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# Parental Concepts and Genetic Relations: An Experimental Philosophy Study in Reproductive Ethics

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## Abstract

In this article, we present findings from an experimental study in reproductive ethics that examines how people think about reproduction and parenthood. Our results show that, although we often take for granted that everyone interprets these concepts—and the links between them—in the same way, this assumption may not hold. For instance, one might expect that if "x is y's father," then "y is x's child" must also be true. Yet our participants did not consistently accept this inference. This suggests that, at a minimum, discussions about reproduction and parenthood require clarity about the specific relationships being referenced. It also indicates the need to investigate more closely the factors that shape or weaken the connections between these concepts. Such work cannot rely solely on theoretical analysis or empirical data, but must draw on a combination of both approaches.

**Keywords:** Ethics- Medical, Ethics, Parenthood, Genetic relations

## Introduction

Reproductive ethicists frequently rely on terms like sibling, parent, child, donor, genes, and biology. These concepts are generally treated as stable and dependable, allowing us to assume that everyone using them is referring to the same ideas. This apparent stability provides a foundation for debates about issues such as the rights and responsibilities of biological versus social parents. Once we adopt a particular interpretation—for instance, prioritizing biological connections over social ones as indicators of parenthood—we often assume that we apply these concepts consistently and that they stand in predictable relationships to one another. Under this view, if Marc is Suzanne's parent, it automatically follows that Suzanne is Marc's child. We also tend to presume a shared understanding of what it means for someone to have reproduced.

Such assumptions carry significant normative weight. If "having reproduced" is treated as essentially equivalent to "being a biological parent," then the obligations and rights of those who reproduce are assumed to match those of biological parents. For example, Velleman argues that individuals who reproduce genetically are the true parents of the resulting children and, consequently, that donor conception is morally problematic because it deliberately separates children from their genetic parents [1]. Decisions about how to interpret these concepts shape practical, legal and ethical perspectives on issues like donor conception.

### *Reproduction and parenthood*

Since the 1970s, with bioethics emerging as its own field and with the introduction of in vitro fertilisation (IVF), ethical questions concerning reproduction and reproductive technologies have multiplied. As biomedical innovations continue to develop, terms like

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mother, biological parent, and reproduction have been increasingly questioned. Concepts once seen as biologically fixed are now more often viewed as flexible, indeterminate, or partly or entirely shaped by social factors.

In response, new strands of inquiry have taken shape in the academic literature. Notably, debates about reproduction and parenthood have become central. Numerous philosophical theories of parenthood exist [2, 3]. Some prioritise biological ties, others emphasise the intentions of would-be parents, and still others treat the causal role in conception as crucial. Another group follows a Lockean perspective, construing parenthood as a status gained through one's actions—particularly caregiving—toward a child. Within biologically grounded accounts, parenthood is often understood as a determinate genetic relationship inherently linked to reproduction. Considerable conceptual and empirical work has addressed these themes [4-10].

Our contribution extends this larger discussion by examining a very specific connection between reproduction and ideas of parenthood. In this paper, we investigate how people understand the relationship between genetics, reproduction, and fatherhood by presenting scenarios in which the genetic link is slightly modified with each version.

*Experimental philosophy*

It was once a common shortcoming in analytic philosophy to assume that philosophers' intuitions reflected those of any "reasonable" person. More recent philosophical approaches aim to move beyond such assumptions. Cannold has highlighted how moral philosophers often fail to adequately understand and engage with laypeople's reasoning about abortion [11]. Empirical methods—such as those employed by Cannold—provide opportunities to interact with the public in ways that can uncover new perspectives on traditionally "philosophical" issues. Such approaches may help philosophers avoid becoming, in Wittgenstein's words, a wheel that spins without anything to grip [12].

The method we employ in this paper is known as experimental philosophy [13, 14]. Typically, an experimental philosophy study constructs several vignettes describing a scenario in which one variable is systematically changed across versions. These vignettes are then shown to participants. This approach can bring to light surprising patterns or inconsistencies in how people interpret certain concepts, thereby aiding philosophers in understanding how such concepts—and the relations between them—are formed. XPhi research has also revealed notable cross-cultural differences in intuitions [15]. Numerous studies have been conducted in areas such as epistemology, free will, moral theory, and aesthetics [16, 17]. Recently, work within experimental philosophy of medicine and experimental philosophy of bioethics has grown as well [18].

In reproductive ethics, empirical research methods such as interviews, focus groups, and surveys have become increasingly common since around 2000 [11]. Even so, experimental philosophy as a specific methodology has been only minimally applied. While there are intersections among empirical ethics, qualitative research, and experimental philosophy [19], the latter—at least as we use it—differs meaningfully from the kinds of empirical studies typically carried out by ethicists and qualitative researchers.

Experimental philosophy is, in certain respects, more restricted in scope. Especially when vignettes are used, the focus lies on a specific concept; participants are limited to the responses the study design permits and cannot exchange thoughts or experiences beyond these constraints. Consequently, the goals of this methodology differ substantially from, for example, qualitative interviews exploring experiences of fertility treatment or focus groups designed to surface ethical concerns around a specific issue. Often, the main purpose in experimental philosophy is to identify the factors that shape participants' understanding of a particular concept. In this sense, vignette-based XPhi may resemble conceptual engineering more closely than empirical ethics or qualitative inquiry.

Experimental philosophy offers an additional means of exploring the questions central to our project. It can also reveal features of people's thinking that other methods may overlook. The emerging field of experimental philosophical bioethics, for instance, seeks to "make sense of the eliciting factors and underlying cognitive processes that shape people's moral judgments, particularly about real-world matters of bioethical concern [14]." Experimental philosophy of medicine examines intuitions about concepts such as disease, health, and disability [18]. As with any empirical method, potential limitations exist that may undermine findings or restrict their generalizability [20]. We recognise these challenges and maintain that, within experimental philosophy, it is crucial to clearly identify the concepts

under examination, interpret findings cautiously, and resist drawing premature normative conclusions. For these reasons, we consider the method especially valuable for analysing concepts in reproductive ethics, where ambiguity and indeterminacy are frequent.

In this study, situated within experimental reproductive ethics, we sought to determine whether respondents view reproduction as necessarily implying parenthood, and whether "x is y's parent" entails "y is x's child." We also aimed to explore the extent to which genetic contribution is regarded as necessary or sufficient for reproduction, parenthood, and "being someone's child." More broadly, our goal was to assess the usefulness of experimental philosophy in illuminating key issues in reproductive ethics. The research question guiding our study was:

Do people's judgments about who has reproduced, who is a parent, and who has a child vary depending on the level of genetic relatedness involved?

In what follows, we outline the vignettes used in our study, describe our methodology, and discuss our results.

## Materials and Methods

*Design*

We created three vignettes, and for each vignette we developed three distinct sets of questions. Each question set contained four items, all answered on a 5-point Likert scale ranging from "completely disagree" to "completely agree." To gather data, we recruited 450 participants through Prolific, an online platform that supports participant recruitment for research [21].

The target sample size was calculated using Qualtrics' online sample size calculator, assuming a population of 1,000,000, a 95% confidence level and a 5% margin of error. This calculation indicated that 384 participants would be sufficient. We increased the number to 450 so that we could implement a 9×50 between-subjects design, meaning that each of the nine combinations of vignette and question set was shown to 50 participants.

Our only eligibility requirements on Prolific were that participants be native English speakers and that the sample be gender balanced. Aside from age and gender, no additional demographic data were collected. Participants represented a broad range of ages, although the majority were between 25 and 44. Because both age and geographic location may influence responses, we regard this as a pilot study and recommend that it be replicated in other regions and with a wider range of age groups. **Figure 1** provides a summary of the structure and flow of the vignettes.

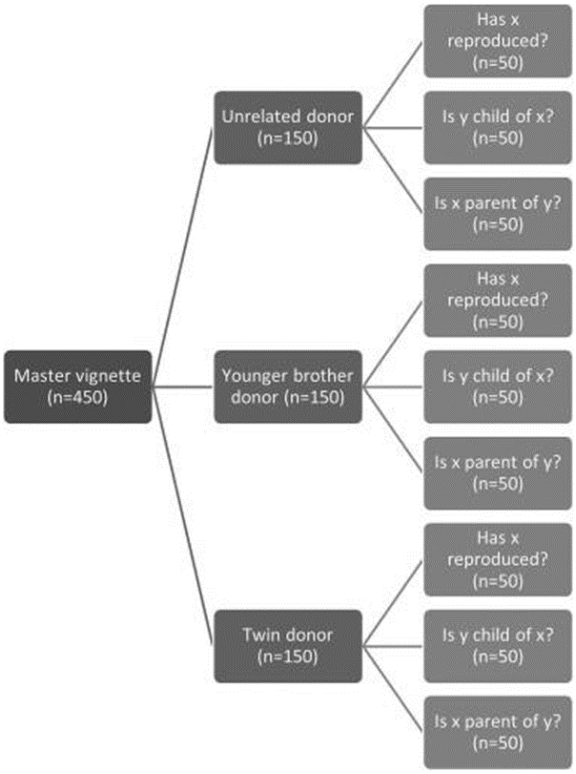


**Figure 1.** Flow of the vignettes.

This study did not require formal ethical approval. We did not collect any personally identifying information, and we implemented a detailed consent procedure to ensure that participants clearly understood the study and voluntarily agreed to participate.

We developed a set of vignettes in which the genetic relationship between the social father, Marc, and the sperm donor varied in three ways. In one scenario, the sperm came from an unrelated donor; in another, from Marc's younger brother; and in a third, from Marc's identical twin. Participants responded to four questions that asked them to rate their agreement with statements such as whether Marc, the sperm donor (or brother/twin), or the fertility doctor "has reproduced." Additionally, we varied the phrasing of the questions to focus on whether someone "has reproduced," "is a parent of," or "is a child of."

The vignette presented to participants was as follows:

Marc and Maria are a long-term couple who have always wanted to become parents. Marc, however, is infertile. A fertility doctor creates an embryo using Maria's egg and [sperm from a sperm bank/sperm from Marc's younger

brother/sperm from Marc's identical twin brother], which is then implanted into Maria. Maria becomes pregnant, and Marc and Maria achieve their goal: the birth of their child, Suzanne.

*Analysis*

The dataset was analysed using SPSS version 29. We treated responses on the 5-point Likert scales as continuous variables. Initially, descriptive statistics—including the minimum and maximum values, means, and standard deviations—were computed. One-way ANOVA tests were then conducted to examine (1) differences across the three genetic scenarios (unrelated donor, brother, identical twin) and (2) differences across the three question types ("has reproduced," "is a parent of," "is a child of"). Where ANOVAs indicated significant effects, Tukey post hoc tests were used to determine which specific pairs of means differed. To account for multiple comparisons, the false discovery rate (FDR) method was applied to all ANOVA p values, and all significant findings remained robust after this adjustment. Because the post hoc analyses were only performed following significant ANOVAs, no additional correction for multiple testing was applied to the Tukey results. Consequently, p values less than 0.05 were treated as statistically significant.

## Results and Discussion

We began by examining whether participants' judgments about who has reproduced, who is a parent, and who has a child varied according to the genetic contribution. In the scenario involving the younger brother as the sperm donor, two significant patterns emerged. Participants were more likely to consider Marc as a parent than to regard Suzanne as his child ($p < 0.001$) **(Figure 2)**. Conversely, they were more likely to identify Suzanne as the child of the donor than to describe the donor as Suzanne's parent ($p < 0.001$) **(Figure 3)**. Additionally, participants showed a slight tendency to agree that "Marc has reproduced" when the sperm came from an unrelated donor compared with when it came from Marc's younger brother or his identical twin, although this difference did not reach statistical significance.

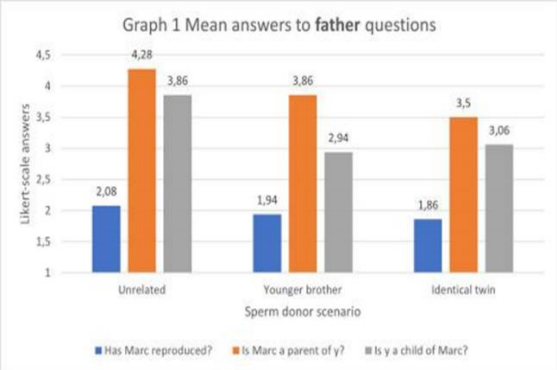


**Figure 2.** Average responses to the three question formulations regarding Marc across the different genetic contribution scenarios. Responses were recorded on a 5-point Likert scale, where 1 = completely disagree, 3 = neither agree nor disagree, and 5 = completely agree.

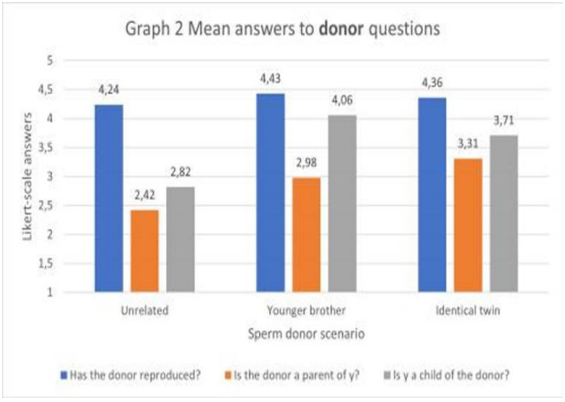


**Figure 3.** Average responses to the three question formulations concerning the donor across the different genetic contribution scenarios. Responses were measured on a 5-point Likert scale, where 1 = completely disagree, 3 = neither agree nor disagree, and 5 = completely agree.

We then explored whether participants' intuitions varied when judging statements such as "Is X a parent?", "Is Suzanne X's child?", and "Has X reproduced?", where X referred to Maria, Marc, brother/the sperm donor/ identical twin, or the fertility doctor, depending on the relationships between the intended parents and the donor. Analysis revealed significant differences in the mean responses for Marc in the parent and child formulations (parent: $p = 0.013$, $F = 4.439$; child: $p < 0.001$, $F = 7.339$) and for the donor (parent: $p = 0.003$, $F = 5.958$; child: $p = 0.001$, $F = 14.515$).

Looking more closely at the effect of genetic contribution, for Marc, significant differences were

observed between the unrelated donor and identical twin scenarios (parent: $p = 0.010$; child: $p = 0.007$), as well as between the unrelated donor and younger brother scenarios (child: $p = 0.002$) **(Figure 2)**. For the donor, significant differences were also found when comparing the unrelated donor to the identical twin scenario (parent: $p = 0.002$; child: $p < 0.001$) and when comparing the unrelated donor to the younger brother scenario (parent: $p = 0.082$; child: $p < 0.001$) **(Figure 3)**.

Our findings included both anticipated patterns and surprising outcomes. In particular, the perceived "closeness" of the donor to the social father appeared to influence how participants attributed parenthood, beyond what would be expected based solely on genetic contribution. While we anticipated differences between judgments of "has reproduced" versus "is a parent" or "is a child," we did not expect participants to distinguish between "is y's parent" and "is x's child" in certain cases. For instance, when the donor was a (younger) brother, respondents were less inclined to agree that an individual had reproduced than that they were a parent. Unexpectedly, they were also less likely to consider Suzanne as Marc's child than to recognize Marc as Suzanne's parent.

Several explanations may account for these patterns. Some participants may have assumed that an anonymous donor would play no ongoing role in the child's life, functioning purely as a genetic contributor. In contrast, a sibling or identical twin of the intended father might be seen as likely to participate in the child's upbringing. If expectations about ongoing social involvement shape perceptions, this could explain why a brother or identical twin is more frequently recognized as a parent than an unrelated donor.

Viewed in this way, participants may have treated the genetic relationship between Marc and the donor as an indirect signal of potential future interaction with the child, rather than the genes themselves being the primary factor. Future research could explore this further by considering other types of donors, such as friends or adoptive siblings, where an ongoing relationship might be presumed despite limited or no genetic connection.

The asymmetry observed between participants' interpretations of the parent-child relationship also suggests that parenthood is understood as a complex and multi-dimensional concept. "Parent" can denote both a status and an action, whereas "child" primarily functions as a relational label. Thus, participants may simultaneously view the child as biologically linked to the donor while regarding the social father as the parent due to his anticipated caregiving role.

Being a parent can be defined in multiple ways: some aspects are biologically determined, while others emerge through active engagement and caregiving. This may account for apparent inconsistencies in judgments, such as cases where "x is y's parent, but y is not x's child." From a Lockean perspective, this makes conceptual sense: "So little power does the bare act of begetting give a Man over his Issue, if all his Care ends there, and this be all the Title he hath to the Name and Authority of a father [22]." According to Locke, fatherhood arises from caring activities and is not automatically fixed by biological connection.

It is important to interpret these results cautiously. All vignettes involved sperm donation; egg donation was not included. Therefore, our findings primarily inform understandings of fatherhood and only partially address parenthood more broadly. Given the gendered nature of these concepts, we cannot generalize these results to parenthood universally, although the link between biological sex and fatherhood remains open to debate. People's intuitions about reproduction, biology, and motherhood may differ considerably. Furthermore, biological motherhood itself can be conceptualized in multiple ways, adding layers of complexity that could be explored in future research.

**Conclusion:**

Reproductive technologies challenge conventional assumptions about family and parenthood in multiple ways. Interestingly, participants were less likely to attribute reproduction to Marc when there was a genetic connection between him and the sperm donor, contrary to the expectation that closer genetic ties might strengthen perceptions of reproduction. For example, in discussions of mitochondrial transfer, the fact that mitochondrial donors contribute only mitochondrial DNA (and minimal nuclear DNA) has been used to argue they are not biological parents. Future studies could investigate whether including a sister as a mitochondrial donor would similarly affect participants' judgments about Maria's reproduction.

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**Conflict of Interest:** None

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**Ethics Statement:** None

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