence with low complexity. This finding replicated study 2 where five consequences were presumably associated with higher complexity compared to one consequence. However, we also demonstrated that the opposite pattern could occur when the one consequence had higher complexity compared to the five consequences. Thus, study 3 indicated that the complexity of the consequences is the crucial factor interacting with thinking style to produce the effects.[7] That is, we found that holistic

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[7] Two follow-up studies tested the plausibility of several psychological constructs in explaining the effect via moderated mediation analysis. In the first follow-up study, 343 undergraduate students were randomly assigned to the holistic or analytic condition. Then, they were randomly assigned to one of the two conditions of the number of consequences manipulation using the lieutenant scenario as in study 1. Next, they reported the degree of responsibility assigned to the cause mentioned in the scenario, along with measures of attributional complexity, need for cognitive closure, need for cognition, involvement, response time, and regulatory focus. The results revealed a significant Thinking Style × Number of Consequences interaction, $F(1, 339) = 4.464$, $p = .035$, $\eta_p^2 = 0.013$. More importantly, the moderated mediation through attributional complexity was supported, $\beta = 0.583$, $SE = 0.386$; 95% CI (0.071, 1.689). The rest of the constructs measured revealed non-significant indirect effects when they were included as mediators, thus no evidence was found to support any of these moderated mediation models. However, a two-way interaction was found between Number of Consequences and Prevention Focus, $B = -1.792$,

individuals assigned to conditions where the consequence/s of a casue was/were framed as complex (regardless of whether they were one or five) attributed more responsibilty to that cause compared to holistic individuals in conditions where the consequence/s was/were framed as more simple.

General Discussion

Pevious research on thinking style has suggested that individuals with a holistic thinking style tend to have broader, more complex attributional processes than analytic individuals (Maddux & Yuki, 2006, Spina et al., 2010). The aim of this research was to further specify new dimensions of consequences never explored in previous research on causal complexity and thinking style. Across seven studies, we found that individuals with a holistic thinking style made more complex attributions than individuals with an analytic thinking style in two new dimensions of causal complexity, namely the valence and the number of consequences. Specifically, study 1 revealed that individuals with higher (vs. lower) levels of holistic thinking style assigned more responsibility to the cause mentioned in the scenario when it produced mixed valence consequences than univalent consequences. Study 2 extended these findings on a different dimension of causal complexity based on the number of consequences, and moved to a full experimental design in which we manipulated participants' holistic (vs. analytic) thinking style. The results showed that participants induced to think holistically (vs.

$t(339) = -2.264$, $p = .024$, 95% CI: -3.349, -0.235 (see the additional study C in supplemental materials for details).

In the second follow-up study, we increased the sample size to have enough power to detect a potential three-way interaction between Thinking Style, Number of Consequences, and Prevention Focus. In addition, we extended the results to a new scenario to further test the generalizability of the effect. This scenario described two companies negotiating a contract. In this study, 958 participants recruited via *Connect CloudResearch* were randomly assigned to the holistic or analytic condition. Then, they were randomly assigned to one of the two conditions of the number of consequences manipulation. Next, they reported the degree of responsibility assigned to the cause along with a measure of Regulatory Focus. Consistent with study 2, a significant Thinking Style × Number of Consequences interaction emerged, $F(1, 954) = 11.941$, $p = .001$, $\eta_p^2 = 0.012$. This two-way interaction was not further moderated neither by Prevention Focus ($p = .378$) nor Promotion Focus ($p = .688$) (see additional study D in supplemental materials for details).

analytically) tended to assign more responsibility to the cause when it produced five consequences than when it produced one. A third study demonstrated that what matters for the interaction effect between thinking style and type of consequences was the complexity of those consequences, regardless of whether those consequences are multiple or few. This study manipulated complexity to isolate its impact and showed that just as one consequence can be seen as complex, multiple consequences can be framed with less complexity, producing potential reversal effects as compared to the findings of the second study. Four additional studies (described in detail in supplemental materials) extended the results to other scenarios and experimental approaches, tested the role of attributional complexity in mediational analysis, and ruled out alternative explanations.

There are situational variables that could further moderate the effects uncovered in this research. For instance, the severity of the consequences could influence the attributional process given that holistic cultures tend to make their judgments based on the perceived severity of the harmful act (Feinberg et al., 2019). Thus, we might anticipate that this variable could magnify the findings in our research.

Similarly, the origin of the cause can also matter. For example, causes originating from the self might be differently perceived than causes originating from external factors (Choi et al., 1999; Gascó et al., 2018). In this line of studies, we have focused on the responsibility of the cause but have not made a distinction as to whether the origin of the cause is dispositional or situational. Given that holistic thinkers tend to make context-dependent attributions whereas analytic thinkers tend to make attributions based on internal dispositions, it would be worth considering whether this variable could influence the effects found in this research.

Furthermore, another factor that could moderate the results of this work is the type of emotions experienced during the attributional process. Previous research has shown that holistic thinkers tolerate the simultaneous activation of contradictory emotions better than analytic thinkers (Grossmann et al., 2016; Santos et al., 2021). In this sense, we predict that holistic individuals might feel less hesitant when exposed to consequences that activate multiple affective states, of different arousal or valence, as compared to analytic individuals.

Theoretical Contributions

This research makes a number of contributions to the literature on both thinking styles and attribution. First, we extended previous research on holistic-analytic thinking and causal complexity by examining two new dimensions of the consequences that play a role when people try to determine the strength of the cause-consequence association, or the responsibility of a cause. These two new elements varying in levels of complexity are showcased in seven studies: the valence (mixed vs. univalent) and number (more vs. less) of the consequences presented in different scenarios. Second, although much of the research conducted on attribution has focused on dimensions of the cause to infer whether it was responsible for determining the consequence of an event, we focused instead on dimensions of the consequence (valence and number) to infer whether the cause was perceived as more or less responsible. Thus, this research is an addition to the scarce literature on attribution that puts its emphasis on the other side of the coin: the consequences.

Applications

This work also provides important practical applications for entities that need resources and support from society to achieve their goals. The key is to present holistic thinkers with a complex approach to consequences, while analytic thinkers need to be

presented with simpler approaches. For example, imagine a nonprofit entity that initiates a fundraising campaign for tackling climate change (one event examined in our research). The message should include the consequence(s) that fundraising can produce in the fight against climate change while also taking into account the thinking style of the audience. Our research suggests that this campaign might be more persuasive for holistic individuals if it signals the multiple consequences (e.g., benefits) that donation produces. However for analytic individuals, it might be better to focus on just one big consequence (e.g., a benefit) of the donation. Thus, our findings may help marketers working in nonprofit organizations to tailor their campaigns differently as a function of the individuals exposed to the campaign.

The results of these studies may also have implications for decision-making processes. Faced with a dilemma with several options, people will ponder which one will maximize the desired consequences. Depending on the thinking style, the potential responsibility attributed to each option could vary. Before making a decision, holistic thinkers would be more likely to focus on causal complexity when estimating the attributional responsibility for each option.

Limitations and Future Research

The present research contains some limitations that must be mentioned. First, one might be concerned about the degree of relevance of scenarios (i.e., they are fictitious or convey a high degree of psychological distance). Future research should attempt to replicate these results with a wide variety of scenarios whose consequences have a more direct impact on the immediate lives of the participants. Furthermore, in this line of studies we have not considered characteristics of the scenarios, such as the degree of familiarity of the event, the source of the information, or whether the

consequences have an impact on oneself or on third parties (or both), so future work should also measure or manipulate these elements.

A second limitation of this research is that we rely solely on self-reported measures of causal responsibility. Thus, future research should include more consequential outcomes such as behaviors linked to the inference of more responsibility in order to extend these results to real-world situations. Moreover, in the present research we manipulated holistic vs. analytic thinking with a well-established procedure (Smith & Redden, 2020), but there are other inductions available in the literature and, as such, future studies could benefit from utilizing different manipulations of thinking style (see Maddux & Yuki, 2006; Wong et al., 2021, for alternative procedures to induce holistic vs. analytic thinking). Regarding thinking styles, one might wonder whether putting the AHS first might influence the results. Future research in this domain should randomize the order of AHS presentation to check that there is an absence of order effect.

Furthermore, although we focused on two new dimensions of the consequences (valence and number), future research should examine a wide array of characteristics based on thinking style theory. For example, given that holistic individuals tend to see the world in constant flux (Ji et al., 2001), one dimension of consequences that can be explored is the malleable nature of consequences. That is, a cause that produces a specific consequence at a given point in time, but produces a different consequence in the future. It may also be interesting to examine how a series of sequentially linked consequences influences the process of attributional responsibility. Since holistic thinkers are able to envision complex linkages between events occurring in different space-time variations (Zhou et al., 2021), one might expect that the connection between

an action and the potential subsequent consequences may be perceived more strongly by holistic thinkers.

In addition to perceiving the world as something that can change, holistic individuals cope with contradictions by embracing both sides (Santos et al., 2021). Thus, another element worth examining could be a cause that produces two incompatible consequences. In our research, although we used mixed valence as a complex attribution element, the consequences were not incompatible with one another. Therefore, future research should explore these other possibilities. Ultimately, these dimensions can be studied in isolation or in combination to maximize the impact in terms of the strength of the cause-consequence association such as, for example, a cause producing numerous consequences, of different valence, that change over time, and that are incompatible among them.

References

Brun, L., Pansu, P., & Dompnier, B. (2021). The role of causal attributions in

    determining behavioral consequences: A meta-analysis from an intrapersonal

    attributional perspective in achievement contexts. *Psychological Bulletin, 147*(7),

    701–718. https://doi.org/10.1037/bul0000331

Choi, I., & Choi, Y. (2002). Culture and self-concept flexibility. *Personality and Social*

    Psychology Bulletin, *28*(11), 1508-1517.

    https://doi.org/10.1177/014616702237578

Choi, I., Dalal, R., Kim-Prieto, C., & Park, H. (2003). Culture and judgement of causal

    relevance. *Journal of Personality and Social Psychology, 84*(1), 46–59.

    https://doi.org/10.1037/0022-3514.84.1.46

Choi, I., Koo, M., & Choi, J. A. (2007). Individual differences in analytic versus holistic

    thinking. *Personality and Social Psychology Bulletin, 33*(5), 691-705.

    https://doi.org/10.1177/0146167206298568

Choi, I., Nisbett, R. E., & Norenzayan, A. (1999). Causal attribution across cultures:

    Variation and universality. *Psychological Bulletin*, *125*(1), 47-63.

    https://doi.org/10.1037/0033-2909.125.1.47

Duval, D., & Wicklund, R. (1973). Effects of objective self-awareness on attribution of

    causality. *Journal of Experimental Social Psychology, 9*, 17-31.

    https://doi.org/10.1016/0022-1031(73)90059-0

Ein-Gar, D., Shiv, B., & Tormala, Z. L. (2011). When blemishing leads to blossoming:

    The positive effect of negative information. *Journal of Consumer Research*, *38*,

    846-859. https://doi.org/10.1086/660807

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-1160. https://doi.org/10.3758/BRM.41.4.1149

Feinberg, M., Fang, R., Liu, S., & Peng, K. (2019). A world of blame to go around: cross-cultural determinants of responsibility and punishment judgments. *Personality and Social Psychology Bulletin*, *45*(4), 634-651. https://doi.org/10.1177/0146167218794631

Gascó, M., Briñol, P., Santos, D., Petty, R. E., & Horcajo, J. (2018). Where did this thought come from? A self-validation analysis of the perceived origin of thoughts. *Personality and Social Psychology Bulletin, 44*, 1615-1628. https://doi.org/10.1177/0146167218775696

Grossmann, I., Huynh, A. C., & Ellsworth, P. C. (2016). Emotional complexity: Clarifying definitions and cultural correlates. *Journal of Personality and Social Psychology*, *111*(6), 895-916. https://doi.org/10.1037/pspp0000084

Hamamura, T., Heine, S. J., & Paulhus, D. L. (2008). Cultural differences in response styles: The role of dialectical thinking. *Personality and Individual Differences*, *44*(4), 932-942. https://doi.org/10.1016/j.paid.2007.10.034

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. The Guilford Press.

Heider, F. (1958). *The psychology of interpersonal relations*. Hillsade: Erlbaum.

Ji, L. J., Guo, T., Zhang, Z., & Messervey, D. (2009). Looking into the past: cultural differences in perception and representation of past information. *Journal of Personality and Social Psychology*, *96*(4), 761-769. https://doi.org/10.1037/a0014498

Ji, L.-J., Lee, A., Zhang, Z., Li, Y., Wang, X.-Q., Torok, D., & Rosenbaum, S. (2023).

    Judging a book by its cover: Cultural differences in inference of the inner state

    based on the outward appearance. *Journal of Personality and Social Psychology,*

    125, 82–99. https://doi.org/10.1037/pspi0000413

Ji, L. J., Nisbett, R. E., & Su, Y. (2001). Culture, change, and prediction. *Psychological*

    Science, 12, 450-456. https://doi.org/10.1111/1467-9280.00384

Jones, E. E. (1990). *Interpersonal perception*. New York: WH Freeman.

Kelley, H. H. (1973). The processes of causal attribution. *American Psychologist, 28*,

    107-128. https://doi.org/10.1037/h0034225

Knobe, J. (2003). Intentional action and side effects in ordinary language. *Analysis*, *63*,

    190-194. https://www.jstor.org/stable/3329308

Luttrell, A., Petty, R. E., Chang, J. H., & Togans, L. J. (2022). The role of dialecticism in

    objective and subjective attitudinal ambivalence. *British Journal of Social*

    Psychology, *61*(3), 826-841. https://doi.org/10.1111/bjso.12504

Maddux, W. W., & Yuki, M. (2006). The "ripple effect": Cultural differences in

    perceptions of the consequences of events. *Personality and Social Psychology*

    Bulletin, 32(5), 669-683. https://doi.org/10.1177/0146167205283840

Martín-Fernández, M., Requero, B., Zhou, X., Gonçalves, D., & Santos, D. (2022).

    Refinement of the Analysis-Holism Scale: A cross-cultural adaptation and

    validation of two shortened measures of analytic versus holistic thinking in Spain

    and the United States. *Personality and Individual Differences*, *186*, 111322.

    https://doi.org/10.1016/j.paid.2021.111322

Masuda, T., Gonzalez, R., Kwan, L., & Nisbett, R. E. (2008). Culture and aesthetic

    preference: Comparing the attention to context of East Asians and

Americans. *Personality and Social Psychology Bulletin*, *34*(9), 1260-1275.

https://doi.org/10.1177/0146167208320555

Morris, M. W., & Peng, K. (1994). Culture and cause: American and Chinese attributions

for social and physical events. *Journal of Personality and Social Psychology,*

67(6), 949–971. https://doi.org/10.1037/0022-3514.67.6.949

Navon, D. (1977). Forest before trees: The precedence of global features in visual

perception. *Cognitive Psychology*, *9*(3), 353-383. https://doi.org/10.1016/0010-

0285(77)90012-3

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of

thought: Holistic versus analytic cognition. *Psychological Review, 108*(2), 291–

310. https://doi.org/10.1037/0033-295X.108.2.291

Norenzayan, A., & Lee, A. (2010). It was meant to happen: explaining cultural variations

in fate attributions. *Journal of Personality and Social Psychology*, *98*(5), 702-720.

https://doi.org/10.1037/a0019141

Preston, J., & Epley, N. (2005). Explanations versus applications: The explanatory power

of valuable beliefs. *Psychological Science, 16*(10), 826-832.

https://doi.org/10.1111/j.1467-9280.2005.01621.x

Ross, L. (1977). The intuitive psychologist and his shortcomings: Distortions in the

attribution process. *Advances in Experimental Social Psychology, 10*, 173-220.

https://doi.org/10.1016/S0065-2601(08)60357-3

Santos, D., Requero, B., & Martín-Fernández, M. (2021). Individual differences in

thinking style and dealing with contradiction: The mediating role of mixed

emotions. *PloS one*, *16*(9), e0257864.

https://doi.org/10.1371/journal.pone.0257864

Scollon, C. N., Diener, E., Oishi, S., & Biswas-Diener, R. (2005). An experience-sampling and cross-cultural investigation of the relation between pleasant and unpleasant affect. *Cognition and Emotion, 19*, 27-52. https://doi.org/10.1080/02699930441000076

Smith, R. W., & Redden, J. P. (2020). The role of holistic processing in simultaneous consumption. *Journal of Experimental Social Psychology, 91*, 104023. https://doi.org/10.1016/j.jesp.2020.104023

Spina, R. R., Ji, L. J., Guo, T., Zhang, Z., Li, Y., & Fabrigar, L. (2010). Cultural differences in the representativeness heuristic: Expecting a correspondence in magnitude between cause and effect. *Personality and Social Psychology Bulletin*, *36*(5), 583-597. https://doi.org/10.1177/0146167210368278

Swann, W. B., Jr, Gómez, A., Seyle, D. C., Morales, J., & Huici, C. (2009). Identity fusion: The interplay of personal and social identities in extreme group behavior. *Journal of Personality and Social Psychology, 96*, 995-1011. https://doi.org/10.1037/a0013668

Wang, H., Masuda, T., Ito, K., & Rashid, M. (2012). How much information? East Asian and North American cultural products and information search performance. *Personality and Social Psychology Bulletin*, *38*(12), 1539-1551. https://doi.org/10.1177/0146167212455828

Wong, V. C., Wyer Jr, R. S., Wyer, N. A., & Adaval, R. (2021). Dimensions of holistic thinking: Implications for nonsocial information processing across cultures. *Journal of Experimental Psychology: General*, 150(12), 2636–2658. https://doi.org/10.1037/xge0001060

Zhou, X. Z., Requero, B., Gonçalves, D., & Santos, D. (2021). Every penny counts: The effect of holistic-analytic thinking style on donation decisions in the times of

Covid-19. *Personality and Individual Differences*, *175*, 110713.

https://doi.org/10.1016/j.paid.2021.110713