



Review

Moral dilemmas in cognitive neuroscience of moral decision-making:
A principled review

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ABSTRACT

Moral dilemma tasks have been a much appreciated experimental paradigm in empirical studies on moral cognition for decades and have, more recently, also become a preferred paradigm in the field of cognitive neuroscience of moral decision-making. Yet, studies using moral dilemmas suffer from two main shortcomings: they lack methodological homogeneity which impedes reliable comparisons of results across studies, thus making a metaanalysis manifestly impossible; and second, they overlook control of relevant design parameters. In this paper, we review from a principled standpoint the studies that use moral dilemmas to approach the psychology of moral judgment and its neural underpinnings. We present a systematic review of 19 experimental design parameters that can be identified in moral dilemmas. Accordingly, our analysis establishes a methodological basis for the required homogeneity between studies and suggests the consideration of experimental aspects that have not yet received much attention despite their relevance.

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Contents

1. Introduction.....	1250
1.1. The context.....	1250
1.2. Moral dilemma research to date.....	1250
2. Rationale behind a moral dilemma.....	1251
3. Dilemma formulation.....	1252
3.1. Presentation format.....	1252
3.2. Expression style.....	1253
3.3. Word framing effects.....	1253
3.4. Word number count.....	1254
3.5. Participant perspective.....	1254
3.6. Situational antecedent.....	1255
3.7. Order of presentation.....	1255
3.8. Type of question.....	1255
3.9. Justifications.....	1256
4. The experimental participant and her relatedness to the story characters.....	1256
4.1. Demographic variables of the participant.....	1256
4.2. In/outgroup.....	1256
4.3. Kinship/friendship.....	1259
4.4. Speciesism.....	1259
5. Dilemma conceptualization.....	1259
5.1. Intentionality.....	1259
5.2. Kind of transgression.....	1260

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5.3.	Directness of harm	1260
5.4.	The trade-off	1260
5.5.	Normality of harm	1260
5.6.	Certainty of events	1261
6.	Schematic overview of 25 studies in relation to the 19 design parameters	1261
7.	Conclusion and discussion	1262
7.1.	Conclusion	1262
7.2.	Future directions: a theoretical framework for working hypotheses	1262
	Acknowledgements	1262
	References	1262

“...the use of artificial moral dilemmas to explore our moral psychology is like the use of theoretical or statistical models with different parameters; parameters can be added or subtracted in order to determine which parameters contribute most significantly to the output.” (Hauser et al., 2007)

1. Introduction

1.1. The context

A morning press release in a daily newspaper informs the well-protected public of a terrible incident in a foreign war-swept country. Apparently rebel troops assaulted a little village on the search for enemy soldiers and recklessly killed also innocent civilians. Frightened, the village inhabitants had hidden together in small groups – so not all had been found and killed. When the enemy had finally left, however, it turned out that one of the women had smothered her baby. She had been trying to keep it quiet so its cries wouldn't give away her group's hiding place to the soldiers, who would have killed them all on the spot.

Such horrible stories about real-life scenarios where people are forced to make moral decisions about life and death, flicker over our TV screens every day. Or, they are brought to us by the radio, via the internet when checking our emails, or by friends who tell us about what they've “heard”. Confronted with this kind of information, we all immediately have feelings about it, and we make judgments of approval and reproach. Some of us may even be asking ourselves, *what would I have done in her place?* Of course we then happily recognize how lucky we are not having to make such moral decisions involving life and death.

But, what if one is taken to a cognitive neuroscience laboratory and asked the same question? *Would you...?* In the quest for the foundational principles of human moral cognition, cognitive scientists have done exactly this: asked experimental participants to judge such morally dilemmatic situations.

It is clear that this experimental set-up does not allow to study *real-life-or-death* decisions, but this is not the intention here (an analysis of real-life decisions made in dilemmatic situations throughout the turmoils of the 20th century would serve that goal). Conversely, moral judgments of *hypothetical* real-life moral dilemmas provide the cognitive scientist with valuable insight into the foundational psychological processes that underlie human moral cognition. Thus, considering the example above, human moral judgment generally deems it wrong to kill a baby, but experiments have shown that there are many variables that influence how an individual eventually judges a moral transgression such as this one (smothering the baby). What if the person to sacrifice to save the others was not a baby, but a fellow adult? A foreigner? What if the protagonist (here the *mother*) would not be killed if the soldiers found them, only the men in the group? *Would you smother your baby if...?* And so forth.

When compared to other experimental approaches used in empirical studies of moral cognition – such as paradigms

involving semantic judgments to sentences with moral content (Heekeren et al., 2003), judgments of disgust and indignation to sentences with moral-emotional connotations (Moll et al., 2005), or moral judgments after participation in game tasks such as the Dictator or Ultimatum games (Hofmann and Baumert, 2010; Takezawa et al., 2006) – moral dilemmas present a series of advantages: first, they permit the inclusion of many more variables in the formulation than in single sentences only, making possible a more holistic approach. Second, they allow the inclusion of all these variables under a higher level of experimental control, as compared to other approaches: the dilemmas are exactly the same for each individual participant and not subjected to the variability that may occur when different individuals – and even actors – intervene in the experiment. Third, a skeptic may remark that the extreme nature of some moral dilemmas simply grasps the reader's attention in such brusque manner that subtle variations in the dilemma formulation suffice to trigger distinct moral judgments. However, reality tells a different story. As shown by means of the *press release* example above, even extreme moral conflicts may be part of all individuals' everyday life. Moral dilemmas allow one to elicit these moral conflicts and to thoroughly investigate which parameters our basic moral intuitions respond to – and all this, under a high level of experimental control.

Consequently, a growing number of authors argue that moral dilemmas – such as the famous *Crying Baby* dilemma above (Greene et al., 2001) – offer a valuable tool to study closely which factors trigger the underlying psychological processes that constitute the foundations of human moral cognition (Greene, 2008; Haidt and Graham, 2007; Hauser et al., 2007; Nichols and Knobe, 2007). This approach will ultimately allow us to draw conclusions about real-life moral decision-making which draw on these foundational psychological processes.

1.2. Moral dilemma research to date

The past decade has witnessed a blossoming of studies in Moral Psychology and Neuroethics. Following the lead of Damasio and his colleagues (Damasio, 1995) in providing neuroimaging evidence that emotional processing is involved in decision-making, many studies that have focused on moral judgment and ethical decision-making have given rise to models that also link moral judgment to emotion (Greene, 2008; Greene et al., 2002, 2004, 2001; Haidt, 2001; Moll et al., 2002, 2005). Among the many experimental paradigms used in this field of research, moral dilemmas are very popular. The reason, as the initial quote points out, is clear: by means of an adequate moral dilemma design, this methodology allows to systematically explore how distinct parameters modulate our moral judgment (Hauser et al., 2007). However, there has been a lack of principled analysis of the relevant parameters involved in moral dilemma formulation, and research appears to have proceeded in a rather piecemeal fashion. Now, the methodological heterogeneity in the field has reached such a level that the

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