The Making of (Un)certainty in Knowledge Production: Rhetoric at Play in a Heritability Controversy

Angelica Camacho and Dominique Robert

University of Ottawa

ABSTRACT
(Un)certainty is not an inherent quality of a scientific assertion. It is rather the product of negotiations and collective work performed amidst noisy or quiet scientific debates. Using a controversy on heritability of crime-related behaviors as a case study, this paper proposes an analysis of the rhetoric at play to produce (un)certainty in publications presenting competing arguments. The controversy under study is at the heart of the legitimization of biosocial criminology, a contested field of study. The research shows that on the discursive front, three main strategies are used to modalize the (un)certainty of scientific claims over that of competing ones: denial, dismissal, and displacement. On the emotion front, surprise and ridicule are used and elicited to transform scientific claims into staple pieces of knowledge. Acknowledging the strengths and uniqueness of science as a mode of knowledge, this study underlines the importance for users of science to get comfortable not only with the doubts and conflicts at its core but also with the discursive strategies that are integral to science production and communication, as well as to the legitimization of a field of study.

To what extend is crime-related behavior a product of nature? The question has haunted the criminology discipline and has motivated many studies that have tried to assess, in a more or less deterministic and mechanical fashion, the respective weight of biological factors and social factors through heritability studies, namely research designs using twins. A few years ago, Callie Burt and Ronald Simons sent a clear message to their scientific community: “[W]e call for an end to heritability studies in criminology and recognition of the problematic nature of existing heritability estimates for criminal phenotypes.” (2014, p. 225). How can such a forceful declaration convince the colleagues and achieve the desired effect? Especially since this appeal evokes a foundational and
heated controversy between proponents of biological and social explanations of crime-related behaviors. Indeed, the history of criminology is characterized by the alternating dominance of one approach over the other.

The birth of the discipline in the nineteen century is associated with the systematisation of methods to find connection between biology and antisocial or deviant behaviors (Bertillon, 1889)(Galton, 1890). In the wake of the Second World War and the atrocities associated with eugenics, the biological explanations for crime were deemed ethically unacceptable, methodologically flawed, and, in some cases, even taboo (Wright & Miller, 1998). Hence, the social explanations of crime-related behaviors became dominant for many decades. However, alongside the publication of some widely popular sociobiology books, the introduction of new technologies such as brain imaging, genetic and epigenetic analysis to capture biological correlates of human behavior have brought the biological viewpoint to resurface in social sciences (Cacioppo, Cacioppo, Dulawa, & Palmer, 2014). It is noteworthy that, in this most recent version of biology, crude determinism and mechanistic understanding (Reiss and Ruse, 2023) are replaced by a model that embraces complex interaction between biological and social correlates of behaviors (Sapolsky, 2017).

Within criminology, the investigation of biological correlates of crime has become the fastest growing line of research (Beaver, Nedelec, da Silva Costa, & Vidal, 2015), thanks to the behavioral geneticists, who have enthusiastically shared their data, tools, and expertise with the social scientists (Panofsky, 2014). Having access to large genetic databases and twin registries, such as Add Health, allowed researchers interested in the weight of biological factors in explanation of crime-related behaviors to conduct heritability studies. Those studied consist in observing and comparing behaviors within and between families, with a focus on twins and adopted children, who share different arrays of genetic relationships to estimate genetic influences (Turkheimer, 2000). Heritability studies have become one of the favoured investigative tools to link biological correlates to delinquency (Boisvert, Wright, Knopik, & Vaske, 2012), lack of self-control (Beaver et al., 2009), and even gang membership (Barnes & Boutwell, 2012). Findings from some of these heritability studies have suggested that more than half of the variability in crime-related behaviors in studied populations can be explained by genetic factors.

While these claims were challenged (Roseman, 2018) and taxed to bring the discipline back to the nineteen century (Carrier & Walby, 2015), the proponents of the biological approach in criminology maintained that, contrary to their critics and the founders of the discipline, they have embraced the cutting-edge and nuanced understanding of biology (Beaver et al., 2015). As such, their heritability studies integrate both the known biological and social explanatory factors, as well as the interaction
between the two sets of factors (Ellis, 2005). Hence, the claim of these scientists to unite the discipline under one roof that they label “biosocial criminology” (Rocque & Posick, 2017).

However, rather than putting an end to the conflict between the biological and social approaches in criminology, the biosocial approach seem to reproduce it. Like a fractal pattern, within the contested biosocial criminology, a pro-genetic and a pro-environment factions collide (Larregue, 2016). Contrary to what one might surmise, the call for an end to heritability studies does not only come from the critics outside of biosocial criminology but from within it. Burt and Simons, adopting a pro-environment stance within biosocial criminology, are themselves researching deviance through looking at the interaction between biology and the social environment. Their call to end heritability studies was answered by a rebuttal in favor of them by James Barnes and six of his colleagues (Barnes et al., 2014), adopting a pro-genetic stance, all actively involved in promoting the biosocial approach in criminology. Interestingly, these two groups of biosocial criminologists quote and refer to many of the same sources to establish the legitimacy of their views.

Using this controversy as a case study, as well as lessons from agnotology and science studies more broadly, our research does not try to solve this debate. Rather, it offers an analysis of (un)certainty production strategies involved in presenting competing arguments. Since “science is politics by other means” (Latour, 2011) it is expected that the battle for pro-genetic biosocial criminology’s recognition is fought at the material level. On that front, pro-genetic biosocial researchers are competing with other streams of criminologists (e.g., pro-environment biosocial criminologists, critical criminologists, etc.) for access to research funds and technological resources, creating affiliations to promote their sub-disciplines and controlling departments, as well as instituting their own professional association (Larregue, 2017).

However, our analysis focuses on the battle that is simultaneously fought within biosocial criminology at the rhetorical level, through discourse. At this level, pro-genetic and pro-environment factions of biosocial criminologists are trying to “make friends” (Latour, 2001), that is, to appropriate and claim filiation to established knowledge to create trust and certainty in one’s statements and uncertainty in the interlocutor’s. Following Rayner (Rayner, 2012), we show that this work is achieved through different rhetorical strategies, namely denial, dismissal, and displacement. While they are not specific to controversies, choosing a heated debate as our observatory allows us to document those strategies at play with more clarity in scientific writing. The present study underlines the importance of overcoming the prevalent idealized and univocal understanding of science (Lahsen, 2013). Indeed, it is essential for users of science to get comfortable not only with
the conflicts at its core, but also with the knowledge production strategies that are integral to creating and communicating science.

**Analytical Perspective**

**Ignorance**

Science is increasingly conceived not only as a producer of knowledge but a producer of ignorance (Kourany & Carrier, 2020). Whether it be the health effects of smoking (Proctor, 2011), the impact of processed and sugar-packed foods on human health (Moss, 2013), or global warming (Oreskes, 2011), examples of the involvement of science in the production and dissemination of ignorance have been numerous. In the field of agnotology, ignorance is not conceptualized simply as the void that precedes knowledge. On the one hand, it is conceived as the result of different cognitive processes, be it when attention is directed elsewhere, or the conscious or unconscious avoidance of readily available uncomfortable information (e.g., information that raises emotions such as guilt, shame, or uncertainties; (Bovensiepen & Pelkmans, 2020). On the other hand, ignorance is conceived as the construction of confusion or doubt (Rayner, 2012). According to this understanding, which we adopt in the present study, whenever new scientific facts get established, information that contradicts their existence needs to be broken down, if not completely hidden from public discourse. Ignorance is then produced when individuals, groups, or whole cultures are made to feel either certain enough about, or incapable of contesting, a statement to the point where they no longer seek out or seriously consider alternative information that may potentially contradict it. Ignorance is a way to defend dominant knowledge from its alternative that threatens to undermine what is commonly accepted as state of fact in any one specific arena (McGoey, 2012).

The production and dissemination of ignorance can be straightforward, such as when contested knowledge is left out of the principal means of knowledge production and transmission (e.g., blacklisting books, courses, conferences;(Heimer, 2012). It can also happen when the process behind the production of contested knowledge is criticized in the scientific literature (e.g., raising doubts about research design’s issues; (Stocking & Holstein, 2009). In the latter case, voicing concerns about the validity of the process of knowledge production, or even referencing to this process, causes said knowledge to lose its gloss of certainty (Latour, 1987). Attracting the attention to the construction of a scientific assertion suggests, by itself, that the assertion is the product of the researcher’s choices or the setting constraints and that the assertion could be, and probably will be in the future, different. Bringing up the conditions of production of an assertion is a move that chips away at the obviousness quality with which we invest facts.
The production of ignorance can also proceed in a more subtle manner, as when scientists use emotions to appeal to their audiences. While we tend to associate science with the disciplining of emotions, there is in fact a whole emotional economy of science (White, 2009). Not only is emotional commitment intrinsic to the way scientists construct their object of study (Fitzgerald, 2013), affective labor is also key to science communication (Davies, 2019). By appealing to readers’ emotions, it is possible to instill in them a sense of trust or distrust about certain claims, as well as influence the extent to which they feel competent or capable of refuting those claims. For instance, Bovensiepen (Bovensiepen, 2020) notes that by appealing to emotions associated with nationalism or feeling of inadequacy, corporations can make people less receptive to information that would help them defend their own interests.

In criminology, agnotology research is famous for documented cases of ‘strategic ignorance’, most commonly understood as a collective, calculated, and rational fabrication inherent in state crimes (e.g. genocides) or corporate crimes (e.g. occupational illnesses caused by asbestos) (Barton, Davis & White, 2018). However, the production of ignorance can also proceed in a customary manner or as the product of a socio-cultural dynamics. In these cases, ignorance emerges as a form of ‘praxis’ (Anand, 2015) or the result of ‘banal’ actions (Bovensiepen, 2020). Alvesson, Einola and Shaefer (Alvesson, Einola, & Schaefer, 2022) recognize this aspect of ignorance and approach it as a collective process that unfolds over time and that requires potential access to information that is, yet, more or less wilfully neglected. For example, researchers write scientific texts with a clear agenda in mind. However, even when there is strategic mediation among researchers, ignorance can be nested within ritualized forms of argumentation and appeal to emotions (Bovensiepen & Pelkmans, 2020).

While conducting fieldwork through observations and interviews with proponents in a controversy yields rich analysis (Benbouzid, 2015), our intentions are more modest and focus on the production of ignorance as it can be grasped from the point of view of a reader interested in a debate that unfolds through peer-reviewed articles. In the present study, we are documenting the strategy and the praxis of producing ambiguity and doubt accomplished by researchers’ prose when trying to convince colleagues, through rhetoric.

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1 We had the good fortune of receiving comments on our paper by a researcher involved in the controversy under study, John Paul Wright, a biosocial criminologist who is part of the group we call pro-genetic in our paper for reason of brevity, after Larregue (2016). The comments were very informative about the context of the controversy and the explicit reasons and actions undertaken by the pro-genetic faction at the time they published their rebuttal to the Burt and Simons (2014) paper. Again, the information provided by Professor Wright is a proof than an ethnographic approach to studying science in the making, whether in real time or retroactively, yields a rich account. However, because we did not design our research this way and because we did not give the opportunity to the other biosocial criminologists involved in this debate to share their behind-the-scenes accounts of the events, we will remain focused on our initial project: a science studies analysis of a controversy through the eyes of a reader of published scientific papers and not the context and intentions of the researchers involved in writing those papers.
Fact Making as a Collective Process

Convincing a scientific audience of the certainty of the claims in one’s paper is a complex rhetorical endeavor (Law & Williams, 1982). It requires, amongst other things, creating a manuscript that connects the newly produced research results with the accepted wisdom in one’s discipline; succeeding in getting a journal to publish the manuscript; nurturing the career of this new article so that it is read and referenced by other researchers. These tasks are all about bringing colleagues to join in the fact-making process. Giving life to a scientific fact is an inherent collective activity (Latour, 2001). The fate of research results depends on the research community. Colleagues will either rally around scientific statements and quote them in support of their own assertions; quote them to nuance or debate the newly proposed claims; or, worse of all, ignore them altogether. Hence, the career of a scientific assertion is determined by colleagues after its publication, through the process of modalization (Latour, 1987).

The modalization of a claim refers to the way in which said claim is qualified or framed. Modalities are the discursive devices used either to “enhance or detract from the fact-like status of [a] statement” (Latour et al., 1987, p. 69). Modalizations can enhance the facticity of a claim by expressing the authors commitment to its certainty (Bertotti & Miner, 2019). For instance, a statement such as serotonin dysfunction is connected to impulsive behaviors can be amplified when modalized with a certainty marker: serotonin dysfunction is strongly connected to impulsive behaviors. These types of modalities have been referred to as boosters. The more often an assertion is positively modalized in colleagues’ publications, the more it gains in facticity, that is the more certainty is attributed to it and the greater the chance it will grow to be taken for granted and represent the common sense or wisdom in a discipline. In other words, the more likely it will become “blackboxed” (Latour, 1987). On the contrary, some modalities weaken the facticity and certainty of a claim by allowing for various speculative possibilities about the relationship between two items (Bertotti & Miner, 2019). For instance, the claim serotonin dysfunction is connected to impulsive behaviors experiences a reduction in facticity when it is modalized with the insertion of an uncertainty marker: serotonin dysfunction might be connected to impulsive behaviors. These types of diminishing modalities have been referred to as hedges (Bertotti & Miner, 2019). An assertion that is negatively modalized, attacked or ignored remains an artefact disregarded on the margins of the discipline.

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2 Engaging with a general public or policy makers is no less complex (e.g., Brossard 2009; Kanerva and Krizsan 2021).
While scientific writing may seem to be dense, impassive, or flat, it follows patterns that are oftentimes very effective at convincing readers about the facticity or certainty of their claims. One characteristic of this genre of persuasive writing is that it uses layers of text that serve as “mutual referents” (Latour & Fabbri, 2000, p. 122). Every claim made in a scientific article is either backed up by output of data analysis that takes the form or tables, graphs, quotes from interviews, or already published papers that lend support to the authors’ claim.

Rhetoric strategies perform an especially important role in times of scientific controversy (Mellor, 1999). Controversies involve conflict. Individuals with conflicting interests and worldviews clash both directly and indirectly to create a new social order or social hierarchy in the universe they share (Venturini, 2010). Interestingly, proponents of different positions in a controversy are able to utilize the same sources as support in their written works, even when the points they are trying to drive across are in direct opposition (Jankó, Móricz, & Papp Vancsó, 2014). Through rhetorical strategies, certainty is built, or doubt is introduced, resulting in very different portrayals of the state of a discipline, different effects on the facticity of scientists’ claims and, in the case under study, different futures for a contested field of research (Latour, 1987; Latour & Fabbri, 2000).

Method

The controversy on the use of heritability studies selected for the purposes of the present research is still active between the pro-genetic and pro-environment factions of biosocial criminology, albeit at a broader level (Burt, 2022). Our analysis focusses on the dialogue that went on between two groups of researchers at the beginning of the controversy. It started in 2014, with the publication of an article titled “Pulling back the curtain on heritability studies: Biosocial criminology in the postgenomic era”. In this article, Callie H. Burt and Ronald Simons deplore the inherent flaws in heritability studies conducted in criminology and call for their ending. The authors are prolific researchers interested in the interaction between biology and the social environment. Their article appeared in Criminology, the main journal of the American Society of Criminology. It has been ranked as one of the top five journals in the discipline of criminology for decades (Barranco, Jennings, May, & Wells, 2016). As such, this article was visible to a large section of the scientific community as soon as it was published.

3 For concision, we will refer to both groups involved in the controversy as the pro-genetic and the pro-environment factions. Doing so emphasizes the difference between the two groups. However, like we mentioned in the introduction, the difference between them is a matter of degree and the weight they attribute to those respective factors in the explanation of crime-related behaviors. Indeed, both groups are similar in that they acknowledge the interplay of biology and environment in behavioral explanations and come under the umbrella of biosocial criminology.
Considering how central heritability studies are to assess the weight of nature and nurture in crime-related behaviors, one can appreciate how bold is Burt and Simons’ plea. So bold that the editors of the journal published a reply to the paper. Barnes and six of his colleagues (2014) wrote a rejoinder titled “Demonstrating the validity of twin research in criminology”. The authors are all researchers in criminology or criminal justice having published extensively on the links between genetics and crime-related behaviors, often using heritability studies. Most of them have been actively engaged in establishing the credibility of biosocial criminology since the 1990’s through publishing textbooks and creating a specific professional association4.

Even if we do not act as arbiters in the controversy within biosocial criminology, to understand the knowledge and ignorance producing strategies employed by Burt and Simons (2014) and Barnes et al. (2014), it is necessary to get acquainted with the substance of their respective arguments.

Burt and Simons question the results of heritability studies in criminology that attribute a large weight to genetics (~50%) when explaining crime-related behaviors in different populations. If true, such findings would suggest that most of the popular theories in the field, which target social factors (e.g., parenting and community dynamics), would have to be revised. One of the authors main arguments concerns the inherent flaws in heritability studies’ methods and assumptions, which, according to them, inflate the heritability effects and underestimate the environmental influences on behaviors. Most specifically, they express alarm at the violation of the equal environment assumption (EEA). This assumption states that environment of monozygotic (MZ), or identical twins, is not more similar than those of dizygotic (DZ), or non-identical twins. If this assumption holds true, any observed difference in concordance rates between MZ twins and DZ twins can only be attributed to genetic factors as opposed to environmental factors. Introducing evidence from past studies showing that MZ twins experience more similar social environments that DZ twins, Burt and Simons argue that the equal environment assumption is often, if not always, violated in heritability studies that look at crime-related behaviors.

The authors also criticize other aspects of heritability studies, including but not limited to their tendency to overuse the same database and its limited measures (e.g., Add Health data); their reliance on large confidence intervals; and their tendency to present unjustified conclusions resulting from the misinterpretation of heritability and environmental estimates. Lastly, Burt and Simons assert that it is “nonsensical” to try to partition genetic and environmental influences on human behaviour like heritability

4 The initial article and the response to it are at the center of our attention here but the conversation has been open by the editors to other pro-genetic and pro-environment researchers.
studies are trying to achieve (p. 225). Rather, they express their support for research based on a postgenomic paradigm, especially in the area of epigenetics, a field of study that focuses on the many ways gene expression is influenced by the environment (Bagot & Meaney, 2010; Bollati & Baccarelli, 2010; Charney, 2012).

Barnes et al.’s (2014) reply is framed as a direct critique of Burt and Simons’ arguments. It can be separated into three main responses. First, the team maintains that Burt and Simons’ critiques are outdated and no longer relevant, as they have already been addressed by multiple other scholars in the past. Second, the team asserts that assumption violations in heritability studies are rare and mostly inconsequential to their results. In order to prove this point, Barnes et al. use a series of mathematical calculations to demonstrate the basis of twin study designs and illustrate, through multiple simulations and empirical evidence, the minimal impact that violating the EEA would actually have on heritability estimates. The authors sustain that, even in the rare occasions where an EEA’s violation would result in the overestimation of heritability estimates, this impact would most likely be counteracted by the effects of the very common violation of another heritability studies assumption: the random mating assumption (RMA). The latter being the assumption that people mate randomly, which, when violated, results in the deflation of heritability estimates. Third, the team reproaches Burt and Simons of purposely leaving out information concerning the effects of the RMA’s violation and cherry-picking the studies they included as examples in their demonstration. In their conclusion, Barnes et al. plead not to abandon heritability research, but instead, work to revise and continue improving its methodologies and statistical models. They go on to explain that epigenetics is an area of research that not only is in its infancy but has also endured heavy criticism from other scholars in the field. Therefore, making it an unsuitable replacement for heritability studies.

In this confrontation, we are not interested in assessing the merit of the arguments of the pro-genetic and the pro-environment contenders in the heritability studies controversy. Rather, we use it as an instrumental case study (Stake, 1994) to document the ways (un)certainty is built rhetorically. Inspired by Janko et al.’s (Jankó et al., 2014), we analyse the citation process and the different ways these two articles have framed and utilized an identical set of references to instill certainty in their respective claims and uncertainty in the claims of their opponents. To do so, a database was created by searching the articles’ reference list and identifying all their common references. We then found the in-text citations of every shared reference within both articles, whether the reference was only referred to, paraphrased, or quoted. Altogether, the articles shared 26 references, which were cited a total of 67 times in both texts. Data analysis consisted of reading the original cited texts and examining the different discursive devices that were used by the two groups of authors under study to either strengthen the certainty of their
claims or weaken that of their opponents. These include the use of modalities (e.g., hedges and boosters), direct attacks to methodological choices, or use of emotionally connotated words or expression by the authors.

We discussed earlier that science, as a genre of persuasive writing, uses layers of texts that serve as “mutual referents” (Latour & Fabbri, 2000, p. 122). Those play an essential role in convincing the readership. The claims made in a scientific article are often supported by already published papers. These are especially important in a controversy that debates the soundness of a central method, heritability studies, in a subfield of study under attack, biosocial criminology. Asserting the filiation with a body of established and accepted knowledge is bound to instill confidence in the method and, consequently, in the contested field of study.

Results and Discussion

Examining the manner in which Burt and Simons on the one hand, and Barnes et al. on the other hand, modalize the same citations in their respective article, we show that they create certainty in their own claims and uncertainty in their opponents’ claims through variations on denial, direct and indirect dismissal, as well as displacement. Those are performed discursively but are sometimes helped by emotional work. The strategies that we exemplify here (for the full list, see Camacho 2022) are parts of the mechanisms used by researchers to instill confidence in the assertions that they construct and that slowly, sometimes imperceptibly, bring a subfield of study, such as biosocial criminology, to shift from one stance (e.g., pro-environment) to another (e.g., pro-genetic).

Selection, Misquotation and Estrangement

Selection, misquotation and estrangement are specific variations of the strategy of denial that we find at the core of the heritability controversy under study. Generally, denial is a “persistent refusal to act on information or even accept its existence” (Rayner, 2012, p. 113). It occurs even though in some cases, individuals or external organizations make an active effort to bring this information into attention. It represents an organization’s or individual’s refusal to acknowledge or engage with information that they find uncomfortable. For example, at the institutional level of the discipline, the limited coverage of biological explanations of crime in introductory textbooks in Criminology after the Second World War has been labeled by some as a form of denial (Wright & Miller, 1998). At the level of this specific controversy though, denial proceeds namely through both the omissions made by the authors involved in the controversy and the omissions reproached to their interlocutors.
Indeed, on several occasions, both groups of authors highlight their interlocutors’ omission of information. For instance, in their rebuttal, Barnes et al. (p. 607) point out Burt and Simons’ decision to leave out information about the random mating assumption (RMA):

> When the assumptions of random mating and the EEA [equal environment assumption] are considered in tandem, calculation and simulation results reveal that violations of one assumption tend to counterbalance violations of the other […] Scholars should, therefore, be skeptical of the unilateral dismissal of heritability studies by Burt and Simons because of among other reasons, their lack of a discussion of the assumption of random mating.

By silencing the impact of the RMA’s violation, which is presumed to inflate the effect of social factors to the detriment of biological factors, Burt and Simons’ made their observations about the effect of the EEA’s violation appear even more striking and difficult to contest, thus helping them advance their claims of heritability studies fallibility.

Another instance of reproached selection was pointed out by Barnes et al. when they noted that Burt and Simons selectively omitted heritability studies that tested the effects of the potential violation of the EEA from a list of studies the latter authors provided as evidence of their claim. By choosing which articles to include in the list, and most importantly, which articles to leave out, Burt and Simons were able to support the argument that the large majority of recent heritability studies disregard the effect that a potential violation of the EEA may have on their findings. By including a readily available, selective, list of heritability studies for readers to examine, Burt and Simons not only provided additional pieces of evidence to support their claims, but also reduced the likelihood of readers looking elsewhere for supporting information that could either confirm or dismiss the information that is presented to them.

Misquotation is also a form of denial at play in this controversy. For instance, Terry Moffit was quoted in Burt and Simons’ (2014, p. 226) article as saying:

> Although evidence from the different methods [to calculate heritability estimates] are used to “provide convergent findings,” given that “each of the primary designs used by behavioral geneticists has its own Achilles heel(s)” (Moffitt, 2005), we show that all of these models are biased toward inflating heritability and underestimating shared environmental influences.

This paragraph would suggest that Moffitt supports Burt and Simons’ claims of heritability estimates being biased, as well as their mobilization in favour of their
abandonment. Given Moffit’s positive reputation in the field\textsuperscript{5}, having her support makes it significantly more difficult for Burt and Simons’ readers of contesting the authors’ claims. However, as pointed out in Barnes et al.’s article (p. 612), when looking at Moffit’s complete statement, key information was omitted in Burt and Simon’s article:

A fundamental assumption guiding this review is that sturdy inferences ought to be drawn from a cumulative body of studies whose methods differ as much as possible but provide convergent findings about the same construct. As we have seen, each of the primary designs used by behavioral geneticists has its own Achilles heel(s), but fortunately, each design’s idiosyncratic flaws are offset by compensatory strengths of the other designs. As a consequence, although particular studies and particular designs may be subject to critique, this does not invalidate inferences derived from the entire cumulative evidence base (Moffitt, 2005, p. 57).

Moffitt’s original quote is actually the opposite of what Burt and Simons were trying to transmit. Compared to paraphrasing, direct quotes appear more legitimate as they remove the possibility of misunderstandings and mistranslations from the formula (Gibson & Zillmann, 1993). Quoting famous researchers in support of an assertion or idea makes readers less inclined to question the authors’ statements. Because of this, misquotations often go unnoticed by readers unfamiliar with the original text.

Interestingly, Moffit’s words, knowledge, and prestige were first appropriated by Burt and Simons to put aside heritability studies. However, Moffit’s words were later reutilized by Barnes et al. as a way of opening the black box that Burt and Simons had previously attempted to shut down. The same texts can be used to lead to opposite ends. This example of denial also highlights the importance for researchers taking part in a controversy to write defensively and to ensure that the information they are using from past literature cannot be turned around and used against them.

Finally, what we call estrangement is also an important form of denial observed in Barnes et al.’s article. Indeed, these authors fail to acknowledge that Burt and Simons were not arguing against biosocial criminology in general, but precisely against the use of heritability studies. This information is important as it could place Burt and Simons, not at the opposite end of the spectrum in the nurture or nature debate, but rather as proponents of biosocial criminology, who are working toward the promotion of better

\textsuperscript{5} With over 40 years of research experience, Terrie Moffit, PhD, is a Professor of Psychology at Duke University and a Professor of Social Development at King’s College London (Duke University 2021). Her areas of expertise include but are not limited to longitudinal methods, developmental theory, clinical mental health research, neuropsychology, and genomics in Behavioral science. Moffit and her team have conducted and published 9 empirical studies on the behavioral effects of genes and environment interactions to date.
biosocial studies. In this sense, knowing that its authors are proponents of the biosocial perspective, Burt and Simons’ article feels less like a critique against the association of human biology and behaviour, and more like an attempt to promote the conversation about what needs to be done for biosocial criminology to be legitimized within the discipline of criminology. The mentioning of Burt and Simons positioning concerning biosocial criminology in Barnes et al.’s article could have the effect of making proponents of biosocial criminology, and heritability studies in particular, lower their defenses and be more receptive to what Burt and Simons had to say since they are not presented as enemies but allies.

**Attack on Data, Attack on Scientists and Appeal to Common Sense**

While denial refers to the outright refusal to acknowledge or engage with certain types of information, dismissal refers to the acknowledgement of the information only to refute it as erroneous or irrelevant (Rayner, 2012). Dismissal is the ignorance strategy most frequently used in the two articles, since they were both specifically crafted as a way of expressing the authors’ disapproval of their respective opponents’ claims. However, we observe two modalities of dismissal with slightly different rhetorical effects. Dismissal can proceed directly through attack on data, attack on scientists and appeal to common sense. As we will see in the next section, it can also proceed indirectly through more subtle mechanisms.

In this controversy, direct dismissal occurs for example when the authors criticize the sources of data used by their interlocutors. Indeed, Burt and Simons (p. 237) expressed concerns about the overuse of a single data source among recent heritability studies:

> [O]f the identified 20 criminological twin studies published since 2008, 17 used the Add Health data. We do not argue that the genetic twin sample in the Add Health is deficient; indeed, the quality of the data seems to be extraordinary (Harris et al., 2006). We do believe, however, that reproducing findings of similar heritabilities for various criminal-related traits on the same set of 289 MZ and 452 DZ twin pairs is problematic. Moreover, this means that most recent heritability estimates in criminology have been based on the same imperfect measures (self-control, delinquent peers, delinquency, and victimization) that are available in the Add Health data.

Mentioning this lack of variability in the database used to test relationships between heritability estimates and crime-related behaviors can raise doubts among readers about the generalizability of recent heritability studies’ findings, as well as the
robustness of pro-heritability studies’ arguments (Mroczek, Weston, Graham, & Willroth, 2021). The authors put under scrutiny not only the articles they are directly referring to, but also all those which currently, or will later, use them as reference to advance their own claims.

Interestingly, Burt and Simons begin their critiques about the overuse of Add Health data by acknowledging that it is in fact of “extraordinary” quality, before drawing down the point that its overuse was problematic. This is a representation of a commonly utilized three-part rhetorical technique, in which individuals show concession with their opponents’ views to later introduce their counterpoints (Bertotti & Miner, 2019). Showing concession give readers the impression that the authors are unbiased and rational in their claims, carefully considering the pros and cons of their opponents’ positions. After all, the acknowledgement of the adversary’s point and its careful dismantlement is the expected discursive move in what is conceived as a rational, fair, cold and scientific debate. It disarms readers, or at least reduces the arsenal at their hands, as it makes it more difficult for them to use the argument that has been conceded with in their possible rebuttals of the authors claims.

While this might very well be a feature of the fiery character of this controversy rather than common is science rhetoric, direct dismissal is also produced by both groups of authors in the form of attacks to opponents’ integrity and capabilities. On their part, Barnes et al. employed strategies to create a contrast between their level of scientific integrity and that of Burt and Simons. This proceeds by claiming inconsistencies in their opponents claims and actions:

... Burt and Simons singled out the Add Health data set as being problematic because it is used in most heritability studies by biosocial criminologists. They pointed out that the entire twin sample nested within the larger probability sample includes only 289 MZ twin pairs and 452 DZ twin pairs for a total of N = 1,482 twins. We are somewhat perplexed by this as Simons has built his career on the FACHS data that include a little more than 800 respondents. In terms of sample size, the twin subsample of the Add Health data dovetails nicely with the FACHS data. What makes these criticisms all the more surprising is that Simons has pointed out in no less than five separate publications that the Add Health data represent an ideal data set to examine genotypic influences on social behaviors (Simons, Beach, and Barr, 2012; Simons and Lei, 2013; Simons et al., 2011, 2012, 2013). (Barnes et al., 2014, p.611)
This argument feeds on a static view of science according to which the truths it produces are immutable and scientists who change perspective must be weak thinkers. By questioning Burt and Simons’ coherence, this observation facilitates the dismissal of the claim. Moreover, the mocking tone used in the dismissal may instill feelings of disdain for Burt and Simons’ claims. Using words such as “perplexed”, and phrases such as “all the more surprising,” Barnes et al. not only emphasize what they conceive as the irony in Burt and Simons’ critiques, but also hint to Burt and Simons’ seeming lack of self-awareness. Furthermore, rather than discussing the repetitive use and the quality of the measures used in the Add Health database, Barnes et al. chose to focus only on the number of cases included in it (1,492) and compare it with the number of cases a database used in the past research of Simons (800). By isolating and turning a part of the argument against their interlocutors, Barnes et al. make them appear less secure of what they believe in and thus less reliable when it comes to the information they produce.

Barnes et al. (p. 616) also make their interlocutors appear short sighted by pointing out the multiple uses of heritability studies and the different ways in which they produced highly impactful research findings. They then turn the attention back to their opponents, challenging them to explain the costs and benefits of removing heritability studies from criminological research in their entirety.

On their part, Burt and Simons indirectly accuse Barnes et al., and directly accuse the criminology community, of lacking common sense:

We are surprised that these somewhat astonishing findings reported in recent studies, such as the reports of more than 50 percent heritability for such complex social behaviors as crime and victimization, have not generated more critical attention in criminology. We also are perplexed by the lack of response to the heritability study finding that so-called shared environmental factors play a minor role in explaining variation in crime-related phenotypes. (p. 224).

The lack of critical attention to heritability studies in criminology is even more conspicuous given their known limitations […] (p.224).

Instead of directly accusing proponents of heritability studies of lacking common sense, Burt and Simons express their discontent over the fact that these types of studies had received very little opposition from the criminology community. They also potentially induce shame in the readers, who are likely criminologists themselves, for their lack of engagement. Expressing confusion towards the lack of scrutiny received by heritability studies, signals readers that such a lack of reaction is not acceptable. This further isolates
any potential dissident reader and, by extension, makes them less likely to express their disagreement with the authors. This direct appeal to the common sense of the reader is reminiscent of what science studies scholar identify as “Mode 2” scholarship. They mean by that a way of writing science that breaks with the traditional isolated and autonomous genre of scientific writing (Mode 1). In contrast, Mode 2 is porous and blend genres to showcase its broader appeal and social usefulness. By appealing to the reader in such direct fashion the authors are enticing the readers to join in, not just witness, the conversation between the two groups of biosocial criminologists.

**Legitimacy, Prestige, Diversity, Qualifiers and Silences**

Dismissal can also occur in covert ways. In those cases, the information that is being dismissed is not singled out by the authors in their text. Instead, authors use subtle writing techniques that make the sources of uncomfortable information appear less reliable or the uncomfortable information itself less legitimate, noteworthy, or relevant. Here, what is at stake is not what is said, but rather the way that it is said.

Some of the most frequent instances of indirect dismissal found in the articles under analysis relate to the manner in which both groups of authors positioned themselves and each other with respect to the scientific community. When it comes to feeding the legitimacy of their claim, one strategy that was repeatedly employed by both groups of authors consists of claiming and showing the support of the scientific community through the use of a large number of referred sources. For instance, when discussing the technical issues that are associated with the violation of the EEA, Burt and Simons (p.232) wrote:

> …the EEA has been the subject of much debate and has sparked the production of a large literature that spans several decades and cuts across multiple fields of study (e.g., Allison et al., 1996; Bulik, Sullivan, and Kendler, 1998; Conley et al., 2013; Cronk et al., 2002; Derks, Dolan, and Boomsma, 2006; Eaves, Foley, Silberg, 2003; Felson, 2014; Hannagan and Hatemi, 2008; Hatemi et al., 2009; Kendler and Gardner, 1998; Kendler et al., 2000; Littvay, 2012; Rose et al., 1988; Scarr and Carter-Saltzman, 1979).

To which Barnes et al. (p. 599) responded with the following statement:

> …numerous studies examining the potential moderating effects of environmental similarity on h2 and c2 estimates have found that violations of the EEA result in statistically nonsignificant parameter deviations (e.g.,
Referencing multiple sources is one of the most widely used strategies to produce scientific knowledge and ignorance. Creating such a strong network of supporters might deter a reader to voice a contrary opinion since they do not only have to override the authors’ expertise, but also that from all the other allies recruited to bear on the issue. In Latour’s (1987, p. 33) words, “[a] document becomes scientific when its claims stop being isolated and when the number of people engaged in publishing it are many and explicitly indicated in the text. When reading it, it is on the contrary the reader who becomes isolated”.

Moreover, both groups of authors explicitly highlighted the prestige and diversity of their supporters from the scientific community. For instance, Burt and Simons (p. 224) stated:

Since at least the early 1930s, scholars-including prominent geneticists, neuroscientists, and molecular biologists-have been warning about the fallibility of heritability studies in human populations, especially for complex social behaviors such as crime (e.g., Joseph, 2004; Kamin, 1974; Lewontin, Rose, and Kamin, 1984; Wahlsten, 1990; Wilson, 1934).

Similarly, when discussing the response to critiques against the association of heritability and behaviors in the 1980s, Barnes et al. (p. 589) wrote: “…a small but growing force of behavioral geneticists, statisticians, and other scholars launched a prolonged effort to collect larger samples of twins, other genetically related relatives, and adoptees.” Choosing to highlight sources from a variety of scientific disciplines further drives across the point that their claims are widely supported, and not just by a specialized and limited faction (Dufresne, Robert, and Roy, 2019).

However, merely listing a number of references and calling upon the prestige and variety of supporters is sometimes not enough to withstand a confrontation with a bold “opponent”. In some instance, the supporting sources have to be qualified. Different adjectives and verbs have different connotations that can make sources and actions appear more or less legitimate. When citing sources to support claims about the negative effects of EEA violations on heritability estimates, Burt and Simons (p. 232) stated:
...many scholars have asserted that the EEA, including its trait-relevant form, is invalid and that the more similar environments of MZ than DZ co-twins bias heritability estimates upward to a significant degree (e.g., Beckwith and Morris, 2008; Horowitz et al., 2003; Joseph, 2004; Lewontin, Rose, and Kamin, 1984; Richardson, 2011).

While Barnes et al. (p. 597), wrote:

Certain critics have cited violations of the EEA as a damning limitation for twin research in sociology (Horwitz et al., 2003), political science (Beckwith and Morris, 2008; Charney, 2008; Suhay and Kalmoe, 2010), educational psychology (Richardson and Norgate, 2005), and social psychology (Simons, Beach, and Barr, 2012).

Two of the cited sources included in the excerpts above are a perfect match (Horwitz, Videon, Schmitz, & Davis, 2003). What varies is the manner in which these researchers are referred to. On the one hand, Burt and Simons make these researchers appear both numerous and prestigious by introducing them as “many scholars”, a definition that carries with it a connotation of high status and reliability. On the other hand, Barnes et al. refer to the same group of researchers as “critics” and quantify them using the adjective “certain”, taking away the occupational and numeric power that had been given to them by Burt and Simons in their article. Barnes et al. make it seem as if the support for their opponents’ claims is minor.

Another way in which citation context can influence the certainty of a claim has to do with the type and amount of information that accompanies it. Heavily modalized statements that display the conditions of their production, give access to the strengths and weaknesses of the study. Contrarily, statements devoid of information about the conditions of their production incite readers to trust the authors’ statements and see them as factual and certain. For instance, Burt and Simons and Barnes et al. discussed Harris’ (Harris, 1998) findings, giving different degrees of specification to the information they presented. On one side, Harris is cited by But and Simons (p. 246) in the following way:

... we urge scholars to recognize that existing heritability estimates are the result of models biased toward inflating genetic influences and underestimating shared environmental ones, and that using these rough and biased heritability estimates to undergird specious debates about the irrelevance of shared environmental factors, such as the family, neighborhoods, and SES (e.g., Harris, 1998; Rowe, 1994), does a disservice to both scientific and public knowledge.
On the other side, Harris’ findings are discussed in Barnes et al. (p. 614) in the following way:

...family processes and parenting behaviors tied to offspring conduct are clearly tangled in the complex web of biology and environment (Harris, 1998). [...] Scholars were so locked into their standard social science paradigm, however, that it took the work of Rowe (1994) and subsequently Harris (1998) to show how the elements of the nonshared environment were important to understanding why some children were influenced by family processes while other children in the same household were not. Heritability studies provided these insights, and they led to more refined studies into parenting and families (Beaver, 2008; Harris, 1998; Rowe, 1994; Wright and Beaver, 2005).

When considered alone, Burt and Simons citation makes it seem as if in his 1998 article, Harris had tried to utilize presumably biased heritability estimates to downplay the importance that shared environmental factors have on behavioral outcomes. Readers of Burt and Simons may not see Harris’ work as anything other than an attempt to advance claims about heritability determinism using flawed methodological tools, even when they do not really know what his study actually found. However, when more details are provided about Harris’ findings and conclusions in Barnes et al.’s article, Harris’ study is transformed from merely an attempt to undermine the impact of environmental factor in human behaviors to an attempt to consolidate the role that both biological and sociological influences play in human experiences.

*Emphasizing the Technical*

The last strategy at play in this controversy is displacement. It refers to the decision to engage with, and address, a narrower or simplified representation of an issue, rather than the predicaments or repercussions associated with it (Rayner, 2012). One could say that the manner in which the controversy concerning the use of heritability studies unfolded in Burt and Simons as well as Barnes et al. articles is in itself an example of displacement. Both articles dive into the methodology of heritability studies and disengage from the wider ethical or political issues linking biological factors, such as genes, to complex human behaviors, such as crime.

Most, if not all, of the arguments that were presented by both groups of authors in favour or against the utilization of heritability studies in criminology were primarily based on the intrinsic technical aspects related to such methodologies, as well as the manner in which these could potentially compromise the validity of heritability estimates. However,
the authors do not explain the reason why caring about the legitimacy of heritability estimates is important and how this method changes the way we think about crime-related behavior. Methods, the language of science, are inherently technical. But methods are not politically neutral. They carry with them collective ideals and social projects (Law, Ruppert, & Savage, 2011). Fighting a socially and politically charged debate on highly technical grounds is a common way of producing ignorance when debating controversial issues. For example, the acceptability of using glyphosate in agriculture was mainly fought on the measures of glyphosate carcinogenicity for humans, therefore obfuscating other impacts the substance has such as other health effects, its persistence in the environment and the increasing dependence of farmers on industrial-style agriculture and the pesticide industry (Paskalev, 2020).

The emphasis on the technical is in direct opposition with the appeal to the reader’s common sense that we discussed earlier. Indeed, here the strategy has the effect of closing the debate rather than opening it to its social usefulness. Overall, this way of writing science takes precedence in the debate over the more porous and engaging mode. By concentrating on the methodological technicalities of heritability studies, this debate orients the type discussions that could be had on the connection between biology and social behavior. It limits the controversial dimensions of the connection between biology and crime-related behaviors to methods and makes it appear as if the controversy could easily be closed in the near future. Once inside this controversy, flooded by the specific methodological arguments used, contested, and reproduced, it is difficult to pull away enough information from the existing debate to even begin formulating a comprehensive perspective on the broader issues involved.

Conclusion and Implications

The certainty of facts in biosocial criminology is constantly being made and remade each time an article on the topic is published, a fortiori, when such an article involves direct confrontation. Through the assertion this article silences and avoids; through the high-profile researchers that the article brings in as ally; through admonition and scorn, readers are convinced or not and the orientation of a subdiscipline can subtly shift. Indeed, those controversies that may seem marginal or else take place in remote borders of the discipline have unexpected ramifications over time.

“The fate of what we say and make is in later users’ hands” (Latour, 1987, p. 29). Indeed, the certainty of one’s scientific claim depends on whether and how colleagues will refer to it when it is published. As such, a claim can be made to appear more like a sure fact, a black box, if it is inserted in an article as a taken for granted statement. Contrarily, a claim can be made to appear weak if it written with modalities that undercut
its certainty status. The present study sought to demonstrate that it is not only the type of information that is presented to support a claim, but also the way it is presented, that influences the degree to which a claim is perceived as a fact or not, as certain or dubious. As such, this qualitative study examined the manner in which the same published literature was cited by two groups of authors presenting conflicting perspectives on the issue of heritability study. In the heated battle between the pro-genetic and pro-environment biosocial criminologists, we showed that the same referred literature can be used to produce very different, or even opposite, outcomes in perception of claims' certainty. For readers who are quantitatively inclined and who are interested in scientific controversy, it is not enough to run scientometric analyses (number and patterns of citations) or even only look at who is quoted or referred to in support of the author’s claim. Like in a play, it is also important to pay careful attention to the wording of the script that those characters are made to contribute as well as the emotions displayed or instilled by the authors. Hence, qualitative criminologists benefit in strengthening their interest in methods imported for the literary field. For example, the fruitfulness of narrative analysis has been demonstrated in a similar controversy on the use of origin myths to push the agenda of a deterministic version of evolutionary psychology to the detriment of a sociological account of sociality (Jackson & Rees, 2007).

Besides shining light on some of the rhetorical strategies that scientists use in their writings, such as denial, dismissal and displacement, the present research reiterates the fact that knowledge and ignorance, as well as certainty and doubts, exist in tandem. For new scientific knowledge to be produced and considered factual and certain, ignorance of conflicting knowledge is produced as well. Moreover, the production of scientific knowledge and ignorance is not devoid of emotions. More than merely conducting investigations using scientific methodologies and informing readership about findings, convincing audiences requires them to feel confident about what they are being told, as well as isolated and overpowered if they should choose to dissent from the author’s arguments. In this sense, producing facts does not only require appealing to reason but can also entail appealing to disdain or shame, as is the case in the controversy under study. The degree of hostility in this particular case is certainly connected to the challenge faced by biosocial criminology in general, and for the pro-genetic faction in particular, to gain recognition after decades where the role of biology in the explanation of crime-related behaviors remained marginal. It might also be connected to a deliberate choice by the contenders in the debate to use a provocative tone to increase their visibility (Larregue, 2020) both within and outside the scientific criminology circles.

This paper does not aim to persuade the reader to welcome or oppose the new versions of biosocial criminology that are bubbling on North American campuses, departments, and scientific journals. It is not either about throwing the towel and letting
go of science altogether for it is just words, on the contrary. This paper stresses the importance to develop a sophisticated understanding of how science is made and communicated so that users of science can develop a surer footing when controversies rage. It is important for users of science, whether they are students or policy makers, to engage with the way scientific facts are produced (in the office, in the laboratories, in the research papers) to let go of a tendency to idealize science. Science is not poetry nor religion. Contrary to those modes of knowledge, it has rules that prize transparency, empirical anchor, and debate. But science, like poetry and religion, is a human-made product. It is a craft. Not acknowledging the selections, the constraints, the creative powers that are necessary to make scientific assertions just “increases public vulnerability to backlash campaigns” against science altogether (Lahsen, 2013). Using science for research or policy decisions requires us to take the long road and delve into how scientific assertions are made, including the rhetoric that scientists mobilize. The goal in doing so it not to solve nor adjudicate the controversy at hand but rather to become skillful analysts of the way the stakeholders in a controversy build their position. Therefore, we are better equipped to play the role of science diplomats, hence contributing to better politics (Latour, 2004).

References


**Contributors**

**Angelica Camacho** is a Research Analyst and Evaluation Advisor working with the Canadian federal government. She has a bachelor’s degree in Psychology from McGill University and a master’s degree in Criminology from the University of Ottawa. Throughout her academic and professional career, she has worked on numerous research projects pertaining to a large range of subjects, most notably, intergroup relationships, interpersonal relationships, sociology of science, and most recently, cultural influences in research.

**Dominique Robert** is Associate Professor in the Department of Criminology at the University of Ottawa. Her research is inspired by science and technology studies and has been published in *Theoretical Criminology, Environmental Science and Policy* and *Deviance et Société*. She also co-edited *Actor-Network Theory and Crime Studies*. 
Explorations on Science and Technology (Ashgate, 2015) and co-wrote A Journey through Qualitative Research: From Design to Reporting (Sage, 2018).

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