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Judge No Evil, See No Evil: Do People's Moral Choices Influence to Whom they Visually Attend?

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Introduction

Eye-tracking technology: Tracking gaze

Eye-tracking technology allows researchers to record and analyse a range of information about what people visually attend to and how they process visual information. For example, eye-tracking technology can be used to document the order in which people attend to different features of a visual image, whether they gaze at (i.e. fixate on) particular elements of an image (or completely avoid them), and, if so, the frequency and duration of these gazes. It can also be used to track more basic processing information, such as pupil dilation (see Chapter 2 in this volume) and gaze 'directionality' (i.e. whether people's eyes tend to gaze in particular directions first or most dominantly).

There are a variety of ways that researchers can track people's eye movements and gaze direction. For example, there are free-standing systems that are typically placed in front of the person – and, thus, require that the person remain still in one location, typically while viewing visual stimuli on a screen – as well as systems that can be secured to a person's head, and are thus more mobile, able to move with the person and track eye movement and gaze more organically, during motion (see suggested readings for reviews).

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Eye-tracking technology has been employed to study a range of phenomena and has been used to investigate several specific domains (e.g. see Lai et al. 2013; Tien et al. 2014; Blondona et al. 2015; Kredel et al. 2017; Ashraf et al. 2018). It provides an exciting window into the cognition of individuals who are not verbal, or cannot verbalize certain experiences, such as infants (Franchak et. al. 2011; Yeung et al. 2016; De Pascalis et al. 2017), children on the autism spectrum (Thorup et al. 2016; Nyström, et al. 2017) and people otherwise unable to communicate (Galdi et al. 2016; Hong et al. 2017; Lee 2017). It has been used to study differences in sensory processing between experts versus novices in a given area, such as art production and evaluation (Zhiwei and Qiang 2004; Rosenberg and Klein 2015; Mitschke et al 2017; Bauer and Schwan 2018), athletic activities (Krzepota et al. 2016; Decroix et al. 2017; Vickers et al. 2017) and other physically related skills (van Leeuwen et al. 2017), teaching (McIntyre et al. 2017; McIntyre et al. 2017), and medical diagnoses (Södervik et al. 2017). It has also been used to investigate ways in which pre-existing dispositional attitudes and attitudinal states influence socially relevant sensory processing (Kawakami et al. 2014; Flechsenhar and Gamer 2017; Frazier et al. 2017).

In this chapter, we will discuss one way this technology could be used to explore questions of interest to experimental philosophers – in particular, questions related to their research into 'folk morality'.

Why is this useful for experimental philosophy? Exploring 'folk morality'.

Of much interest to philosophers and psychologists alike is the question of 'folk morality'. For instance, do people, as the age-old model holds, form moral judgements on the basis of impartially evaluating all of – and only – the relevant information (Piaget 1932; Kohlberg 1969)? Or can their judgements be influenced by seemingly irrelevant information? The last few decades of experimental research have largely toppled the former view in favour of the latter. Indeed, we now know that people's moral judgements can be biased by emotional processing (Haidt 2001; Greene and Haidt 2002; Greene 2007), but such biasing can be triggered by the presence of seemingly irrelevant sensory information, such as certain types of smells (Schnall et al. 2008; Schnall et al. 2008; Tobia et al. 2013), tastes (Eskine et al. 2011; Eskine et al. 2012), sounds (Prinz and Seidel 2012; Seidel and Prinz 2013a, 2013b) and visual imagery (Amit and Greene 2012; Zarkadi and Schnall 2013).

People's moral judgements are apparently also influenced by how they attend to and process this sensory information. People who were better at processing

visual information formed moral judgements that were more strongly influenced by its presence than people who were better at processing verbal information (Amit and Greene 2012). And when viewing a social interaction, the judgements people formed about it were found to be influenced by what part of the interaction they had attended to the most. Specifically, when viewing videotapes of suspects' police interviews, the viewpoint the video takes (i.e. facing either the suspect or the police officer) influenced people's judgements about the degree to which a confession was given voluntarily, the likelihood that the suspect was guilty and the severity of the punishment s/he should receive (Lassiter and Irvine 1986; Lassiter et al. 2001; Lassiter et al. 2002) – even when it involved actual suspect interview footage (Lassiter et al. 2009) in real life trial situations (Lassiter et al. 2002) and even when the viewers were judges and police interrogators (Lassiter et al. 2007). Later research revealed that this effect was largely a function of which person (the suspect or the police officer) the viewer had attended to the most – when allowed to view both equally (from the side), which of the two people the viewer looked at the longest was a complete mediator of the effect (Ware et al. 2008). It is thus clear that – at least in some situations – the way we attend to and process sensory information impacts the moral judgements we form. But what if the moral judgements we have already formed also influence the way we attended to and processed subsequent sensory information? Such a finding would further complicate the story surrounding moral judgements, and would be of relevance to both philosophers and psychologists interested in better understanding the causes and consequences of people's moral cognition.

There is plenty of research to suggest that our moral judgements influence other kinds of 'downstream' processing. One area this has been found in is the degree to which we seek out or attend to incoming information. People frequently form judgements and then selectively seek out or attend to information that supports these judgements, ignoring or discounting disconfirming information (Kunda 1990; Ditto and Lopez 1992; Baumeister and Newman 1994; Munro and Ditto 1997; MacCoun 1998; Jonas et al. 2001). This phenomenon is particularly apparent with moral judgements (Haidt 2001; Ditto et al. 2009) – people cling tightly to their moral judgements and are strongly motivated to defend them against disconfirming evidence and others' conflicting judgements, resulting in a tendency to discount, ignore and avoid those who have them (Skitka and Mullen 2002; Skitka et al. 2005; Wright et al. 2009; Wright 2012). Another area this has been found is in the way in which people's moral judgements inform their subsequent judgements about things for which their moral judgements should be irrelevant, such as causation (e.g.

whether someone caused a moral harm to occur: Knobe and Fraser 2008; Knobe 2010) and intentionality (e.g. whether she did so intentionally: Wright and Bengson 2009; Knobe 2010).

There is also some evidence for sensory processing being biased by people's pre-existing judgements, generally speaking. For example, people alter the way they search a visual field, depending on what they want to confirm (Jonas et al. 2001), and their pre-existing judgements about feature relevance influence what they attend to or ignore when assessing the frequency of target objects in a visual array (Goldstone 1993; Arita et al. 2012). And, apparently, people's judgements do not even have to be directly relevant to the visual scene to which they are attending. For example, Luo and Isaacowitz (2007) found that people high in 'dispositional optimism' (i.e. people who view others as generally good and think that things typically work out for the best in the end) attended to visual stimuli differently than people low in dispositional optimism. Specifically, when shown an image of a skin cancer lesion, optimistic people attended more to the healthy surrounding tissue, looking very little at the cancerous area, whereas pessimistic people focused almost exclusively on the lesion itself (see also Segerstrom 2001; Isaacowitz 2005).

Research on depression suggests that depressed individuals preferentially attend to negative information (Beck 1967) – e.g. fixating their gaze longer on dysphoric than neutral stimuli (Mathews and Antes 1992; Eizenman et al. 2003; Caseras et al. 2007; Kellough et al. 2008). And people high in anxiety have been found to visually attend more to threatening words and images, while people low in anxiety direct their visual attention elsewhere (MacLeod et al. 1986; Bradley et al. 1998; Mogg and Bradley 1999). For example, highly anxious people who were primed to think about terrorism visually attended more to Middle Eastern faces than white faces, while people low in anxiety who had received the same prime did the opposite (Horry and Wright 2009).

Together, these findings suggest that people's existing beliefs, attitudes and judgements can powerfully influence the way they attend to and process visual information – which gives us good reason to suspect that existing moral judgements will do the same. Exploring this question is where eye-tracking technology becomes useful.

Study 1

Previous research across several disciplines suggests that, just as people's processing of sensory information can influence their moral judgements, so too

should their moral judgements influence the way they attend to and process sensory information. Therefore, we expected that when we asked people to form judgements about particular moral scenarios, they would be inclined to seek out or attend to (i.e. fixate their gaze upon) visual information that was most consistent with or supportive of those judgements, and/or avoid visual information that was inconsistent or unsupportive.

Since both of these inclinations – i.e. the inclination to *attend to* supportive visual information and to *avoid* unsupportive visual information – generally accomplish the same objective (i.e. insulating one's judgements from challenge, maintaining integrity of one's attitudes and beliefs, etc.), we did not have any strong *prima facie* theoretical reason to expect the use of one strategy over the other, but we did expect that either one or the other (or potentially both) would reliably occur.

Method

Participants. The participants in this study were 115 students from a southern US institution (97 females; 88% Caucasian, 4% African-American, 3% Asian-American, 2% Hispanic, 3% other) taking introductory psychology classes and receiving course credit for their participation. Twenty-three participants[1] were unable to participate due to calibration issues – mostly due to the fact that they were wearing eye-glasses, though people with overly dry eyes or dark irises were also harder to calibrate.

Apparatus. We employed the ERICA eye-tracking device (Version 05.01.20, 50 mm TV Lens, 1:1.13; Eye Response Technologies 2004) with gaze fixation points set at.05 seconds (minimum) time within a gaze diameter of 40 pixels – in other words, in order to count as a discrete gaze fixation point, the participants' gaze would need to remain within a 40 pixel gaze diameter for a minimum of.05 seconds. The eye-tracker was on a desk directly in front of a computer screen (1920 by 1200 pixel resolution), which was placed approximately 2.5 feet (0.762 meters) in front of the participant. The experimenter was located at one end of the desk with a laptop computer that controlled the images on the monitor and calibrated the ERICA eye-tracker to each participant's dominant (typically right) eye.

[1] While 20% is a fairly high rate of disqualification, it was unavoidable given the calibration limitations of this particular eye-tracking device. Other (newer, more expensive) technologies are not as limited. We reduced our disqualification rate in Study 2 to 12% by restricting the study to participants who did not wear glasses.

Materials and Design. A text box presenting a moral scenario (two per participant) was presented to participants for 25 seconds followed by a 10 second exposure to an image depicting the characters presented in the dilemma. A three-second buffer slide containing a dark screen with centred red dot was presented between each slide to reorient the participants' eyes to the centre of the screen. In both studies we considered the first recorded fixation point on the images to be a centred focus point carried over from the buffer slide. Therefore, we counted the second recorded fixation point as the participants' first true glance at the images.

Participants were presented first with the Trolley, then the Baby/Villager scenario:

> *Trolley:* A trolley is running out of control down a track. In its path are five people working on the trolley track and they are wearing head gear designed to block out noise, so they won't hear the trolley coming in time to move out of the way. Fortunately, you can flip a switch, which will lead the trolley down a side track to safety. Unfortunately, there is a very large man working on that side track. He is listening to music on his iPod and won't hear the trolley coming in time to move out of the way. So if you pull the switch, you will move the trolley to the side track, killing him, but saving the five workers.
>
> *Baby/Villager*: Enemy soldiers have taken over your village. They have orders to kill all remaining civilians. You and some of your townspeople have sought refuge in the cellar of a large house. Outside, you hear the voices of soldiers who have come to search the house for valuables. Your baby begins to cry loudly. You cover his mouth to block the sound. If you remove your hand from his mouth, his crying will summon the attention of the soldiers who will kill you, your child and the others hiding out in the cellar. To save yourself and the others, you must smother your child to death.

Immediately after reading each scenario, participants read the following question: 'Would you [*Trolley*: flip the switch to save the five people][*Baby/Villager*: smother your baby to save the other villagers]?' on 7-point Likert scales, where 1 was strongly negative and 7 was strongly affirmative. They were given an answer sheet upon which to write their numerical response to the question directly after reading each scenario, before the images appeared.

After responding to the question, a split screen was presented with 5" × 5" (96 dpi resolution) colour grey-scaled[2] images connected to the scenario. For

[2] We grey-scaled (i.e. removed colour) the images from both studies to eliminate any effect that different colours might have – and also so that we did not have to control for colour deficiencies in our participants.

the Trolley scenario, they were shown an image of an overweight man on one side of the screen and an image of five workmen on the other side. For the Baby/Villager scenario, they were shown an image of a baby on one side of the screen and an image of a group of people hiding in a cave (meant to depict the villagers) on the other side. For both, the side on which the images appeared was counterbalanced between participants.

Procedure. The eye-tracking task was part of a larger study (they filled out a survey for an unrelated study about folk meta-ethics after completing the eye tracker portion) and was the first task participants engaged in after filling out an informed consent. Participants were in the laboratory for 30 minutes with roughly 5–10 minutes spent on the eye-tracker. Participants were shown into the eye-tracking room and were asked to make a triangle with their hands and focus with both eyes open on a dot hanging on the wall across the room. Once they had the dot in focus, they were asked to close one eye at a time and observe when the dot disappears. We considered the dominant eye (which was typically the right eye) the one with which they could still see the dot when it was open. After this, they were told to sit close to the desk – 2.5 feet (0.762 meters) from the monitor – in a comfortable position so that they can hold their head still during the tracking. The eye-tracker was focused on the participants' dominant eye followed by a calibration of the device, which involved having them visually follow a series of red squares as they moved across the screen, allowing the eye tracker to lock in on their pupil's location, thereby allowing it to calculate gaze fixation.

Once all this preparatory work was completed, the participants were told that they would be presented with a set of stories for them to consider and that they would be allowed to report their judgements about them after reading each scenario. They were instructed how to write their answers on the sheet in front of them without lowering their eyes from screen, so as to not disrupt the calibration with the eye-tracker for the second scenario (though a minimal amount of disruption nonetheless occurred). At this point, the program was started and the experimenter stepped out of the room until it was finished. After this, participants were instructed to leave their written responses on the desk in front of them and they accompanied the experimenter into another room to participate in the other study.

Results

For the *Trolley* scenario, the average willingness to flip the switch was $M = 5.0$, $SE = .16$. The average number of discrete gaze fixations on the workers was $M =$

10.5, *SE* =.39 and on the individual *M* = 6.2, *SE* =.28. Participants' first glance (measured by their second recorded gaze fixation point) was at the individual 59.3% of the time and at the workers 40.7% of the time.

For the *Baby/Villager* scenario, the average willingness to smother the baby was *M* = 3.0, *SE* =.19. The average number of discrete gaze fixations on the villagers was *M* = 9.4, *SE* =.52 and on the baby *M* = 7.0, *SE* =.39. Participants' first glance (measured by their second recorded gaze fixation point) was at the baby 50.5% of the time and at the villagers 49.5% of the time.

The first thing we examined was the relationship between participants' judgements and their pattern of first glances (measured by their second recorded gaze fixation point), using binary logistic regression.[3] We hypothesized that for both scenarios, people would gaze first *at the beneficiary of that judgement* – an action consistent with both the inclination to seek out or attend to visual information that is consistent with or supportive of the judgement and the inclination to avoid visual information that is inconsistent with or unsupportive of the judgement.

As expected, people's judgements in the *Trolley* scenario about what they would be willing to do significantly predicted the image to which they gazed at first in the Trolley scenario, $X^2(1, N = 92) = 5.3$, $p = .022$. For every single unit increase in participants' willingness to pull the switch, the odds of participants' first glance being at the workers increased by 143% (or a factor of 1.43). This was also true for the *Baby/Villager* scenario, $X^2(1, N = 92) = 3.6$, $p = .050$. For every single unit increase in participants' willingness to smother the baby, the odds of participants' first glance being at the villagers increased by 80% (or a factor of.80).

Next, we examined the relationship between participants' judgements and their gaze fixation frequencies (i.e. the number of times they fixated their gaze upon each of the image options). We hypothesized that people's judgements would predict their tendency to gaze *more* at the beneficiary of their judgement or *less* at the non-beneficiary of their judgement, but not both. Because each of these represents a distinct strategy (approach vs avoidance) we predicted that people would be inclined to employ only one of them – that is, either participants would be inclined to *gaze at the beneficiary image*, which means their gaze would fixate more frequently upon the beneficiary image than anywhere else (including

[3] Binary logistic regression is a statistical technique used to predict the relationship between a continuous predictor variable (in this case, participants' judgements) and a binary predicted variable (in this case, first glance, which could be either at the beneficiary or the non-beneficiary). See Hatcher (2013).

'off-image', in between or outside the range of either image) or they would be inclined to *not gaze at the non-beneficiary*, which means their gaze would fixate less frequently upon the non-beneficiary image than anywhere else. And this is what we found.

Specifically, linear regressions revealed that for the *Trolley* scenario participants' willingness to pull the switch predicted the number of discrete gaze fixations on the workers, B =.60, $t(90)$ = 2.5, p =.016 – i.e. the more willing they were to pull the switch, the more frequently they gazed at the workers – but not with the number of discrete gaze fixations on the individual, B = -.24, $t(90)$ = 1.4, p =.171. So, in this case, participants tended to gaze at the beneficiary of their judgement, not away from the non-beneficiary.

Interestingly, for the *Baby/Villager* scenario this flipped – participants' willingness to smother the baby predicted the number of discrete gaze fixations on the baby, B = -.43, $t(89)$ = 2.1, p =.042 – i.e. the more willing they were to smother the baby, the less frequently they fixated on the baby. But it did not predict the number of discrete gaze fixations on the villagers, B = -.15, $t(90)$ =.5, p =.599. Here, participants tended to *gaze away from* the non-beneficiary, rather than at the beneficiary.

Discussion

We hypothesized that for both scenarios, people would gaze first *at the beneficiary* of their judgement and this is what we found across both scenarios. We also hypothesized that people would either gaze *more* at the beneficiary of their judgement or *less* at the non-beneficiary of their judgement, but not both – which we also found. Specifically, we found that the more willing people were to kill the individual to save the group, the more they gazed at the workers (beneficiary) in the Trolley scenario – suggesting an impulse to direct their gaze *towards*, rather than *away* (i.e. the approach strategy) – and the more willing people were to kill the baby to save the group, the more they gazed away from the baby (non-beneficiary) in the Baby/Villager scenario, suggesting an impulse to direct their gaze *away*, rather than *towards* (i.e. the avoidance strategy). This finding is consistent with Amit and Greene's (2012) finding that participants who judged it wrong to kill the individual reported visualizing the individual more than the group – but the participants who judged it acceptable to kill the individual did not report visualizing the group more than the individual.

This leaves an important question unanswered, however – and that is *why* people employed one strategy for the *Trolley* scenario and another for the *Baby/*

Villager scenario. One possibility is that which strategy gets activated (approach or avoidance) depends upon certain aspects of the scenarios themselves. For example, a clear difference that stands out between the two scenarios chosen for Study 1 (*Trolley* vs *Baby/Villagers*) is the level of difficulty – in terms of the choices participants were asked to make – they represent. While many people report that it would be relatively easy to pull the switch (for discussions about why this might be, see Petrinovich et al. 1993; Greene et al. 2004; Greene et al. 2008; Greene et al. 2009), smothering a baby (even to save a village) is a much more difficult choice. And perhaps this has an influence on the strategy employed. For scenarios where the choice is relatively easy, people would be inclined to gaze at the beneficiaries, their gaze pattern functioning as a sort of visual *confirmation* of their judgement – a sort of 'feel good' impulse to gaze upon the positive outcome of their choice. On the other hand, for scenarios where the choice is difficult – and thus, discomfort and guilt would conceivably be higher – people would be inclined to gaze away from the non-beneficiary, their gaze pattern functioning as a visual *avoidance*, an impulse (likely subconscious) to avoid a source of potential guilt and regret.

Study 2

To test this possibility – namely, that people will employ different strategies for visually processing information, depending upon whether the moral choice they were asked to make was easier or more difficult – we designed another study, the results of which are reported below.

Method

Participants. The participants in this study were 120 students from a southern US institution (82 females; 86% Caucasian, 5% African-American, 4% Asian-American, 2% Hispanic, 3% other) taking Introductory Psychology classes and receiving course credit for their participation. Eye-tracking data for 14 participants was not successfully generated due to difficulties with calibration (similar to Study 1).

Apparatus. Once again, we employed the ERICA eye-tracking device with everything set up in the same way as Study 1.

Materials and Design. In order to test whether people gaze at the beneficiary of their chosen action or away from the person who does not benefit, we developed

six new scenarios that required participants to make a choice that benefitted one person at the expense of another. All six scenarios had a 'strong' version, in which one of the potential beneficiaries was much more desirable/deserving of that benefit than the other (making the choice of who to benefit relatively easy and justified), and an 'ambiguous' version, in which both potential beneficiaries seemed equally desirable/deserving (making the choice between them harder because of its completely arbitrary nature). We hypothesized that for the strong scenarios, people would be inclined to gaze at the beneficiary of their judgement, while for the ambiguous scenarios people would instead be inclined to gaze away from the non-beneficiary.

All six scenarios also included written and visual information about a third person, who would neither benefit nor be negatively impacted by the participants' judgements (more on the reason for this below).

As an example, here is one of the scenarios:

> *Strong version*: Bob has always been on time. He works well with everyone and puts in the extra effort on projects that help the company. Fred is late on a weekly basis and usually clocks out early. He doesn't really interact with anyone else in the company and never puts in extra effort to help get the job done. Joe was just recently hired and is learning the ropes.
>
> *Ambiguous version*: Bob is always on time to work. He works well with all of the other employees and isn't afraid to put in the extra effort to help the company. Fred is very punctual and hasn't been late to work once. He gets along with the rest of the staff and works well with them too. Sometimes he even comes in on Saturday to help finish a project. Joe was just recently hired and is learning the ropes.

For both, participants then saw the question, 'You have the ability to promote either Bob or Fred to a position with a higher salary (being new, Joe is not eligible for a promotion) and you can only promote one. Which of the two would you promote?' In order to avoid the difficulties encountered with having participants write down their responses while trying *not* to look down from the screen, we asked them to respond verbally instead. Thus, they stated their decision after reading the scenario, but before the images came up on the screen. The other scenarios involved the choice of whom to 2) save from drowning, 3) help out with an errand, 4) give a job, 5) rule (in court) in favour of, 6) give an award (see Appendix for full scenarios).

A text box presenting each scenario was presented to participants for 25 seconds followed by a 10 second exposure to 3" × 4" grey-scaled (96 dpi resolution) images depicting the characters presented in each scenario. A

three-second buffer slide containing a dark screen with centred red dot was presented between each slide to reorient the participants' eyes to the centre of the screen. Once again, we considered the first recorded gaze fixation point on the images to be a centred focus point carried over from the buffer slide. Therefore, we counted the second recorded gaze fixation point as the participants' first true glance at the images.

The key difference in Study 2 was that after each scenario, participants where shown three (rather than two) images, two of which represented the individuals they were choosing between and the third – always placed in the middle – was an irrelevant 'other' who would not benefit either way (and could therefore neither be helped nor negatively impacted by the participants' choice). This set up allowed us to better test between the two possibilities – whether people are *gazing at* the beneficiary or *away from* the non-beneficiary – because if participants' first impulse was to gaze at their beneficiary, then we should see a highest frequency of first glances at the beneficiary (as before), but no difference in frequency between the first glances at either the non-beneficiary or the 'other'. If, on the other hand, their first impulse was to gaze away from those negatively impacted by their judgements, then we would expect the lowest frequency of first glances at the person their chosen actions harm/fail to benefit, but no difference in frequency between their first glances at either the beneficiary or the 'other'.

Scenario presentation was varied along two dimensions: first, the order in which the scenarios were presented (1–6 or 6–1) and, second, which of the six scenarios were strong, which ambiguous (participants always got three of each). We did not vary the presentation of the images, or the names assigned to the images, within each scenario.

Procedure. The eye-tracking task was once again a part of a larger study (this time, they filled out a survey for an unrelated study about people's attitudes about free will after completing the eye tracker portion) and was the first task participants engaged in after filling out an informed consent. This time participants were in the laboratory for 50–60 minutes with roughly 5–10 minutes spent on the eye-tracker. Participants were shown into the eye-tracking room and told to sit close to the desk in a comfortable position where they could hold their head still during the tracking. The eye-tracker was focused on the participants' dominant (typically right) eyes followed by a preliminary calibration of the device. The participants were told that they would be presented with a set of stories to consider and that they would be allowed to verbally report their judgements about them after reading each scenario. They were instructed to verbally state

their judgements, which would be recorded by a person sitting directly outside the room. At this point, the program was started and the experimenter stepped out of the room until it was finished. After this, participants accompanied the experimenter into another room to participate in the other study.

Results

In the strong (i.e. easy) versions of the scenarios, participants chose to benefit (i.e. act or judge in favour of) the clear 'deserving' individual in the vignette (e.g. Bob, Laura, Brendan, Joanna, Wayne and Ginger) far more often than the 'non-deserving' individual – on average 87.2% versus 10.8% of the time. In the ambiguous (i.e. hard) versions of the scenarios, however, participants were split between the two (48.3% vs 50.1%). Importantly, across both the strong and ambiguous cases, participants almost never chose the 'irrelevant' individual (1.9% and 1.7%, respectively).

The location of participants' first glance (measured by their second recorded fixation point) was more often the beneficiary of their choices (36.9% of the time for the strong and 32.5% for the ambiguous versions) than either the non-beneficiary (20.0% strong and 18.7% ambiguous) or the irrelevant other (17.9% strong and 30.1% ambiguous). A repeated-measures ANOVA with first glance *location* and scenario *version* (strong/ambiguous) as within-participant variables revealed a main effect for location of first glance, $F(2,182) = 14.5$, $p < .001$, $\eta^2 = .14$. More specifically, paired-sample t-tests revealed that – collapsing across version – participants' first glance was at the beneficiary more often ($M = 44\%$ of participants, $SE = .02$) than either the non-beneficiary ($M = 25\%$, $SE = .02$), $t(91) = 5.0$, $p < .001$, or the irrelevant other ($M = 31\%$, $SE = .02$), $t(91) = 3.3$, $p = .002$ and that there was no difference between participants' first glance at the non-beneficiary versus the other, $t(91) = -1.6$, $p = .096$.

Consistently with our hypothesis, however, the ANOVA revealed a more complicated story. Specifically, there was an interaction between location and version, $F(2,182) = 3.6$, $p = .029$, $\eta^2 = .04$. A series of paired-sample t-tests revealed that, for the strong version of the scenarios, the location of first glance mapped onto the general pattern mentioned above: there was a significant difference between participants' first glances towards the beneficiary ($M = 43\%$ of participants, $SE = .03$) versus the non-beneficiary ($M = 21\%$, $SE = .02$), $t(91) = 5.0$, $p < .001$, as well as a significant difference between participants' first glances towards the beneficiary versus the irrelevant other ($M = 23\%$, $SE = .02$), $t(91) = 4.6$, $p < .001$, but no difference between participants' first glances towards the

non-beneficiary versus the irrelevant other, $t(91) = -.6$, $p = .528$. Thus, it would appear that when the choice of who to benefit was easy and justified, people's first glance was clearly *towards the beneficiary* of their choice.

For the ambiguous version of the scenarios, however, the opposite pattern emerged. Paired-sample t-tests once again revealed a significant difference between participants' first glances towards the beneficiary ($M = 36\%$ of participants, $SE = .03$) versus the non-beneficiary ($M = 22\%$, $SE = .03$), $t(91) = 2.8$, $p = .006$. But, we also found a significant difference between participants' first glances towards the non-beneficiary versus the irrelevant other, ($M = 33\%$, $SE = .03$), $t(91) = -2.3$, $p = .025$ and *not* between participants' first glances towards the beneficiary versus the irrelevant other, $t(91) = .5$, $p = .636$. Thus, it appears that when the choice of whom to benefit was not easy (but was rather difficult and arbitrary), people's first glance was *away from the non-beneficiary*, rather than towards the beneficiary of their choice (Figure 3.1).

Now turning to participants' frequency of gaze fixations, the average number of discrete gaze fixations on the beneficiary of participants' choices was $M = 2.1$, $SE = .21$ for the strong scenarios and $M = 2.2$, $SE = .21$ for the ambiguous scenarios, while the average number of discrete gaze fixations on the non-

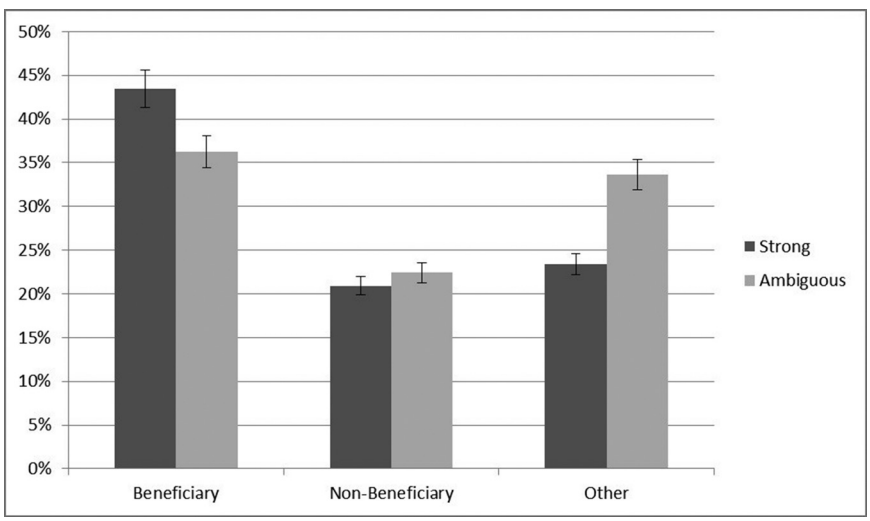

Figure 3.1 Study 2, Percentage of first-glances to the beneficiary, non-beneficiary, and 'other' individuals in the strong (easy) and ambiguous (hard) conditions. Error bars represent standard error.

Table 3.1 Study 2, Expectations of frequency of discrete fixations by condition.

	Beneficiary	**Other**	**Non-Beneficiary**
Strong (Easy) Cond	Look More	Look Less (**SONB**)	
Ambiguous (Hard) Cond	Look More (**AOB**)		Look Less

beneficiary was M = 1.8, SE =.19 for the strong scenarios and M = 1.6, SE =.17 for the ambiguous scenarios.

Given the above, our expectation should be that for the strong versions of the scenarios, people would gaze more frequently (in terms of number of discrete gaze fixations) at the beneficiary than either the non-beneficiary or the irrelevant other – yet, in the ambiguous versions of the scenarios, they would gaze less frequently away from the non-beneficiary than either the beneficiary or the irrelevant other (see Table 3.1 for diagram).

In other words, we should expect that participants would gaze significantly less frequently at the other/non-beneficiary when given the strong version of the scenarios (SONB) than at the other/beneficiary when given the ambiguous version of the scenarios (AOB). And this is what we found: the number of SONB gaze fixations was significantly less (M = 60.5%, SE =.02) than the number of AOB gaze fixations (M = 70%, SE =.01), $t(101) = 4.3$, $p < .001$.

In addition, for the strong versions of the scenarios, people more frequently gazed at the beneficiary (M = 37.3%, SE =.02) than either the non-beneficiary (M = 31.6%, SE =.01) or the other (M = 31.1%, SE =.02), t's (107) = 2.3 and 2.1, p's =.027 and.040, respectively. And for the ambiguous versions of the scenarios, they looked less frequently at the non-beneficiary (M = 27.1%, SE =.01) than either the beneficiary (M = 38.8%, SE =.02) or the other (M = 33.1%, SE =.01) t's (107) = 5.6 and 3.1, p's <.001 and.002, respectively.

Discussion

Study 2 confirmed that people's first glance was at the beneficiary of their judgement. It also confirmed that which strategy this first glance represented (approach or avoidance) depended upon whether the choice they were making was fairly easy and justified (as in the 'strong' scenarios) or hard (as in the 'ambiguous' scenarios). Specifically, in the former situation, people's first glance was *towards* the beneficiary, but in the latter case, it was *away from* the non-beneficiary. In further support, people more frequently gazed at (in terms of

discrete gaze fixations) the beneficiary when given the easy choice and more frequently away from the non-beneficiary when given the hard choice.

General discussion

Taken together, these two studies provide evidence that people's moral judgements influence the way they attend to and process sensory information. Study 1 found that participants gazed first and most frequently at the beneficiary of their chosen actions. Yet, whether their gaze pattern was towards the individual benefitted or away from the individual not benefitted – that is, whether it functioned as a visual *confirmation* or a visual *avoidance* of their intended action – varied depending on the scenario presented. We hypothesized that this could be because the choice participants were being asked to make was easier in one of the scenarios (Trolley) than the other (Baby/Villager).

Study 2 was designed to test this possibility and found that when one of the two individuals in the scenario was set up to clearly deserve the benefit more than the other, making the participants' choice easier, then their gaze patterns did indeed act *confirmatory* in nature, visually gazing at the beneficiary they had chosen first and most frequently. When, on the other hand, the two individuals were on par with one other, making participants' choice about who to help/benefit harder and more arbitrary, their gaze patterns functioned more like an *avoidance* mechanism, gazing first and most frequently at someone other than the individual their choice harmed/failed to benefit.

In sum, there is extensive evidence that people's morally relevant beliefs and judgements are influenced by the presence of seemingly irrelevant sensory information – particularly, when they attend to it – but this is the first evidence we are aware of that people's moral judgements likewise influence how they attend to and process sensory information. In conjunction with the previous literature discussed in the introduction, this suggests a strong bi-directional relationship between people's moral cognition and their attention to sensory information – in this case, visual. In other words, not only are we likely to form important moral judgements on the basis of the sensory information we have attended (or avoided attending) to, but we are likely to reinforce those judgements through our later patterns of sensory processing.

Why did participants choose one strategy (visually 'approaching' positive stimuli) when their judgements were easy – or, at least, *less* difficult – and

another (visually 'avoiding' negative stimuli) when their judgements were *more* difficult? It might be that in the former situation, there are less negative emotions generated – indeed, some have argued that scenarios like *Trolley* do not elicit much emotion at all, but rather trigger more rational, utilitarian calculus (e.g. Greene et al. 2001) – and so the default (i.e. 'adaptive')[4] strategy would be for people to gain as much judgement-relevant information as they can, in this case by attending first and most frequently to the visual information relevant to the outcome of their judgements. In the latter situation, on the other hand, the presence of stronger negative emotions or conflict associated with making an 'impossible' decision could trigger an avoidance mechanism – now the main goal is to avoid gazing at anything that would exacerbate that negative state.

It is interesting to note that this seems consistent, at least on the surface, with the visual patterns observed in optimistic, non-depressed and non-anxious participants (see Introduction) – that is, their tendency to attend to positive information and avoid negative information. But this means that it is also inconsistent with the patterns observed in pessimistic, depressed and anxious people, who seemed more inclined to attend to negative information (though it is not clear that they avoided positive information). If this is correct, then it would suggest that the visual patterns we found may be consistent with more general 'low-level' (e.g. perception rather than cognition) strategies we have developed to help maintain optimal health and well-being. Of course, whether they also contribute to good social-moral decision making is a question that deserves further exploration.

Strengths and limitations of gaze-tracking technology

The research reported here explored an exciting methodological route for experimental philosophers to pursue. The use of technologies such as the eye-gaze tracking device allow for a deeper exploration into how sensory information influences and is influenced by the sorts of attitudes, beliefs and judgements philosophers care about, not only in ways that our models of rationality would

[4] Elsewhere, people have argued for evolutionary account of 'adaptive attentional attunement', which is the view that we evolved to attend more to information that is socially/ relevant to our well-being/ survival, such as physical attractiveness in women and social status in men (e.g. Maner et al. 2007; DeWall and Maner 2008).

predict, but in surprising, counterintuitive ways – ways that help us to better map out a more accurate model of human cognition.

The strengths of this methodological approach are that it allows us to measure non-conscious processes – things people are unaware of and, thus, unable to report. This is one of the things that makes this approach so useful in research with infants, people on the autism spectrum, and people otherwise unable to communicate.

Like the Implicit Attitudes Test (IAT, Greenwald et al. 1998) and other forms of 'implicit attitude' measurement, eye-tracking technology can be used to access various qualities of people's implicit visual processing. Specifically, it can be used to measure their gaze fixation frequency and duration, as well as their scan path – i.e. how often they gaze at specific visual stimuli, for how long and in what order. This allows us to examine the role of such information in influencing, and being influenced by, people's consciously reported responses.

The downsides to using gaze-tracking technology are two-fold. First, it is expensive, requiring special equipment and software to run, as well as training on how to calibrate it properly to each individual to minimize error. Such calibration can be problematic, especially for people who wear glasses or have very dark irises (making the pupil hard for the eye tracker to detect). This has a worrying side-effect of making certain demographics of people more difficult to test than others. Secondly, this technology provides us with access to a fairly limited range of information – namely, facts about how people attend to and process visual information. While there are certainly areas of cognition where this information is helpful – for example, uncovering potential sources of error or bias in people's processing of and attitudes about visual information – there is only so much we can learn by examining where and when and for how long people look (but see Chapter 2 in this volume).

Relevance to experimental philosophy

It is also worth considering why using this technology to uncover the way people's moral judgements are influenced by and influence processing of sensory information – while potentially worthwhile for social scientists, who need an accurate picture of how people form and use their judgements in order to be able to explain and predict their behaviour – would be a worthwhile endeavour for experimental philosophers.

One obvious response is because experimental philosophers are already doing this sort of research. That is, as the citations listed earlier in this chapter indicate, they already care about how people form and use their moral judgements, whether that's of deeper philosophical significance or not. And giving them a wider range of technologies and methodologies to employ only strengthens their ability to study and draw conclusions about their topic of interest, such as 'folk morality'.

But we think there are two additional reasons worth mentioning. First, as many philosophers have observed, to the extent that philosophical theories diverge from reality – to the extent that they predict judgements or behaviour that is not what we actually observe – then the onus is on the philosophical theory to justify the divergence (Knobe and Nichols 2017). And second, knowing how human beings think, feel and behave provides a valuable meta-cognitive lens for understanding how they *philosophize* (i.e. which philosophical models are likely to seem the most accurate, to be the most attractive). In other words, utilizing an expansive empirical methodology to explore the intersections between philosophical inquiry and human cognition seems like a good idea.

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Appendix to Chapter 3

Example of images:

Study 1, Baby/Villagers

Study 2, Case 1

Study 2 Scenarios

Case 1 – described above

Case 2

Strong: Jack and Laura are two seven-year-olds making snow angels on a hill near a river (and you are babysitting Jill, Jack is one of her neighbours). Jack gets jealous because Laura's snow angle is better than his and so he shoves her really

hard and she tumbles down the hill into the river. Shoving her causes him to slip on the ice and so he tumbles into the river directly behind her. Pat is a friend of theirs who was also making a snow angel nearby and saw what happened. You were standing down by the river and witnessed the event, as well as both children falling in.

You jump in to save them (Pat was too far away to respond), but the current is very strong and is pulling them in two different directions. Therefore, you only have time to save one of them. Who do you save?

Ambiguous: Jack and Laura are two seven-year-old twins that you are babysitting. They are making snow angels on a hill near a river. Jack tries to help Laura stand up out of her snow angel but pulls too hard and they both tumble down the hill into the river. Pat is a friend of theirs who was also making a snow angel nearby and saw what happened. You were standing down by the river and witnessed the event, as well as both children falling in.

You jump in to save them (Pat was too far away to respond), but the current is very strong and is pulling them in two different directions. Therefore, you only have time to save one of them. Who do you save?

Case 3

Strong: You are the only college student in your dorm with a car. Brendan needs you to take a letter to the post office before they close; Richard needs you to take a package to the FedEx store. Brendan has always been there for you when you needed something. Richard is very flaky with everything, especially when you need a favor. Matt is your other friend you often go drinking with.

These two stores are in different parts of town and you only have time to make it to one. Which friend (Brendan or Richard – at this point Matt is not asking you for a favour) do you help out?

Ambiguous: You are the only college student in your dorm with a car. Brendan needs you to take a letter to the post office before they close; Richard needs you to take a package to the FedEx store. Both of them have been there for you when you needed a favour and are very dependable. Matt is your other friend you often go drinking with.

These two stores are in different parts of town and you only have time to make it to one. Which friend (Brendan or Richard – at this point Matt is not asking you for a favour) do you help out?

Case 4

Strong: Joanna has volunteered at numerous community centres focused on helping the elderly. She has just received her BS in Psychology from the College of Charleston. She has numerous awards, was an executive member of the Psychology Club and received an overall GPA of 3.8. Sarah got the interview because her father knew the director. She dropped out of college after her junior year. Her cumulative GPA until that point was a 2.0 and on a background check, an arrest came up for shoplifting. Zoey is another former CofC student who was thinking about applying for the job, but decided not to.

You only have one job opening at your nursing home and so you have to choose who to give the job to (either Joanna or Sarah – Zoey decided not to apply for the job), so who do you hire?

Ambiguous: Joanna has a lot of relevant experience working with the elderly. She is a recent CofC graduate with a BS in Psychology. Her cumulative GPA is 3.8. Sarah has volunteered at a lot of nursing homes and has gained relevant experience from doing so. She graduated from college last year with a BS in Psychology. She has received many awards and honors for volunteering and helping the elderly community. Her cumulative GPA is a 3.5. Zoey is another former CofC student who was thinking about applying for the job, but decided not to.

You only have one job opening at your nursing home and so you have to choose who to give the job to (either Joanna or Sarah – Zoey decided not to apply for the job), so who do you hire?

Case 5

Strong: Wayne has accused Patrick of beating him up at a local bar and stealing his wallet. Patrick has had numerous arrests in the past. He once almost beat another man to death. His fingerprints were all over Wayne's wallet when they found it. Wayne's injuries are consistent with his story and the bruises on Patrick's hand provide evidence as well. Plus, there was a security camera in an ATM in the bar that caught Patrick confronting Wayne. Nonetheless, Patrick maintains his innocence. Ralph was the bartender at the bar, but he had stepped away from the bar at the time and so didn't see anything.

You are the judge in this case and you have to decide who to rule in favour of (Patrick or Wayne). Ralph can't help you decide, since he didn't see anything. If you rule in favour of Patrick, the charges will be dropped and he will be free to

go. If you rule in favour of Wayne, Patrick will be charged with battery and theft. Who do you rule in favour of?

Ambiguous: Wayne has accused Patrick of beating him up at a local bar and stealing his wallet. Both men were pretty battered. Patrick says that Wayne was the one who started the fight by throwing a beer bottle at him and that Wayne's wallet must have fallen out of his pocket during the fight. Wayne, on the other hand, says that Patrick was trying to go for his wallet during the fight. The wallet was found on the bar floor with no cash and a missing debit card. Patrick's prints were found on the outside of the wallet, but he might have touched it during the fight. Ralph was the bartender at the bar, but he had stepped away from the bar at the time and so didn't see anything.

You are the judge in this case and you have to decide who to rule in favour of (Patrick or Wayne). Ralph can't help you decide, since he didn't see anything. If you rule in favour of Patrick, the charges will be dropped and he will be free to go. If you rule in favour of Wayne, Patrick will be charged with battery and theft. Who do you rule in favour of?

Case 6

Strong: Two students are in the running for 'best overall female student of the year'. Ginger is a senior at CofC with a cumulative GPA of 3.9 and has been involved in many campus clubs and organizations, including one she started to have a positive impact on child literacy rates in the local community. She also has an on-campus job helping incoming freshmen adjust to college and is considered by many to be a fabulous mentor. Amber is also a senior at CofC. Her application is also very strong – cumulative GPA of 3.75, lots of community and campus involvement, in addition to a few strong leadership positions in student affairs. However, right before the decision is to be made, you discover that Amber is suspected of cheating on her final exams and dealing drugs on campus. Last year's award winner, Rachel, will be the one to deliver the award to the new winner this year.

You are on the committee determining who (Ginger or Amber) should receive the award that Rachel will deliver to the winner. Which of these students would you give award to?

Ambiguous: Two students are in the running for 'best overall female student of the year'. Ginger is a senior at CofC with a cumulative GPA of 3.9 and has been involved in many campus clubs and organizations, including one she started to have a positive impact on child literacy rates in the local community. She

also has an on-campus job helping incoming freshmen adjust to college and is considered by many to be a fabulous mentor. Amber is also a senior at CofC. Her application is also very strong – cumulative GPA of 3.75, lots of community and campus involvement, in addition to a few strong leadership positions in student affairs. Also, right before the decision is to be made, you discover that Amber volunteers at a local senior centre with patients with Alzheimer's disease. Last year's award winner, Rachel, will be the one to deliver the award to the new winner this year.

You are on the committee determining who (Ginger or Amber) should receive the award that Rachel will deliver to the winner. Which of these students would you give award to?