Supplementary Material for "Effects of manipulation on attributions of causation, free will, and moral responsibility"

Supplementary Material B: Position results and discussion

The effects of position and agentiveness have been studied in other types of causal chain. There may be a *proximity effect* (in which the factor closest to an outcome is judged to be more of a cause than other factors) in chains involving independent causal events, but a *primacy effect* (in which the first factor is judged to be more of a cause than others) when the first factor causes the second (Johnson et al., 1989; Miller & Gunasegaram, 1990; Vinokur & Ajzen, 1982). Hart and Honoré (1985) argue that people should give higher causal ratings to more proximal factors in opportunity chains (in which F1 creates the opportunity for F2 to cause the eventual outcome, but in which both factors are independently necessary for the outcome), but this prediction has met with mixed results. Hilton et al. (2005) and Lagnado & Channon's (2008) results support Hart and Honoré's (1985) conjecture, but McClure, Hilton, and Sutton (2007) find that intentional actions are always preferred to physical causes, regardless of position. Hilton et al. (2010) find that F1 is preferred over F2 when F1 performs an intentional human action, but that most prefer F2 when F1 is an inanimate physical event (with results somewhat mixed when the early factor is an unintentional human action).

However, because these studies (like many in the literature) do not vary the status of F2 (which is always a physical event), the preference for intentional causes may be due to their uniqueness (simply being a different type of cause than the other events in the chain) rather than because of any interesting interaction between position and the intentions. Moreover, none of these studies use scenarios where one factor directly causes the other to bring about the outcome, as in our experiments, and even related work on overdetermination and joint causation (e.g., Spellman and Kincannon, 2001; Lombrozo, 2010; Lagnado et al., 2013; Gerstenberg and Lagnado, 2014) hasn't used cases involving manipulation. Our studies therefore expand the investigation of position into new types of causal chain.

Results

Experiment 1

To analyze effects of position, we created a *responsibility difference score* that subtracted the responsibility rating for F2 from that for F1. A positive score would thus indicate higher ratings for the factor that initiated the causal chain (F1), and a negative score a higher rating for the factor that shared a more proximal relation to the outcome (F2). To analyze responsibility difference scores, we performed an ANOVA with F1 status (2: F1+, F1-), F2 status (2: F2+, F2-), and vignette (6) as between-subjects factors.

This analysis revealed a significant intercept, $F(1, 476) = 244.22$, $\eta^2 = .35$, $p < .001$, indicating that difference scores were reliably different from zero ($M = 1.23$, $SD = 3.37$) and that overall, the first factor in the causal chain was given higher responsibility ratings. There were also significant effects of F1 status, $F(1, 476) = 953.91$, $\eta^2 = .68$, $p < .001$, with higher difference scores in F1+ ($M = 3.67$, SD = 1.93) than F1- ($M = -1.20$, $SD = 2.68$), and of F2 status, $F(1, 476) = 312.88$, $\eta^2 = .41$, $p < .001$, with lower difference scores in F2+ ($M = -0.16$, $SD = 3.65$) than F2- ($M = 2.63$, $SD = 2.36$), as well as a significant two-way interaction, $F(1, 476) = 46.11$, $\eta^2 = .09$, $p < .001$. When a single factor was more agentive, it was reliably given a higher rating (when only F1+: $M = 4.53$, $SD = 1.46$; when only F2+: $M = -3.13$, $SD = 2.25$), but in cases where the factors had the same agentive status, F1 received higher ratings (F1+, F2+: $M = 2.81$, $SD = 1.96$; F1-, F2-: $M = 0.73$, $SD = 1.35$), with a larger benefit for F1 when both were more agentive. Finally, there was a significant main effect of vignette, $F(1, 476) = 2.30$, $\eta^2 = .03$, $p = .044$, a significant interaction between vignette and F2 status, $F(1, 476) = 6.36$, $\eta^2 = .07$, $p < .001$, and a significant interaction between vignette, F1 status, and F2 status, $F(1, 476) = 2.26$, $\eta^2 = .02$, $p = .048$.

Experiment 2

A 2x2x6 ANOVA on responsibility difference scores with F1 status, F2 status, and vignette as between-subjects factors revealed a significant intercept, $F(1, 476) = 102.61$, $\eta^2 = .18$, $p < .001$, indicating that difference scores were reliably different from zero ($M = 0.77$, $SD = 1.71$) and that overall, the first factor in the causal chain was given higher responsibility ratings. There was also a significant main effect of vignette, $F(1,$

476) = 2.93, η^2 = .03, p = .013, as well as significant interactions between vignette and F1 status, $F(1, 476) = 3.19$, η^2 = .03, p = .008, and vignette and F2 status, $F(1, 476) = 3.33$, η^2 = .04, p = .006. There were no significant effects of F1 status (p = .762), F2 status (p = .564), or an interaction between F1 status and F2 status (p = .062).

Experiment 3

A 2x2x6 ANOVA on responsibility difference scores with F1 status, F2 status, and vignette as between-subjects factors did not reveal a significant intercept (p = .381), suggesting that there was no effect of position when collapsing across all conditions. However, there were significant main effects of F1 status, $F(1, 476) = 58.39$, η^2 = .11, p < .001, with higher difference scores in F1+ (M = .58, SD = 2.02) than F1- (M = -.46, SD = 1.59), and of F2 status, $F(1, 476) = 59.80$, η^2 = .12, p < .001, with lower difference scores in F2+ (M = -.47, SD = 1.97) than F2- (M = .58, SD = 1.65). In addition, there was a significant main effect of vignette, $F(1, 476) = 30.56$, η^2 = .25, p < .001, and significant interactions between vignette and F1 status, $F(1, 476) = 4.48$, η^2 = .05, p = .001, and vignette and F2 status, $F(1, 476) = 2.40$, η^2 = .03, p = .036.

Experiment 4

A 2x2x6 ANOVA on responsibility difference scores with F1 status, F2 status, and vignette as between-subjects factors revealed a significant intercept, $F(1, 476) = 11.71$, η^2 = .03, p = .001, indicating that difference scores were reliably different from zero (M = -0.26, SD = 2.02) and that overall, the second factor in the causal chain was given higher responsibility ratings. There was also a significant main effect of vignette, $F(1, 476) = 50.56$, η^2 = .36, p < .001.

Experiment 5

A 2x2x6 ANOVA on responsibility difference scores with F1 status, F2 status, and vignette as between-subjects factors did not reveal a significant intercept (p = .528), suggesting that there was no effect of position when collapsing across all conditions. However, there were significant main effects of F1 status, $F(1, 476) = 63.38$, η^2 = .12, p

< .001, and of F2 status, $F(1, 476) = 175.86$, $\eta^2 = .28$, $p < .001$. Difference scores were higher in F1+ ($M = 0.66$, $SD = 2.65$) than F1- ($M = -0.77$, $SD = 2.56$), and lower in F2+ ($M = -1.25$, $SD = 2.50$) than F2- ($M = 1.13$, $SD = 2.35$). Finally, there was also a significant main effect of vignette, $F(1, 476) = 36.29$, $\eta^2 = .29$, $p < .001$, and a significant interaction between vignette and F1 status, $F(1, 476) = 2.36$, $\eta^2 = .03$, $p = .039$.

Experiment 6

A 2x2x6 ANOVA on responsibility difference scores with F1 status, F2 status, and vignette as between-subjects factors revealed a significant intercept, $F(1, 476) = 268.02$, $\eta^2 = .37$, $p < .001$, indicating that difference scores were reliably different from zero ($M = 1.41$, $SD = 2.41$) and that overall, the first factor in the causal chain was given higher responsibility ratings. There were also significant main effects of F1 status, $F(1, 476) = 32.11$, $\eta^2 = .07$, $p < .001$, with higher difference scores in F1+ ($M = 1.90$, $SD = 2.21$) than F1- ($M = .92$, $SD = 2.51$), and of F2 status, $F(1, 476) = 120.22$, $\eta^2 = .21$, $p < .001$, with higher difference scores in F2- ($M = 2.35$, $SD = 2.10$) than F2+ ($M = .47$, $SD = 2.33$). There was also a significant interaction between F1 status and F2 status, $F(1, 476) = 10.71$, $\eta^2 = .02$, $p = .001$, with a larger effect of F1 status on difference scores in F2+ (a difference of 1.54 points) than F2- (a difference of .41 points). Finally, there was a significant main effect of vignette, $F(1, 476) = 27.14$, $\eta^2 = .23$, $p < .001$.

Experiment 7

A 2x2x6 ANOVA on responsibility difference scores with F1 status, F2 status, and vignette as between-subjects factors revealed a significant intercept, $F(1, 476) = 759.17$, $\eta^2 = .63$, $p < .001$, indicating that difference scores were reliably different from zero ($M = 2.29$, $SD = 2.22$) and that overall, the first factor in the causal chain was given higher responsibility ratings. There were also significant main effects of F1 status, $F(1, 476) = 88.38$, $\eta^2 = .16$, $p < .001$, with higher difference scores in F1+ ($M = 3.08$, $SD = 1.89$) than F1- ($M = 1.51$, $SD = 2.25$), and of F2 status, $F(1, 476) = 54.75$, $\eta^2 = .11$, $p < .001$, with higher difference scores in F2- ($M = 2.91$, $SD = 2.09$) than F2+ ($M = 1.68$, $SD = 2.17$). There was also a significant interaction between F1 status and F2 status, $F(1,$

476) = 24.23, $\eta^2 = .05$, $p < .001$, with a larger effect of F1 status on difference scores in F2+ (a difference of 2.39 points) than F2- (a difference of .75 points). Finally, there was a significant main effect of vignette, $F(1, 476) = 9.90$, $\eta^2 = .10$, $p < .001$, as well as a significant interaction of vignette by F1 status, $F(1, 476) = 4.25$, $\eta^2 = .04$, $p = .001$.

Discussion

Our results suggest that the effects of position are importantly dependent on agentive status, and not simply a factor's uniqueness (being a different type of cause than the other events in the chain). In cases of 'full manipulation' (Experiment 1), when one factor was more agentive than the other it received higher ratings regardless of position, but when both factors had the same agentive status, F1 received higher ratings than F2. In Experiment 2 (agent vs. non-agent), F1 received higher ratings regardless of agentive status, but in Experiment 4 (proximal effects foreseen vs. not foreseen), F2 received higher ratings than F1 regardless of agentive status. In Experiment 3 (immediate action intended vs. not intended) and Experiment 5 (proximal effects intended vs. not intended), there was no effect of position. In Experiment 6 (outcome intended vs. not intended) and Experiment 7, there was a general preference for the initial cause (F1) over the proximate cause (F2), but ratings were additionally influenced by agentive status, with higher ratings when factors were more agentive. Finding a robust preference for F1 when both agents are more agentive in Experiments 1 and 7 (that is, in cases of 'full manipulation') coheres with the results in the main text on the interpersonal effects of agentiveness.